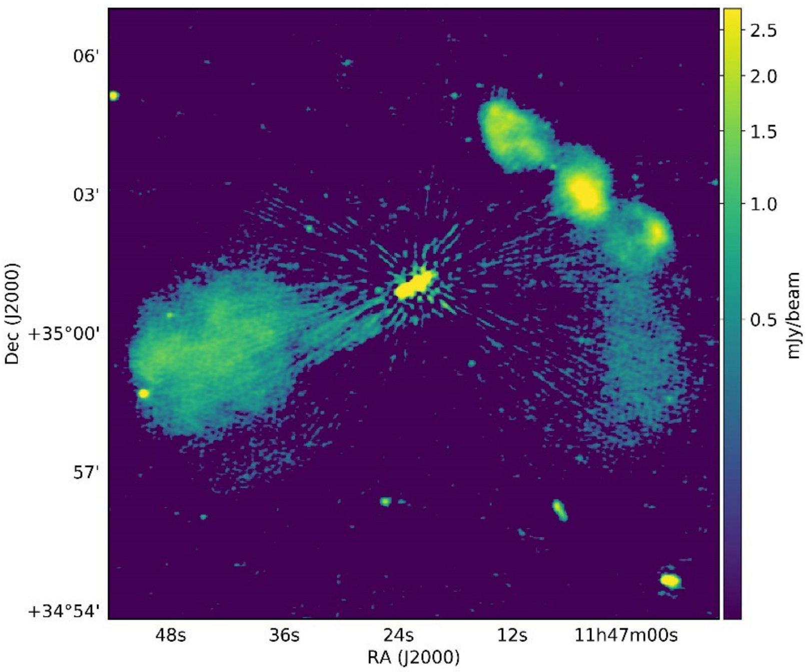
Dnr: SEE 2023-0089

Onsala Space Observatory

The Swedish National Infrastructure for Radio Astronomy

Annual Report 2022



LOFAR image of the radio galaxy NGC 315. From Shimwell et al.: The LOFAR Two-metre Sky Survey V. Second data release (Astronomy & Astrophysics 659, A1, 2022).

Onsala, 31st March 2023

John Conway
Director, Onsala Space Observatory

CHALMERS UNIVERSITY OF TECHNOLOGY | ONSALA SPACE OBSERVATORY

Contents

This report is divided into the following sections. The sections or subsections contain (where relevant) a reference to the corresponding modules defined in OSO's March 2017 infrastructure proposal to VR. A financial account and an operational report are provided separately to VR.

1 Operations

During 2022 Onsala Space Observatory (OSO) operated the following facilities:

- The Onsala 20 m telescope for astronomical Very Long Baseline Interferometry (VLBI), geodetic VLBI and single-dish astronomy
- The Onsala 25 m telescope for astronomical VLBI
- The Onsala LOFAR station as part of the International LOFAR Telescope (ILT) and in stand-alone mode
- The Atacama Pathfinder Experiment telescope (APEX) used for mm wave single-dish astronomy and mm-VLBI
- The Nordic ARC node (the Atacama Large Millimeter/sub-millimeter Array Regional Centre node for the Nordic, and Baltic, countries)
- The Onsala Twin Telescope (OTT) for geodetic VLBI
- The Onsala gravimeter laboratory for absolute and relative gravimetry
- The Onsala GNSS stations
- The tide gauges at Onsala
- A water vapour radiometer (WVR) to support space geodesy
- The Onsala aeronomy station for observations of H_2O, CO, and O_3 in the middle atmosphere
- The Onsala seismometer station
- The Onsala time & frequency laboratory

Operations using the above facilities are described in more detail below under Telescopes (Sect. 1.1), Nordic ARC node (Sect. 1.2), and Geophysical instruments (Sect. 1.3), resp.

1.1 Telescopes

[Modules 3, 4 and 5]

Below we describe the activities of the Onsala telescopes during 2022.

Onsala 20 m telescope: The 20 m telescope was used according to expected plans during 2022. It participated in 39 geodetic 24-hour campaigns, 8 astronomical single-dish projects, 5 extended astronomical VLBI sessions (plus three short out-of-session campaigns), 10 24-hours astronomical eVLBI sessions, several extended geodetic test runs in synchronisation with the Onsala Twin Telescopes, and 2 teaching/outreach observations. Maintenance activities in the form of minor upgrades and repairs, as well as technical on-sky observations, were at normal levels. Upgrades included a new protection from potential radar damage to the SIS receiver by automatically blocking the optical path and moving the telescope far from the line of sight to the transmitter source (a low earth orbit satellite), based on official announcements of predicted overhead passes. Also, the elevation helical gearboxes were serviced as a result of the trouble shooting process for the tracking problems described in Onsala Activity Report 2021.

Onsala 25 m telescope: The Onsala 25 m telescope was used for astronomical VLBI as planned without any major problems during the year.

Figure 1.1. *The the 25 m telescope in Onsala. Credit: Magnus Thomasson*

Onsala Twin Telescope (OTT): In 2022, The OTT was used for 44 VGOS sessions of 24 h duration and 89 VGOS sessions of 1 h duration. See Sect. 1.3 for details.

APEX: Swedish APEX observations, during 2022, were conducted on 31 days, organized mainly in three major observing runs in April, July, and October. To perform service mode observations, OSO normally sends an observing team to Chile for every run. In 2022 travelling to Chile was again possible despite some pandemic restrictions, and the service observations were performed by Swedish astronomers at APEX with the aid of remote support from Sweden and the local APEX staff members.

LOFAR: The Onsala LOFAR station operates in two main modes: International LOFAR Telescope (ILT) mode and Local mode. In ILT mode, the station is controlled centrally by ASTRON in the Netherlands. In Local mode the station is controlled by OSO; this observing time is partially allocated via an Onsala open Call-for-Proposals basis and partially via ILT Call-for-Proposals that run in Local mode. In both cases the Local mode time is devoted to pulsar research with some exceptions, e.g., a short meteor shower observation in August 2022.

VLBI: Very Long Baseline Interferometry observations were conducted using the Onsala 25 m and 20 m telescopes, and OTT (Onsala Twin Telescope) as part of international networks of telescopes for astronomy and geodesy. The astronomical VLBI observations were scheduled based on recommendations from time allocation committees [for the 20 m and 25 m telescopes theses TACs are the European VLBI Network TAC and the Global Millimetre VLBI Array (GMVA) TAC]. Geodetic VLBI observations using Onsala telescopes (20 m and OTT) were scheduled by the International VLBI Service (IVS).

The usage of the above telescopes was distributed in the following way:

– The Onsala 20 m telescope:	17 days of astronomical VLBI 39 days of geodetic VLBI (for details, see Sect. 1.3) 130 days of single-dish astronomy
– The Onsala 25 m telescope:	69 days of regular astronomical VLBI (in addition, observations were carried out on 98 days for the VLBI-campaign PRECISE and magnetar monitoring, see Sect. 4.3)
– The Onsala Twin Telescope:	44 + 89 sessions of geodetic VLBI (for details, see Sect. 1.3)
– The APEX telescope:	31 days of single-dish astronomy on Swedish time
– The LOFAR station:	271 days ILT, 94 days Local, out of 365 days observing (74 % ILT, 26 % Local)

Note that time for "normal" technical service, pointing, etc. are not included in the above figures. These service activities amounted to about 16 and 12 days on the 20 m and 25 m telescopes, respectively.

1.2 Nordic ARC node

[Module 2]

After recovering from the COVID-19 pandemic period, ALMA returned to full operations in Cycle 8 2021, which started on 1 October 2021 and finished in 30 September 2022 and was executed without any major deviations from the original cycle plans.

In spring of 2022, the ALMA Cycle 9 Call for Proposals took place. It was the second time the review process of regular proposals was perfomed in a Distributed Peer-Review mode. Out of 461 submitted proposals in the Nordic countries (Sweden 210; Denmark 195; Finland 37; Norway 19), 159 projects were accepted. The oversubscription rate remains the highest in Europe (39% of all proposals had a European PI). Observations of Cycle 9 projects successfully started on 1 October but, due to a cyber-attack on 29 October operations of ALMA halted completely. Observations could only resume right before Christmas. Due to the cyber-attack, more than two months of the cycle were lost affecting the observations planned in the most compact configurations of the array (C-1 and C-2). Those configurations will not be visited in Cycle 9.

Locally at the Nordic ALMA Regional Center (ARC) node, in 2022 we provided support to our ALMA user community and to telescope operations. Our most direct form of support are Face-to-Face visits and community events. In 2022 the node carried out 12 Face-to-Face in-person visits for researchers in Sweden, and 2 remote support cases of non-locals. We also supported 7 researchers in proposal preparation (including PIs of Large Programs). Besides that, the National Facility Computing Infrastructure provided computing resources to 8 Nordic PIs to work on ALMA projects.

The Nordic ARC node contributed significantly to telescope operations. In 2022 staff were Contact Scientists of a total of 33 Cycle 9 ALMA projects. We also carried out the Quality Assurance of 65 observations, including specialized manual data reduction for 5 full polarization observations (which are not automatically reduced by the ALMA Science Pipeline yet). In that respect, the node staff is key to the data reduction of full polarization projects in Europe. Staff also participated in a training week at the ESO headquarters in Garching on the topic of the Quality Assurance of ALMA full polarization data and contributed to the yearly testing of the ALMA Observing Tool. Nordic ARC node staff in collaboration with Allegro (the ARC node in the Netherlands) and the Joint ALMA Observatory in Chile are the developers of a reporting system that facilitates to the ALMA Contact Scientists the tracking of the projects they support during the cycle. In 2022 the reporting system was released as a stable version and made available to contact scientists in all the ALMA Regional Centers. Relevant to the coordination of operations and user support in Europe are the yearly European ARC Network All-hands meeting, in which all ARC members in Europe participate (Kreuth, 17–20 October 2022).

After the long period of remote interactions in the pandemic, the node organized a series of events to serve the community, maintaining remote availability and revamping interactions in person whenever possible. Three online events were hosted on the subject of Proposal Preparation for ALMA Cycle 9. Staff was also in the scientific/local organizing committes of the first Meeting of ALMA Young Astronomers (MAYA 2022 conference, March 2022), the European Radio Interferometry School (Dwingeloo, 19–23 September 2022), the first ALMA Archive Schoool (Bologna, 5–7 October 2021) and the Swedish astronomical meeting Astronomdagarna 2022 (Göteborg, 6–8 October 2022). In the latter, special representation of the Nordic ARC node was organized to reach out to the Swedish community of astronomers. Node staff was also present at the EAS 2022 conference (Valencia, 27 June – 1 July 2022), which included a Symposium and a Lunch Session organized by ARC node staff (Symposium S7 - Building bridges: The lifecycle of dust and gas in the Milky Way with ALMA and SKA and Lunch Session LS6 - ALMA in Europe: support by the European ALMA Regional Centre Network and new ways of interacting with data through the ALMA Science Archive). In June 2022, the node hosted a one-day local event at the Onsala Space Observatory. The event congregated astronomers and receiver developers working with ALMA to present the future developments of the telescope that will take place under the ALMA2030 Wide-Sensitivity Upgrade and discuss the needs of the user community in Sweden in preparations for this future challenge.

Other activities directed at users were carried out at the European ARC Network level: the continuation of the series of online trainings events I-TRAIN with the European ARC Network with 6 new trainings in 2022 (staff contributed the main coordination of the series and were tutors and active hosts in 2 of the tutorials), and the European ARC Network social media (staff in charge of its Facebook site). In the Nordic ARC node region, we maintained our main channel of online communication: we provided relevant news on ALMA to our users through the mailing list (with almost 90 subscribers). Staff also participated in the European ARC Network Visibility Working group, which aims at improving the visibility of the network and its activities among ALMA users in Europe.

The node activities also encompass advanced products and software tools for ALMA users. Extra imaging products were generated for all ALMA projects observed in full polarization as part of the European ARC Network project *High-level Data Products*. The new polarisation products were ready for ingestion into the ALMA Science Archive. However, due to several factors, including the cyber-attack that the observatory suffered at the end of 2022, the ingestion of the products was delayed to 2023. These products will be available as supplementary products in the ALMA Science Archive by Spring 2023.

The node hosts and maintains the software tool UVMultiFit. A total of 9 users received support in using that tool, which was cited in 12 publications in 2022. Efforts to migrate the tool UVMultiFit to a CASA 6, Python 3 based, environment continued, focusing on making the code easier to maintain and test. By breaking up the original, monolithic code base into several classes, the code was restructured in order to comply with modern practices and packaging recommendations. This should facilitate any future additions to the functionality of the tool.

The Nordic ARC contributed with dedicated FTE in 2022 to the ESO ALMA Development Study *"High-Cadence Imaging of the Sun"* (PI: S. Wedemeyer & Toribio). The study explores the potential of sub-second ALMA observations of the Sun and in particular the challenges for the interferometric imaging techniques. The support will continue until the completion of the study (its final review is scheduled in spring 2023).

1.3 Geophysical instruments

[Module 6]

Geodetic VLBI:

The geodetic VLBI observing sessions 2022, using the 20 m telescope with its S/X receiver system, were 24 h long and included regular IVS sessions in the R1-, RD-, RV-, T2-series. In total 39 sessions in the IVS program were observed during 2022. The cancellation of eight originally planned sessions was due to the co-observing rules introduced after the Russian invasion war against Ukraine. All sessions were recorded with the DBBC2 in vdif-format on the FlexBuff recorder for geodetic VLBI. These data were then e-transferred to the respective correlator.

The Onsala twin telescopes (OTT) were used for 44 international broadband VGOS operational (VO) sessions of 24 h duration each, and 89 VGOS sessions of 1 h duration (B2/C2/V2). During most of these sessions both OE and OW were used in parallel and all data were recorded with the corresponding DBBC3 backends in vdif-format on dedicated FlexBuff recorders. While the international VO-sessions were observed in networks of up to 9 VGOS partner stations in total, the B2/C2-sessions were observed together on one baseline with station Ishioka (Japan), and the V2-sessions with Kokee Park (Hawaii, USA).

The VO-sessions were correlated at the correlators at MIT/Haystack (USA), USNO Washington (USA), MPIfR Bonn (Germany), Technical University Vienna (Austria), and Shanghai Astronomical Observatory (China). The B2/C2-sessions were correlated at the Tsukuba correlator (Japan) and the V2-sessions at USNO Washington (USA). The goal of the VGOS 1 h Intensive sessions is to determine UT1-UTC parallel to simultaneously observed IVS-Intensive sessions with legacy S/X systems and to test the limits of VGOS slewing and recording modes.

Additionally, during 2022 nine local interferometry sessions were observed using the On-Oe-Ow cluster, with the goal to connect the twin telescopes to the 20 m telescope. These so-called ONTIE-sessions were all planned, scheduled, observed, correlated, fringe-fitted, and analysed at Onsala. Unfortunately, one of these nine sessions did not result in a useful database for analysis.

For the other geoscience facilities, the activities are summarised as follows:

GNSS stations:
OSO's primary GNSS station, called ONSA, has operated continuously during 2022. This is a station in the SWEPOS network operated by Lantmäteriet, the Swedish mapping, cadastral and land registration authority. ONSA is also one of the fundamental reference sites used in the global IGS network, as well as in the European EUREF network. An additional station, ONS1, has also delivered data continuously the same networks network. In addition to ONSA and ONS1, the six GNSS stations close to the Onsala twin telescopes were all running continuously during the year. For these six GNSS stations, the receiver type was exchanged on 23 February 2023 to a more modern receiver of type Trimble NetR9. The reason for replacing the receivers was that we found that the Javad Sigma receivers were generating and transmitting signals that interfered with other equipment and observations at the observatory. The Trimble NetR9 receiver model is also a more modern receiver tracking all GNSS. For one of the six stations, OTT1, the antenna was changed to a Leica AR20 on 30 August 2022. Already in 2021, the antennas of the other five stations had been exchanged to the same antenna type. The reason for the exchange of the antenna was to install individually calibrated antennas including antenna radomes for all GNSS stations at OSO. The antenna calibrations were carried out at GEO++.

Gravimeter laboratory:
The main purpose of the gravimeter laboratory at Onsala is to maintain a gravity reference and calibration facility co-located with space geodetic techniques. The facility is one component of the Fundamental Geodetic Station. The laboratory is furnished with platforms for visiting absolute gravimeters (AGs), which happens on average one to three times per year. The laboratories primary instrument is a superconducting gravimeter (SG, model GWR 054). In international context the instrument is called OSG054 and has been operated continuously with very few breaks in recording (less than 10 days) since its installation in June 2009. The one-minute sampled gravity data are uploaded monthly to the International Geodynamics and Earth Tide Service (IGETS) servers and contribute to the global SG data base, together with 41 other SG around the world. In 2022, we hosted the NKG absolute gravimeter intercomparison at Onsala. Comparing absolute gravimeters is necessary to assess the accuracy of these instruments. The comparison was arranged as an additional comparison according to the CCM-IAG strategy for Metrology in absolute gravimetry. To guarantee traceability to the SI, its results will be linked to the International and European key comparisons (CCM.G-K2.2017 and EURAMET.M.G-K3) through joint participants. The gravimeter intercomparison was held during 7 weeks between May and July in 2022. In total 15 different instruments participated, of which 5 were from the NKG countries. Both ballistic (FG5X, FG5, A10) and quantum (AQG) absolute gravimeters participated in the intercomparison. The Onsala SG continuously kept track of local gravity variations, especially due to hydrological effects. It allows to properly compare all absolute gravity measurements across the 7 weeks duration of the intercomparison.

Since 2022, the SG also has its own DOI, which should be cited when its data (available through the IGETS portal) are used. The DOI page is available here: https://dataservices.gfz-potsdam.de/igets/showshort.php?id=280b90c6-27ae-11ed-88a2-c7c587541054. More and more journals encouraged/require authors to include data citations as part of their reference list. This should help to enhance the visibility of our SG data and to monitor their usage.

The SG had some power issues that tend to trigger spikes into the data in October and December 2022. This was due to an excessive power load applied to the continuous self-levelling system of the device. Under the guidance of the supplier GWR, we adjusted the tilts of the gravimeter to reduce that load. Spikes stopped occurring after that.

Tide gauges:
The Onsala tide gauge station ran uninterrupted for the entire year, excluding the yearly cleaning of the well causing a data gap of less than 3 hours on 10 August. The sea level observations are available in real time from the official web site of national sea level data operated by the Swedish Meteorological and Hydrological Institute (SMHI). Onsala's other GNSS-based tide gauge was also operated continually over the year proving observations with a sampling rate of 1 Hz. Data are stored in Receiver Independent Exchange Format (RINEX) format and include multi-GNSS (i.e., GPS, GLONASS, Galileo, Beidou) code- and carrier-phase observations as well as signal-to-noise ratio (SNR) measurements.

Figure 1.2. *The GNSS-based tide gauge in Onsala. Credit: Magnus Thomasson*

Water Vapour Radiometers:
The water vapour radiometer Konrad measures the sky brightness temperatures at 20.7 GHz and 31.4 GHz from which the radio wave propagation delay due to water vapour in the atmosphere can be inferred. During 2022 Konrad was operating more or less continuously from 12 January to the end of the year. There were just a few data gaps due to computer failure, internet failure, and human interference, in total a few days. The largest loss of data is due to rain, or very heavy clouds, in the observed volume of air, which causes the retrieval algorithm to suffer from large uncertainties.

Aeronomy station:
The aeronomy station consists of two radiometers: 1) The single sideband H_2O system (water vapour) that measures the sky brightness temperature at 22 GHz, and 2) the double sideband CO/O_3 system (carbon monoxide and ozone) that measures the sky brightness temperatures at 111 and 115 GHz. Spectra from both radiometer systems are used to retrieve vertical profiles of the observed molecules in the middle atmosphere. During 2022 both radiometers operated without problems, which means that we have about 340 days of collected H_2O and CO/O_3 measurements.

Figure 1.3. *The water vapour radiometer Konrad, with the radome enclosing the 20 m telescope in the background. Credit: Magnus Thomasson*

Seismometer station:
OSO hosts a seismograph station in the Swedish National Seismic Network (SNSN) led by Uppsala University. We have data access to the local seismometer and keep a continuous archive of its recordings. The station's waveform files are used in delay calibration of the superconducting gravimeter and for noise reduction in absolute gravity measurements.

Time and frequency laboratory:
The time and frequency laboratory hosts the hydrogen maser, necessary for VLBI observations, but which also contributes to the universal atomic time. OSO also collaborates with RISE (Research Institutes of Sweden) on a Swedish time-keeping system. RISE owns a second hydrogen maser and a cesium clock that are installed at Onsala. These instruments are used for comparison measurements and provide redundancy of accurate reference time (and frequency) for the VLBI observations (both astronomy and geodesy) at the observatory. Since both instruments are getting old, there is a need to purchase a new hyrdogen maser rather soon.

InSAR reflectors:
Two corner reflectors for Interferometric synthetic aperture radar (InSAR), provided to us by Lantmäteriet, were permanently installed on bedrock at the observatory. During 2022 the coordinates of the InSAR reflectors were determiend in the local survey network at OSO.

2 Key numbers

2.1 Astronomy

[Modules 2, 3, 4, 5]

Detailed key numbers for the astronomy activities are given in tables at the end of this report and in a separate excel file. Here we give only a few comments, a summary of the publication statistics, and some key numbers for single-dish observations with the 20 m telescope.

Users of the astronomy research infrastructure

The ALMA user project/user statistics given at the end of this report and in the associated excel file are for Proposal Cycles 8 and 9; that is for observations in the period October 2021 – September 2022. In conjunction with the annual ALMA deadline the Nordic ARC node is very active in advertising the use of ALMA in Sweden and the Nordic countries and a significant number of Nordic/Swedish ALMA project proposals are generated by these Nordic ARC publicity efforts.

We note that for ALMA, APEX, astronomical VLBI, and LOFAR taken together, slightly less than one quarter of the Swedish users (individuals) were from other institutions than Chalmers. The Swedish non-Chalmers users were affiliated with Stockholm University, Royal Institute of Technology, Uppsala University, and Lund University.

About one quarter of the users in 2022 were women. There was only a small difference in success rate (fraction of applications for telescope time which are observed) between men and women.

Number of refereed scientific papers

The associated excel file gives a list for each instrument of *papers in refereed journals published in 2022* (see also the publication list at the end of this report). Conference publications are not included (except for a few technical publications). Below are given summary statistics of papers for each instrument/activity. For each instrument two figures are given; in most cases the first number is the total number of instrument-related publications while the second is the number of publications with at least one Swedish author. In contrast for ALMA the first number is the number of papers with at least one Nordic author.

The Nordic ARC provides standard support for all projects with Nordic PIs, and further dedicated support upon request. The level and type of Nordic ARC node support for each publication is described in the accompanying excel file. Alongside the raw numbers for ALMA publications below, on the same line, we give the total number of papers with at least one Nordic/Swedish author that have received dedicated Nordic ARC node support. The dominant reason the number of papers receiving Nordic ARC support is smaller than the total number of ALMA papers authored by Nordic/Swedish scientists is that ~75 %/60 % of those publications used ALMA data from projects that were not led by Nordic PIs, and therefore received support from other ALMA Regional Centers.

For APEX, publications based on all partners' observing time are counted because OSO contributed to the full APEX operations costs and because Swedish receivers are used by all partners. The numbers for astronomical VLBI include observations with EVN, GMVA, EHT and users of JIVE. Publications by OSO staff on technical R&D are also presented. A publication list is found at the end of this report.

• ALMA	106/43, Nordic ARC node dedicated support 28/16	*(Nordic/Swedish)*
• APEX	76/17	*(total/Swedish)*
• Astronomical VLBI	51/24	*(total/Swedish)*
• LOFAR	119/12	*(total/Swedish)*
• 20 m telescope, single-dish	7/4	*(total/Swedish)*
• Technical publ. by OSO staff	13	

In addition, in 2022 there was one publication using astronomical data from the satellite *Odin* (now operating mainly in aeronomy mode), and two publications using data from the Swedish-ESO Submillimetre Telescope *SEST* (closed in 2003).

Onsala 20 m telescope, single-dish observations
Single-dish observations with the 20 m telescope in Onsala are not supported by VR (but by Chalmers funding) and key numbers for them are therefore not given in the tables at the end of this report. We note that in 2022, proposals for 8 projects were observed. There were 4 female and 9 male users on the observed projects. Of these, 7 were Swedish (6 of them from Chalmers).

2.2 Geosciences

[Module 6]

Users of the geoscience research infrastructure
The OSO geoscience instruments, including the geodetic VLBI observations as the major activity, do not have individual scientific users who apply for observing time. Rather the geoscience instruments make long-term measurements of Earth parameters – which are thereafter stored in international databases with open access. Since these databases are open access, it is impossible for us to acquire detailed insight in the user groups in terms of which universities or other organisations they belong to and the gender distribution of the users. The data and derived products such as station positions, Earth's orientation/rotation rate and gravity field are then used both by the global geophysics community for scientific purposes and by civil society for a variety of practical applications including supporting accurate geo-location services and monitoring of global change. As far as we know, all use of the data for scientific purposes was within the subject area *105 Earth and Related Environmental Sciences.*

Number of refereed scientific papers
We have identified 5 papers with one or more Swedish authors and 22 papers with non-Swedish authors published during 2022 where the use of data or services from OSO are specifically stated. In addition, there are significantly more papers making use of OSO data products, especially those using GNSS reference data from OSO via IGS/EUREF, that cannot be identified because the inclusion of the OSO station is not explicitly mentioned. It is also likely that there are papers published that we simply are not aware of. A publication list is found at the end of this report. We are not aware of any patents originating directly from our geoscience activities. No user has been rejected to use OSO geoscience data. This is in any case not a readily computable statistic since as described above virtually all of the OSO geoscience data are automatically distributed via open data bases.

Data submissions
Geodesy VLBI:
The geodetic VLBI observations are carried out within the framework of the International VLBI Service for Geodesy and Astrometry (IVS), http://ivscc.gsfc.nasa.gov. In total 39 experiments,

each one with a length of 24 h and rather evenly spread over the year, were carried out during 2022 with the Onsala 20 m telescope. Additionally, we have been observing with the Onsala twin telescopes during several VGOS sessions; 44 international 24 h sessions and 89 one-baseline intensive sessions (1 h long).

Correlated VLBI observations are provided via the IVS data archives and are available free of charge. The IVS registers its data also under the umbrella of the World Data System (WDS), which is an Interdisciplinary Body of the International Council for Science (ICSU). Databases as well as products are supplied to users around the globe with minimum latency in order to guarantee that operation critical information, in particular Earth orientation parameters from VLBI observations, are available for satellite operators, space agencies, and other stakeholders. These databases are fundamental for many scientific disciplines with Geophysics. Given also that global navigation satellite systems like GPS and Galileo, would not be operable without the Earth orientation parameters provided from VLBI measurements, the true value chain and the number of users of products emerging from data collected at globally distributed VLBI sites, like Onsala, has significant economic value to society; given that everybody relying on GNSS positioning and navigation has in the end use of the data.

GNSS:

The two major GNSS reference stations at OSO, i.e. ONSA and ONS1, are nodal points for the Swedish permanent GNSS network, SWEPOS, hosted by Lantmäteriet. All data acquired continuously are openly distributed via the data archives of IGS https://webigs.ign.fr/gdc/en/, and EUREF http://www.epncb.oma.be/. These archives serve thousands of users every year. Additionally, GNSS data are recorded with six stations distributed around the Onsala twin telescopes, called OTT1 to OTT6 with data stored at Lantmäteriet. It should be noted that the need for using GNSS data from OSO is motivated by the fact that the stations are co-located with one of the most accurately determined VLBI stations world-wide. Therefore, indirectly also the VLBI data are used via the GNSS data from OSO. Many cases are found in the research community where GNSS data are used with OSO acting as a reference site in global, regional and local studies. A vast majority of the downloads, that occur from the international databases operated by IGS and EUREF, are by universities and research agencies for studies of, *e.g.*, plate tectonics, crustal deformation, space weather, sea level, climate, meteorological monitoring, *et cetera*. Thus, OSO provides both the national and international user communities with a robust and accurate link to the international reference frame. Also during 2022 the GNSS station OSOI has been operated and contributed to ESA's ionospheric monitor network.

Gravimeter Laboratory:

Gravimeter data with one-second samples and maximum with a two-minutes latency is publicly available, see http://holt.oso.chalmers.se/hgs/SCG/monitor-plot.html. The records are also submitted to the archive of IGETS (International Geodynamics and Earth Tide Service) at GeoForschungsZentrum (GFZ) Potsdam (Germany), on a monthly routine. OSO delivers 1-minute down-sampled data, raw and "corrected", i.e., cleaned from earthquake signatures. IGETS is a service under the auspices of the International Association of Geodesy (IAG). In 2022 we hosted the NKG absolute gravimeter intercomparison in Onsala. It was held during seven weeks between May and July in 2022. In total 15 different instruments participated. Since 2022, the SG also has its own DOI, which should be cited when its data (available through the IGETS portal) are used. The DOI page is available here: https://dataservices.gfz-potsdam.de/igets/showshort.php?id=280b90c6-27ae-11ed-88a2-c7c587541054.

Ocean tide loading service:
Since 2002, OSO provides a computing service for ocean tide loading effects in application to surface displacements and gravity (http://holt.oso.chalmers.se/loading). Being endorsed by the IERS, its main purpose is to provide consistent reduction of these effects to VLBI, GNSS and SLR analysis centres in their preparation of products that maintain the ITRF. Apart from this, the service's logbook hints at a large number of users peripheral or outside the ITRF community in their analysis of GNSS observations. Loading-induced displacements are computed from a range of global ocean tide maps, using 28 sources featuring 8 to 11 tide species each.

Tide gauges:
The data from the super tide gauge are transferred to SMHI in near-real time. These are available to the public through the SMHI web pages. In 2022 the Onsala tide gauge station ran uninterrupted for the entire year, excluding the yearly cleaning of the well causing a data gap of less than 3 hours on 10 August.

Aeronomy station:
During 2022 both radiometers operated without problems, which means that we have about 340 days of collected H_2O and CO/O_3 measurements. These data are being processed to be delivered to the Network for the Detection of Atmospheric Composition Change (NDACC; see http://www.ndsc.ncep.noaa.gov).

3 Selected scientific highlights

Below follows a list of scientific highlights selected to illustrate the different instruments and science areas covered by OSO. In the listed publications Swedish authors are shown underlined.

Astronomy

Especially highlighted in this section are papers from Swedish astronomers using OSO telescopes or receiving user support provided at OSO (via for instance by the Nordic ARC Node). In addition, some interesting international results that make use of OSO telescopes and/or instrumentation are listed.

3.1 ALMA
[Module 2]

CO line observations of OH/IR stars in the inner Galactic Bulge: Characteristics of stars at the tip of the AGB
Olofsson, H., Khouri, T., Sargent, B. A., Winnberg, A., Blommaert, J. A. D. L., Groenewegen, M. A. T., Muller, S., Kastner, J. H., Meixner, M., Otsuka, M., Patel, N., Ryde, N., Srinivasan, S.
Astronomy & Astrophysics, vol. 665, p. A82 (2022)

Summary: Hans Olofsson and colleagues observed a sample of 22 evolved stars toward the inner Galactic bulge using ALMA. Using CO lines and continuum, they measured essential properties of these stars, namely the mass-loss rates, wind velocity, $^{12}C/^{13}C$ isotopic ratios, and dust-to-gas ratios. Those parameters eventually govern the fate of evolved stars and are keys to our understanding of stellar evolution. The team performed consistency checks to classify the stars and make sure that they could be treated as an equidistant and homogeneous enough sample to be able to characterise the stellar population in the bulge. For example, some stars of the sample may have recently ceased mass loss and, hence, have begun to evolve beyond the Asymptotic Giant Branch. Despite short integrations of only few seconds to few minutes per target, all stars in the sample were successfully detected, demonstrating the capability of ALMA for follow-up studies on a much larger sample.

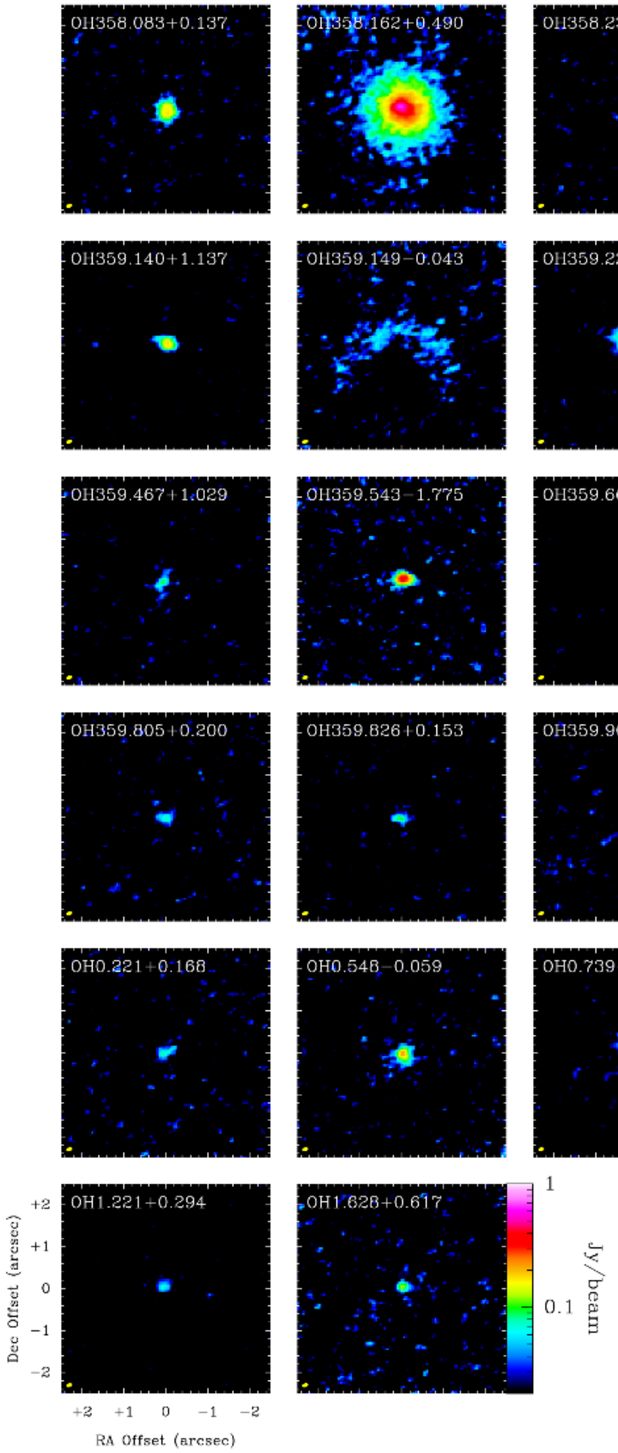


Figure 3.1. *$^{13}CO(J = 3–2)$ brightness distribution integrated over the line for a sample of OH/IR stars located in the inner Galactic bulge.*

First Images of the Molecular Gas around a Born-again Star Revealed by ALMA
Tafoya, D., Toala, J. A., Unnikrishnan, R., Vlemmings, W. H. T., Guerrero, M. A., Kimeswenger, S., van Hoof, P. A. M., Zapata, L. A., Trevino-Morales, S. P., Rodriguez-Gonzalez, J. B.
The Astrophysical Journal Letters, vol. 925, p. L4 (2022)

Summary: Born-again stars allow probing stellar evolution in human timescales and provide the most promising path for the formation of hydrogen-deficient post-asymptotic giant branch objects, but their cold and molecular components remain poorly explored. In this work the authors present high angular ALMA observations of V 605 Aql that unveil for the first time the spatio-kinematic distribution of the molecular material associated with a born-again star. Both the continuum and molecular line emission exhibit a clumpy ring-like structure. The clumpy ring-like morphology of the emission resembles the elliptical distribution of hydrogen-deficient clumps seen in the more evolved born-again planetary nebulae. The presence of high-density tracer molecules, such as HCN and HCO^+, suggests that the expanding molecular disk seen in V 605 Aql contains dense neutral regions. Thus, it is expected that, after ionization and erosion by the energetic radiation and fast winds from the central star, the molecular disk will turn into a disrupted ring like the ones seen in later stages of the born-again star evolution.

These results were featured in an ESO blog: https://www.eso.org/public/blog/a-star-is-born-again/.

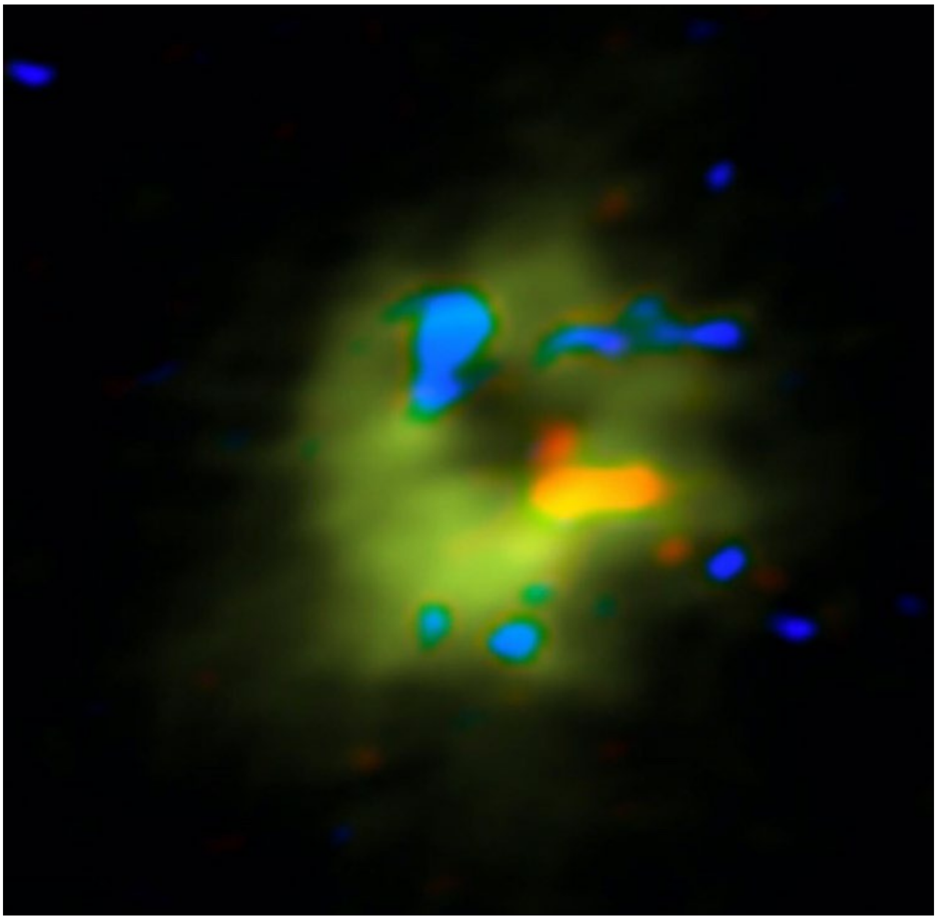


Figure 3.2. *ALMA observations of the molecular gas disc around V605 Aquilae. The blue and red structures at its center are two jets moving towards us (blue) and away from us (red), while the yellow-green indicates the rapidly expanding disc.*

3.2 APEX

[Module 3]

The APEX Large CO Heterodyne Orion Legacy Survey (ALCOHOLS). I. Survey overview
Stanke, T., Arce, H.G., Bally, J., Bergman, P., Carpenter, J., Davis, C.J., Dent, W., Di Francesco, J., Eislöffel, J., Froebrich, D., Ginsburg, A., Heyer, M., Johnstone, D., Mardones, D., McCaughrean, M.J., Megeath, S.T., Nakamura, F., Smith, M.D., Stutz, A., Tatematsu, K., Walker, C., Williams, J.P., Zinnecker, H., Swift, B.J., Kulesa, C., Peters, B., Duffy, B., Kloosterman, J., Yıldız, U.A., Pineda, J.L., De Breuck, C., and Klein, T.
Astronomy & Astrophysics, vol. 658, p. A178 (2022)

Summary: A 2.7 square degree CO(3-2) mapping survey covering main sites of star formation in the Orion molecular cloud complex. The mapping was made with the SuperCAM heterodyne 64-pixel array at APEX. Evidences for expanding bubbles and molecular outflows are seen.

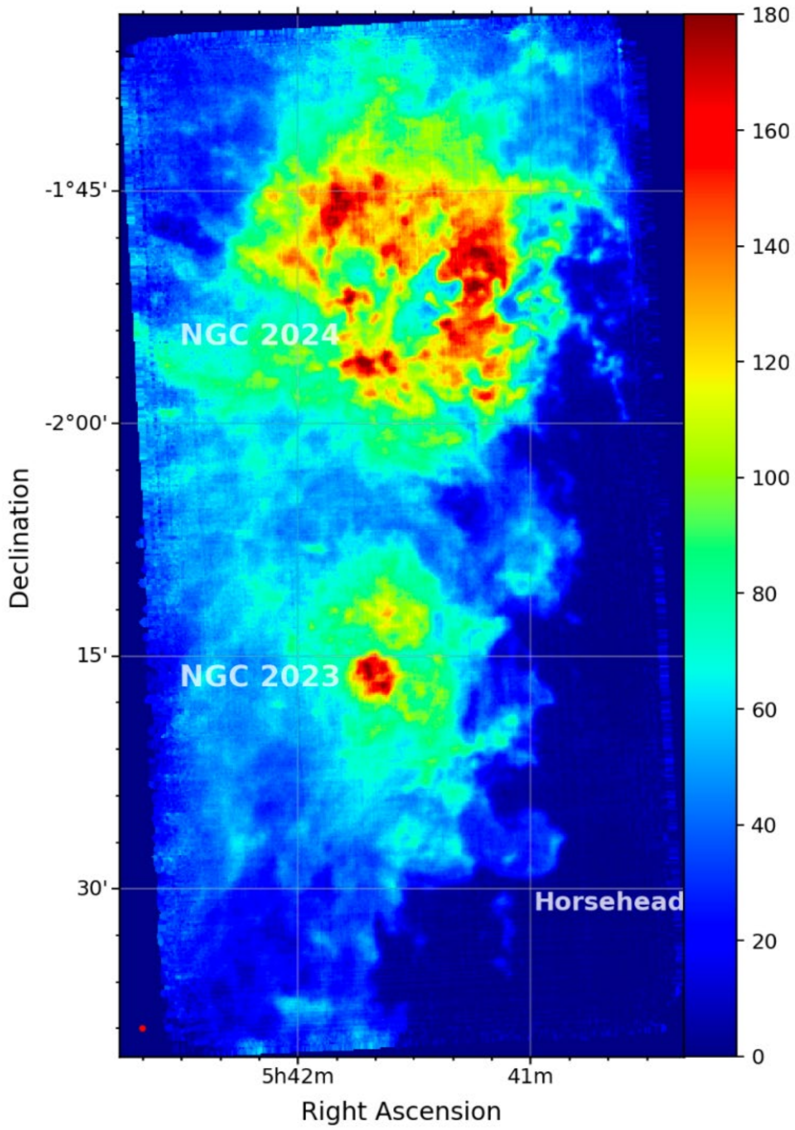


Figure 3.3. *The NGC 2023/2024 part of the SuperCAM CO(3-2) map. The beam size (19 arcsec) is indicated in the lower left corner as the red dot.*

APEX and NOEMA observations of H_2S in nearby luminous galaxies and the ULIRG Mrk 231. A possible relation between dense gas properties and molecular outflows
Sato, M.T., Aalto, S., Kohno, K., König, S., Harada, N., Viti, S., Izumi, T., Nishimura, Y., Gorski, M.
Astronomy & Astrophysics, vol. 660, p. A82 (2022)

Summary: The APEX SEPIA180 GHz receiver was used to study the molecule H_2S (the sulphur version of water) in several nearby luminous galaxies. The study was focussed on possible formation mechanism of H_2S molecules, and the authors did not find any connection with galactic-scale outflows. Instead, the authors suggest the elevated presence of H_2S could be due to harsh radiation (such as X-rays and cosmic rays) or smaller scale shocks.

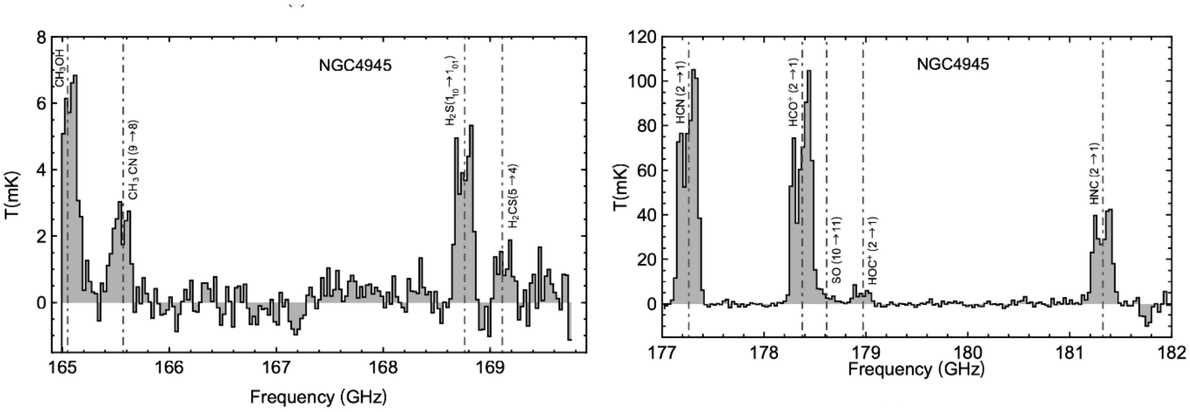


Figure 3.4. A spectrum showing several molecular lines toward the galaxy NGC4945 - a nearby luminous galaxy. The H_2S line is near 169 GHz. The spectrum was obtained with the SEPIA 180 GHz receiver at APEX.

Ionize Hard: Interstellar PO^+ Detection
Rivilla, V.M., García De La Concepción, J., Jiménez-Serra, I., Martín-Pintado, J., Colzi, L., Tercero, B., Megías, A., López-Gallifa, Á., Martínez-Henares, A., Massalkhi, S., Martín, S., Zeng, S., De Vicente, P., Rico-Villas, F., Requena-Torres, M.A., Cosentino, G.
Astronomy and Space Sciences, vol. 9, 829288 (2022)

Summary: The phosphorus monoxide ion lines were detected using the IRAM 30 m telescope toward the molecular cloud G0.693-0.027. The authors used APEX to provide additional information on related molecules in this source.

3.3 Astronomical VLBI

[Module 4]

First Sagittarius A* Event Horizon Telescope Results.
I. The Shadow of the Supermassive Black Hole in the Center of the Milky Way
Event Horizon Telescope Collaboration et al. (from Sweden: Ceccobello, C., Conway, J.E., Lindqvist, M.)
The Astrophysical Journal Letters, vol. 930, p. L12 (2022)

Summary: The Event Horizon Telescope (EHT) collaboration presented the first EHT observations of Sagittarius A* (Sgr A*), the Galactic Centre source associated with a supermassive black hole. The observations were conducted in 2017 using a global interferometric

array of 8 telescopes operating at a frequency of 230 GHz. A variety of imaging and modeling analyses all support an image that is dominated by a bright, thick ring with a diameter of ~52 μas (see Fig. 3.5). The ring has modest azimuthal brightness asymmetry and a comparatively dim interior. Using a large suite of numerical simulations, Event Horizon Telescope Collaboration et al. (2022) demonstrate that the EHT images of Sgr A* are consistent with the expected appearance of a Kerr black hole with mass of $4 \cdot 10^6$ M⊙. The results provide direct evidence for the presence of a supermassive black hole at the center of the Milky Way galaxy.

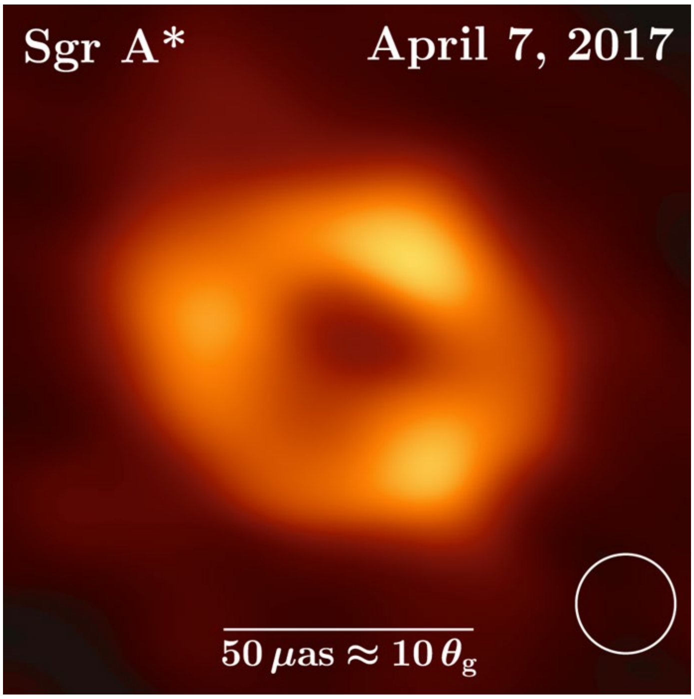


Figure 3.5. *EHT image of Sgr A* from the 7 April 2017 data. The inset circle shows the restoring beam used for CLEAN image reconstructions (20 μas FWHM).*

A repeating fast radio burst source in a globular cluster

Kirsten, F., Marcote, B., Nimmo, K., Hessels, J.W.T., Bhardwaj, M., Tendulkar, S.P., Keimpema, A., Yang, J., Snelders, M.P., Scholz, P., Pearlman, A.B., Law, C.J., Peters, W.M., Giroletti, M., Paragi, Z., Bassa, C., Hewitt, D.M., Bach, U., Bezrukovs, V., Burgay, M., Buttaccio, S.T., Conway, J.E., Corongiu, A., Feiler, R., Forssén, O., Gawroński, M.P., Karuppusamy, R., Kharinov, M.A., Lindqvist, M., Maccaferri, G., Melnikov, A., Ould-Boukattine, O.S., Possenti, A., Surcis, G., Wang, N., Yuan, J., Aggarwal, K., Anna-Thomas, R., Bower, G.C., Blaauw, R., Burke-Spolaor, S., Cassanelli, T., Clarke, T.E., Fonseca, E., Gaensler, B.M., Gopinath, A., Kaspi, V.M., Kassim, N., Lazio, T.J.W., Leung, C., Li, D.Z., Lin, H.H., Masui, K.W., Mckinven, R., Michilli, D., Mikhailov, A.G., Ng, C., Orbidans, A., Pen, U.L., Petroff, E., Rahman, M., Ransom, S.M., Shin, K., Smith, K.M., Stairs, I.H., and Vlemmings, W.

Nature, vol. 602, p. 585 (2022)

Summary: The vast majority of fast radio bursts (FRBs, extremely bright millisecond-duration radio-flashes of unknown extragalactic origin) have been seen only once, although some are known to repeat. A possible explanation invokes young neutron stars with strong magnetic fields (magnetars) as the source of the emission. Kirsten et al. (2022) reported observations that localized the repeating FRB 20200120E to a globular cluster associated with the spiral galaxy

M81, where it is 2 parsecs away from the optical centre of light of the globular cluster (see Fig. 3.6). Globular clusters host old stellar populations, challenging FRB models that invoke magnetars formed in a core-collapse supernova as FRB progenitors. They propose instead that if FRB 20200120E is a magnetar, it must have formed via exotic formation channels such as accretion-induced collapse of a white dwarf, or the merger of compact stars in a binary system. Alternative source models include old millisecond pulsars or low-mass X-ray binaries, all of which are found in abundance in globular clusters.

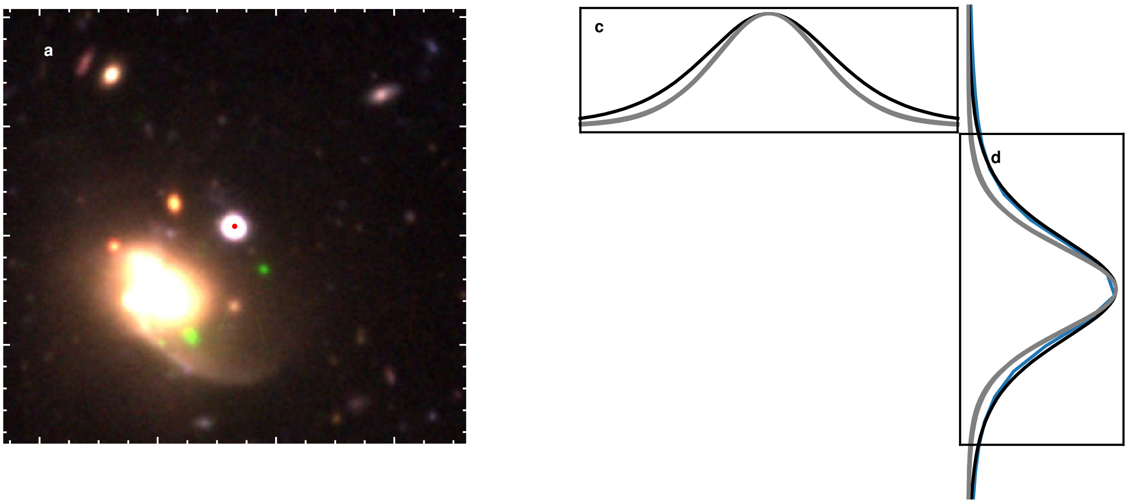


Figure 3.6. *From Kirsten et al. (2022), showing the localisation of FRB 20200120E (small red ellipse in both panels) and its surroundings as seen in optical images acquired with Hyper Suprime-cam. The right panel is a zoom-in on the position of the globular cluster, illustrating the offset of the FRB from the optical center of light (grey circle).*

Is there a sub-parsec-scale jet base in the nearby dwarf galaxy NGC 4395?

Yang, J., Yang, X., Wrobel, J.M., Paragi, Z., Gurvits, L.I., Ho, L.C., Nyland, K., Fan, L., Tafoya, D.

Monthly Notices of the Royal Astronomical Society, vol 514, p. 6215 (2022)

Summary: Faint dwarf galaxies are the most common type of galaxy in the Universe. Observing these nearby dwarf galaxies might provide some key clues for the early stage of the co-evolution of galaxies and massive black holes. The dwarf galaxy NGC 4395, at a distance of 4.3 Mpc, hosts a black hole with a very low mass, likely about 10^4 $M_{\odot}$. As a rarely-seen intermediate-mass black hole (IMBH), it also powers an active nucleus from X-ray to radio wavelengths. To probe its radio nucleus, Yang et al. (2022) performed milli-arcsecond-resolution observations and re-visited some already existing data. Figure 3.7 shows their multi-frequency and multi-resolution imaging results. There are two features, marked as E and C, in the low-resolution 15 GHz image. The central component C represents a thermal radio emission region associated with the central IMBH and is not seen in the high-resolution VLBI maps because of its low surface brightness. The more compact component E is detected in the high-resolution 1.4 GHz map and possibly tracks a relic plasma blob from the early ejection activity. This research provides an unprecedented view of the radio nucleus and present the strong evidence for the IMBH radio activity in NGC 4395.

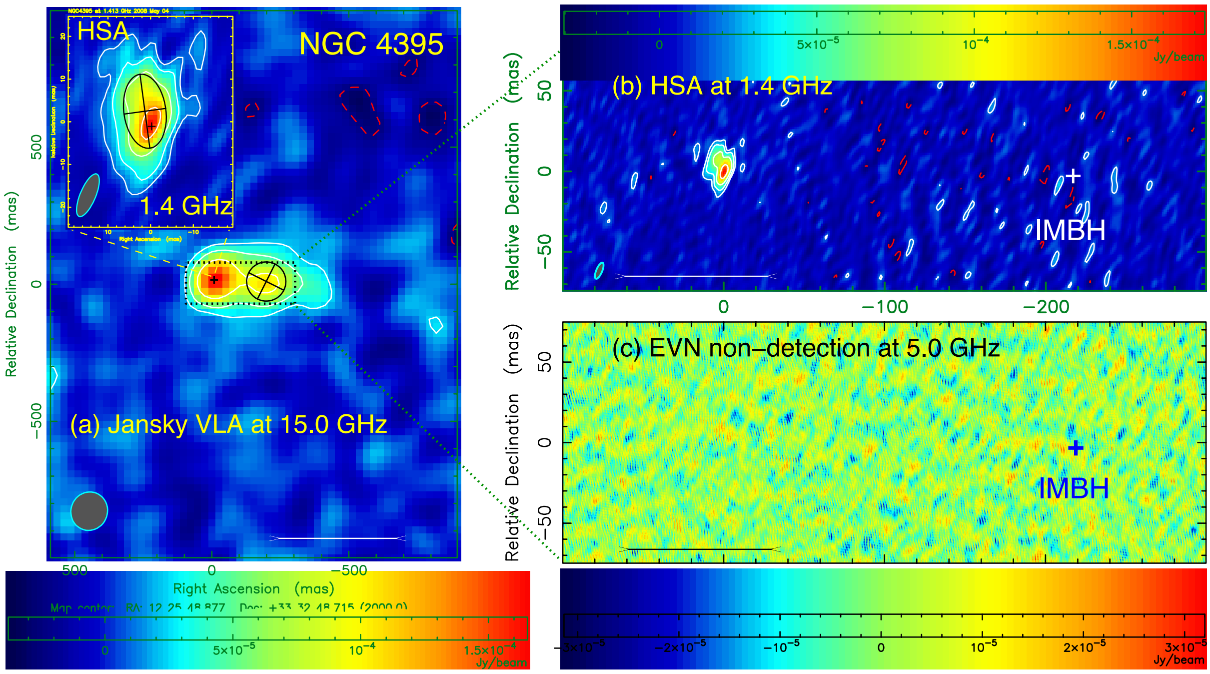


Figure 3.7. *The radio nucleus of the nearby dwarf galaxy NGC 4395. North is up and east is left. The involed radio facilities are the Jasnky VLA (Very Large Array), the HSA (High Sensitivity Array) and the EVN (European VLBI Network).*

3.4 LOFAR

[Module 5]

Magnetic field strength in cosmic web filaments

Carretti, E., Vacca, V., O'Sullivan, S.P., Heald, G.H., Horellou, C., Röttgering, H.J.A., Scaife, A.M.M., Shimwell, T.W., Shulevski, A., Stuardi, C., and Vernstrom, T.

Monthly Notices of the Royal Astronomical Society, vol. 512, p. 945 (2022)

Summary: This paper uses data from the LoTSS data release 2 at 144 MHz. The authors create a catalogue of rotation measures (RM) and polarization fractions, *p*. The evolution with redshift of the extragalactic RM is flat at 144 MHz, but, once redshift-corrected, it shows evolution at high significance, and also *p* evolves with redshift.

The LOFAR Two-metre Sky Survey - V. Second data release

Shimwell, T. W., et al. (from Sweden: Conway, J.E., C. Horellou, C.)

Astronomy & Astrphysics, vol. 659, p. A1 (2022)

Summary: LoTSS is an ongoing survey consisting of images in the 120–168 MHz frequency band using the LOFAR telescope. It currently covers 27% of the northern sky. This paper marks the 2nd data release. Some figure highlights from the survey are shown in Fig. 3.8.

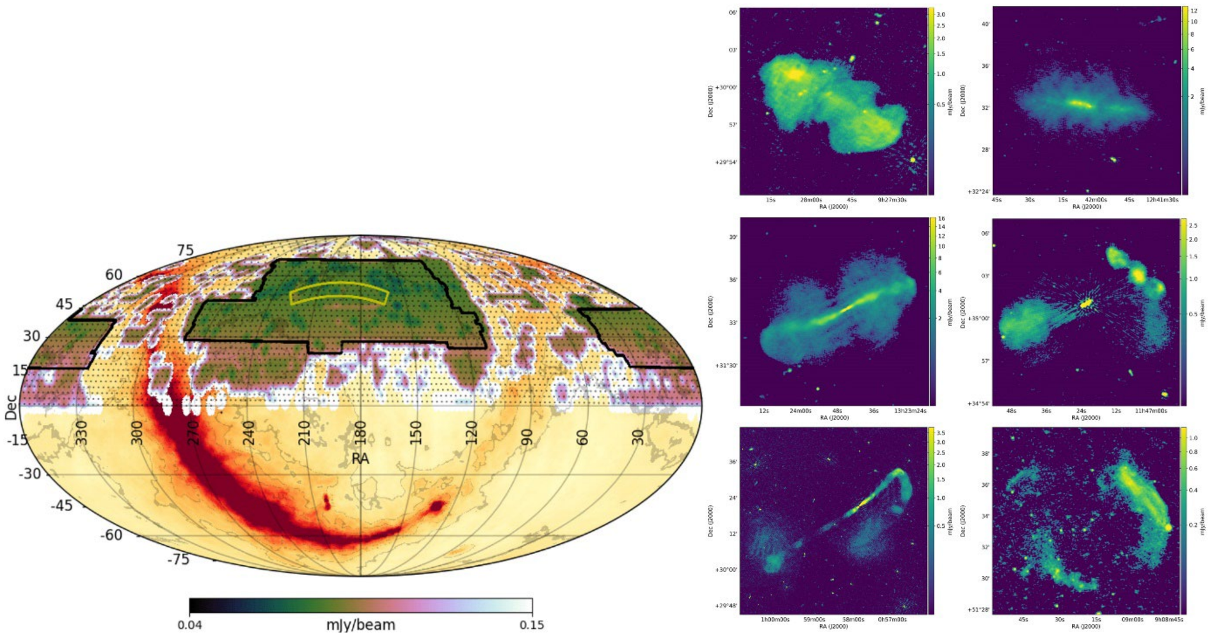


Figure 3.8. *Left: Status of the LoTSS observations as of April 2021 (yellow and black outlines show the LoTSS-DR1 and LoTSS-DR2 areas respectively). Right: LoTSS-DR2 images of a selection of highly resolved sources, including radio galaxies and cluster of galaxies.*

Nearby galaxies in the LOFAR Two-metre Sky Survey. I. Insights into the non-linearity of the radio-SFR relation

Heesen, V., Staffehl, M., Basu, A., Beck, R., Stein, M., Tabatabaei, F.S., Hardcastle, M.J., Chyży, K.T., Shimwell, T.W., Adebahr, B., Beswick, R., Bomans, D.J., Botteon, A., Brinks, E., Brüggen, M., Dettmar, R.-J., Drabent, A., de Gasperin, F., Gürkan, G., Heald, G.H., Horellou, C., Nikiel-Wroczynski, B., Paladino, R., Piotrowska, J., Röttgering, H.J.A., Smith, D.J.B., Tasse, C.

Astronomy & Astrophysics, vol. 664, p. A83 (2022)

Summary: This paper presents an analysis of a large sample of galaxy images from the LoTSS. In particular, spatially resolved radio spectral indices are presented that have a mean indicative of cosmic ray electrons (CRE), and these spectral indices are comparable to radio-star forming rates (SFR) derived from infra-red and Halpha measurements.

3.5 Onsala 20 m telescope single dish

Emission from HCN and CH_3OH in comets. Onsala 20-m observations and radiative transfer modelling

Bergman, P., Lerner, M.S., Olofsson, A.O.H., Wirström, E., Black, J.H., Bjerkeli, P., Parra, R., Torstensson, K.

Astronomy & Astrophysics, vol. 660, p. A118 (2022)

Summary: A new radiative transfer code was applied to a large sample of cometary observations of HCN and CH_3OH done with the 20 m telescope (see Fig. 3.9). The code takes into account the changing excitation conditions molecules released from the surface undergo until they reach the point of destruction/dissociation. This in turn improves the accuracy of production rate estimates.

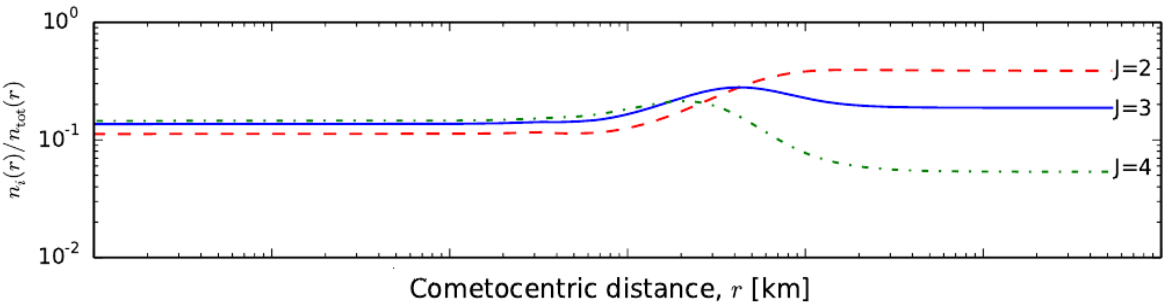


Figure 3.9. *Modelling of a 73P/Schwassmann-Wachmann fragment showing HCN level populations variations vs distance when various excitation mechanisms are accounted for. The logarithmic distance scale runs from 10^0 to 10^6 km.*

Multiple components in the molecular outflow of the red supergiant NML Cyg
Andrews, H., De Beck, E., Hirvonen, P.
Monthly Notices of the Royal Astronomical Society, vol. 510, p. 383 (2022)

Summary: The 3- and 4-mm receivers at the Onsala 20 m telescope were used to make spectral surveys of two massive post main sequence stars. This paper presents results for the Red Super Giant (RSG) NML Cyg. The data were consistent with a 3-component model with varying relative contributions from different molecular species and in general agreement with morphologies seen in maser and dust emission. The results also suggest that there could be different evolutionary paths in terms of the nature of mass loss rate for this type of stars.

Expanding shells around young clusters - S 171/Be 59
Gahm, G.F., Wilhelm, M.J.C., Persson, C.M., Djupvik, A.A., and Portegies Zwart, S.F.
Astronomy &Astrophysics, vol. 663, p. A111 (2022)

Summary: Onsala 20 m telescope ^{13}CO 1-0 data were used to delineate several shell structures in the nebula Sharpless 171 (surrounding the cluster Berkeley 59), which is an expanding HII region. One result from the modelling efforts based on these data is that massive shell structures are dragging behind cloudlets which obtained very high initial velocities.

3.6 Geosciences
[Module 6]

Broad band flux-density monitoring of radio sources with the Onsala twin telescopes
Varenius, E., Maio, F., Le Bail, K., Haas, R.
Experimental Astronomy, vol. 54, p. 137 (2022)

Summary: Ten bright radio sources were monitored repeatedly using the Onsala twin telescopes (OTT) as a standalone instrument. During seven months a total number of 71 short interferometric sessions were observed, correlated, and analysed. Seven potentially variable radio sources and three reference calibrators were included in this pilot study. A bright multi-frequency flare was observed in the radio source 0058+581, while OJ287 and 1156+295 showed significant long-term variability in their light curves. Empirically, the flux density uncertainty was determined to about 5 %.

Comparison of EOP and scale parameters estimated from the three simultaneous CONT17 VLBI observing networks
MacMillan, D.S.
Journal of Geodesy, vol. 96, p. 25 (2022)

Summary: The author analyses the latest continuous VLBI campaign, CONT17, observed during 15 days in 2017 with two different legacy S/X VLBI. The differences between the Earth Orientation Parameters (EOPs) and scale parameters estimated from the simultaneous observing sessions of the three networks are compared, as well to corresponding results derived from Global Navigation Satellite System (GNSS) observations. Using the so-called three corner hat method the precisions of the derived polar motion values is determined to be between 20 and 40 microarcseconds. The session scale parameter precision of the legacy S/X VLBI networks is between 0.30 and 0.45 ppm.

Detection of a New Large Free Core Nutation Phase Jump
Z. Malkin, S. Belda, S. Modiri
Sensors, vol. 22(16), p. 5960 (2022)

Summary: The authors analysed free core nutation (FCN) models based on the global geodetic VLBI data set and detected a phase jump of the FCN in the period 2021/2022. The detected phase jump is the second one detected in more than 30 years and 1.5 times larger than a previous phase jump in 1999/2000. It is suggested that the 2021/2022 phase jump it is connected to a recent geomagnetic jerk that started in 2020.

3.7 Device physics and Terahertz technology

[Module 8]

SEPIA345: A 345 GHz dual polarization heterodyne receiver channel for SEPIA at the APEX telescopes
Meledin, D., Lapkin, I., Fredrixon, M., Sundin, E., Ferm, S.-E., Pavolotsky, A., Strandberg, M., Desmaris, V., López, C., Bergman, P., Olberg, M., Conway, J., Torstensson, K., Durán, C., Montenegro-Montes, F.M., De Breuck, C., and Belitsky, V.
Astronomy and astrophysics, vol. 668, p. A2 (2022)

Summary: This paper describes the SEPIA345 heterodyne receiver channel installed at the Atacama Pathfinder EXperiment (APEX) telescope, including details of its configuration, characteristics, and test results on sky. SEPIA345 is designed and built to be a part of the Swedish ESO PI Instrument for the APEX telescope (SEPIA). This new receiver channel is suitable for very high-resolution spectroscopy and covers the frequency range 272–376 GHz. It utilizes a dual polarization sideband separating (2SB) receiver architecture, employing superconductor-isolator-superconductor mixers (SIS), and provides an intermediate frequency (IF) band of 4–12 GHz for each sideband and polarization, thus covering a total instantaneous IF bandwidth of $4 \times 8 = 32$ GHz.

The paper provides a description of the new receiver in terms of its hardware design, performance, and commissioning results. Even though the receiver was installed in 2020 at the beginning of the pandemic, it has only been fully commissioned in 2022 and thus is now available for observation. The receiver features an ALMA compatible cartridge layout (see Fig. 3.10) and an integrated IF circuitry enabling the delivery of 12 GHz IF per sideband per polarization. The noise performance of the receivers and typical sideband separation ration are illustrated in Fig. 3.11 and Fig. 3.12 below.

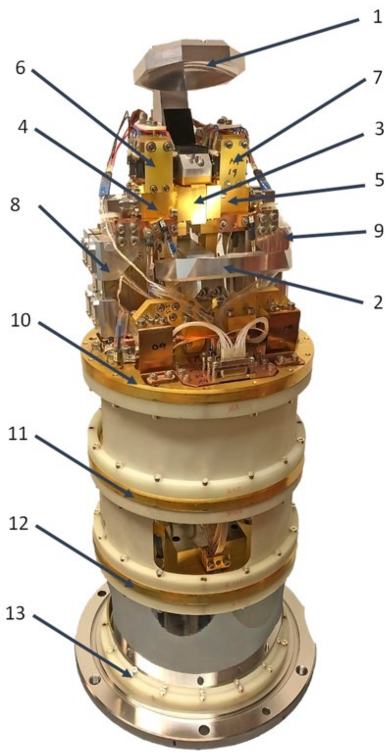
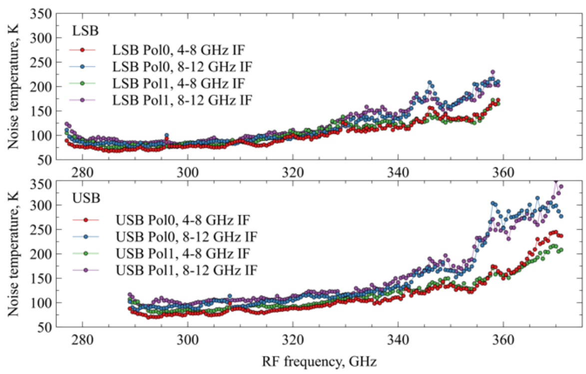


Figure 3.10. *SEPIA345 CCA layout. The following components are marked: 1 – the first cold mirror; 2 – the second cold mirror; 3 – the OMT; 4 – the 2SB mixer block at Pol0; 5 – the 2SB mixer block at Pol1; 6 – the magnetic coil assembly at Pol0; 7 – the magnetic coil assembly at Pol1; 8 – the LSB and USB IF assemblies at Pol0; 9 – the LSB and USB IF assemblies at Pol1; 10 – the 4K plate; 11 – the 15K plate; 12 – the 110 K plate; 13 – the room temperature plate.*



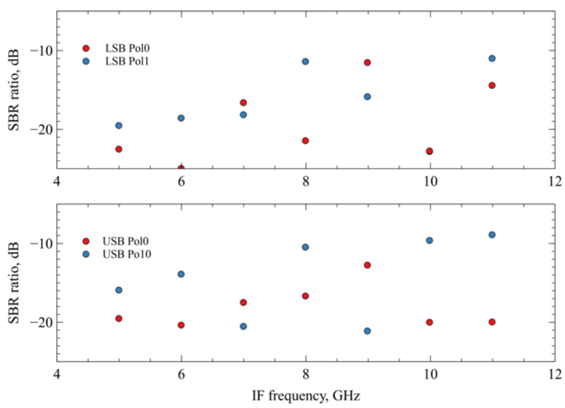


Figure 3.11. *SSB receiver noise temperature measurements performed for each polarization and sideband over the entire RF band averaged over each 4.0 GHz-wide FFTS IF sub-band. The temperature in the higher IF section (8–12 GHz) is illustrated with blue (Pol0) and violet circles (Pol1). The results in the inner segment (4–8 GHz) are shown with red (Pol0) and green circles (Pol1).*

Figure 3.12. *Estimated SBRR over the 4–12 GHz IF at every 1 GHz, as determined by observations of the CO J = 3 → 2 line toward WB 947 in the LSB (top) and in the USB (bottom).*

4 Instrument upgrades and technical R&D

4.1 ALMA

[Modules 2 & 8]

Within the frame of the ALMA Band 2 Development and pre-production project, where GARD owns the role of the cold cartridge designer in this prestigious international project with partner institutions from the Netherlands (NOVA, Groningen), and Italy (INAF, Palermo), GARD completed in 2022 the design of two cartridge receivers and produced most of the unique and dedicated hardware in its own workshop. In the fall of 2022, the two prototype ALMA Band 2 cold cartridge receivers have been assembled at NOVA and the receiver tests at INAF have shown excellent results. Consequently, ESO together with ALMA decided to build six ALMA Band 2 receiver cartridges and integrate them into ALMA FE receivers for commissioning. This work is continued in 2023 when a decision on full ALMA Band 2 deployment will be taken after initial tests.

The Band 2 receiver pursues 2SB layout and provides 4–18 GHz IF band for two sidebands in dual-polarization configuration covering the 67–116 GHz band, taking advantage of the recent progress in mm-wave amplifiers. The Band 2 is the last band that completes the suit of the 10 receiver channels of the ALMA Observatory

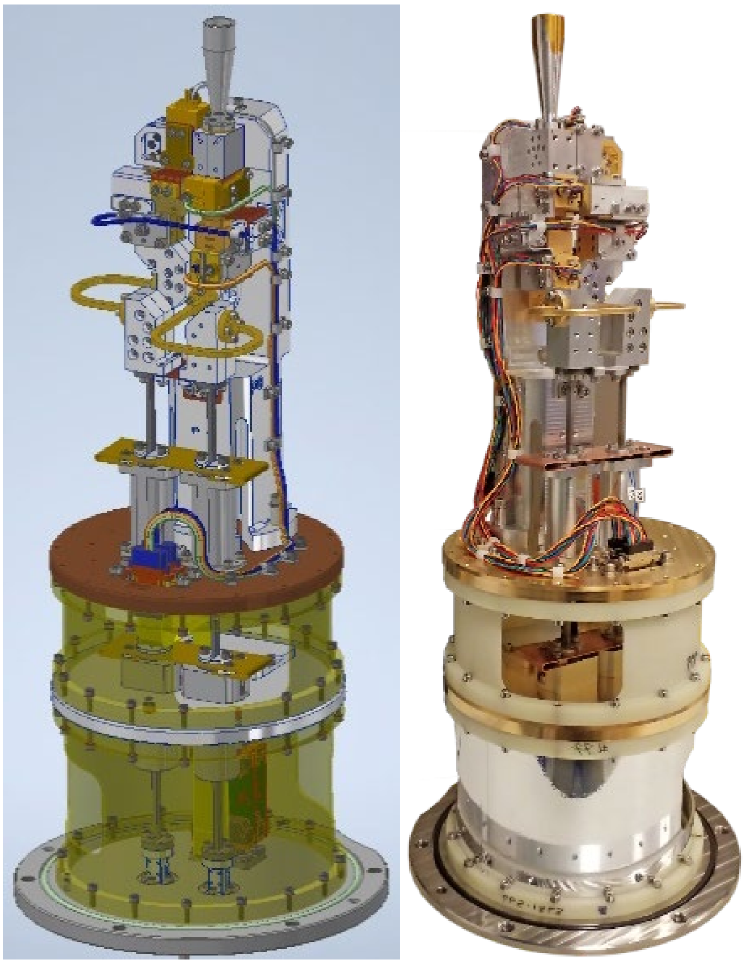


Figure 4.1. *The ALMA Band 2 CCA 3D model (left) and the built prototype of the ALMA Band 2 CCA (right), for 67–116 GHz.*

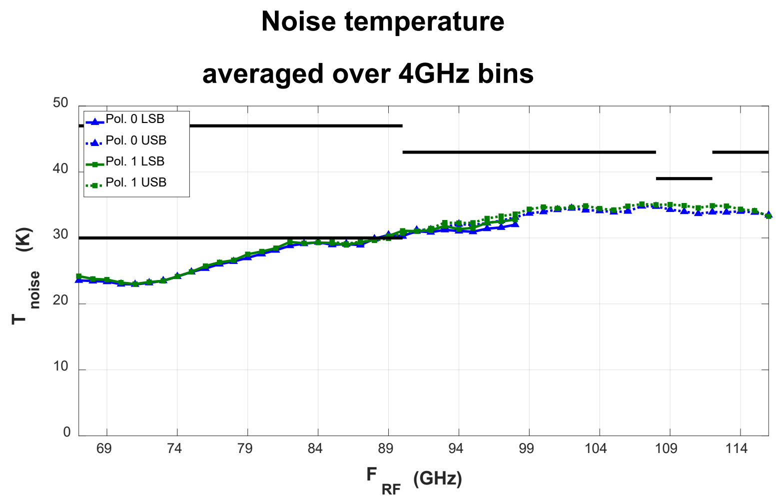


Figure 4.2. *ALMA Band 2 receiver noise, preliminary results, 4–18 GHz IF bandwidth, averaged over 4 GHz bins, RF 67–116 GHz.*

The Nordic ARC contributed with dedicated FTE in 2022 to the ESO ALMA Development Study *"High-Cadence Imaging of the Sun"* (PI: S. Wedemeyer & Toribio). The study explores the potential of sub-second ALMA observations of the Sun and in particular the challenges for the interferometric imaging techniques. The support will continue until the completion of the study (its final review is scheduled in spring 2023).

4.2 APEX

[Modules 3 and 8]

A replacement synthesizer was sent to APEX in April 2022. This synthesizer is needed as local oscillator reference for all SEPIA receivers. In conjunction with this, some minor adjustments were made to the synthesizer output power level to improve the phase locking stability in the 180 and 345 GHz channels. The SEPIA receivers were working without problems during the science operations.

The SEPIA 345 GHz instrument paper was published in 2022 (Meledin et al. 2022). This paper contains technical details of the receiver as well as important information on the astronomical usage.

4.3 Astronomical VLBI

[Module 4]

The VLBI technique allows astronomers to use multiple radio telescopes on Earth or in space to study the very high-resolution structure of distant objects, such as black hole shadows. To observe much fainter sources at tens of micro-Jansky, it requires that the current VLBI networks, e.g., the European VLBI Network, significantly improve its observing bandwidth. Recently, the Onsala station has installed the 3rd generation digital base-band converter (DBBC3) developed by HAT-Lab. This new backend enables the Onsala 25 m and 20 m telescopes to operate astronomical VLBI observations with a bandwidth up to 4 GHz per polarization in the upcoming years.

Figure 4.3. *The new OSO VLBI DBBC3 backend.*

Since May 2019 the Onsala 25 m telescope has taken part in a VLBI-campaign (PRECISE) that regularly observes Fast Radio Bursts that have been reported to repeat as discovered by the CHIME telescope in Canada and other major facilities around the globe. The ad-hoc array is composed of most of the smaller (< 40 m) telescopes that also take part in EVN-observations viz Onsala, Torun, Irbene, Medicina, Noto, Urumqi, Shanghai, and Westerbork. Since January 2020, the telescopes in Effelsberg and Sardinia also take part in a subset of the observations. The 25 m telescope was used for this project on 40 days in 2022. In addition to that, OSO has been monitoring repeating FRBs and magnetars as potential galactic sources of FRBs. This work is done in collaboration with Westerbork in the Netherlands and Torún in Poland. In total, the 25 m telescope was used for this project on 58 days in 2022. These data were partially used for a master thesis project of student Omar Ould-Boukattine (University of Amsterdam, The Netherlands).

4.4 LOFAR

[Module 5]

During 2022 the technical development of LOFAR2.0 came to a conclusion. At the same time the operational aspects of LOFAR2.0 were initiated. In particular, a remote LOFAR station was taken out of regular operations so that it could be used exclusively to explore the technical possibilities of LOFAR2.0, a project called IDOLS. Operationally, the unique aspects of LOFAR2.0 is in its use for space-weather observations, since space-weather is real-time, event driven, while astronomy is highly static and repeatable. These event driven operations have led to the further development of software coming out of the LOFAR4SW called iLiSA, written by OSO staff engineers.

iLiSA was exploited in earnest during a collaborative campaign between OSO, Trinity college Dublin, and Berkley University. The campaign employed students during the summer of 2022 to schedule observations of transients using two international LOFAR stations: the one in Ireland and the Onsala station. A crucial element of the schedules was that the stations observed simultaneously, thus allowing the exclusion of local, radio inference transients and obtaining proper commensurable transients on the celestial sky. In this regard, the OSO developed iLiSA proved crucial, and observations of transients such as pulsar and variable stars were successful.

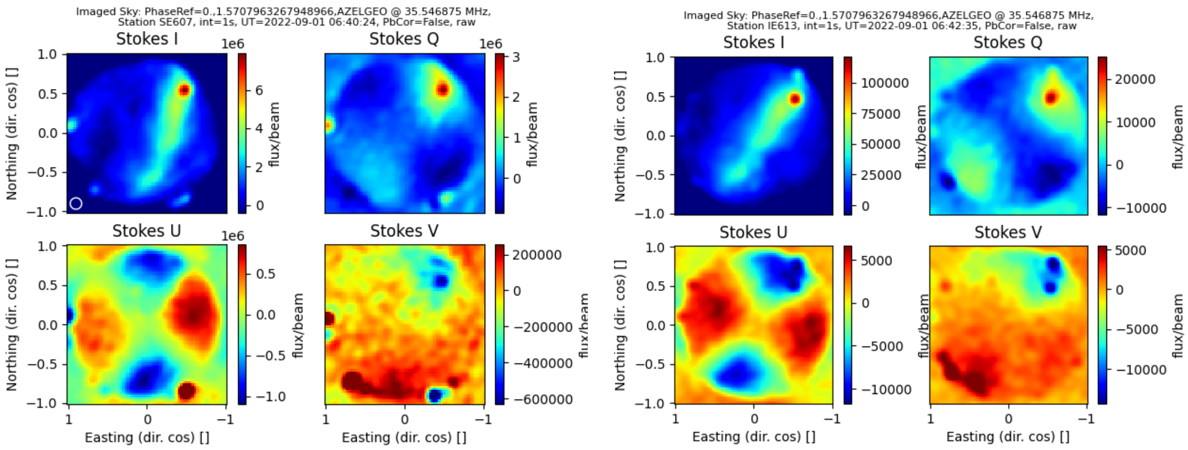


Figure 4.4. *The hemispheric, all-sky images show simultaneous measurements with the Swedish (left) and Irish (right) LOFAR stations Low Band Array. The presence of the transient source on North-Eastern horizon of the Swedish station, allows it to be excluded as a celestial transient. Also, a similar source can be seen in the South-Western horizon, which is actually the OSO 20 m telescope building. Differences in rotation of Milky-Way band orientation has to do with the fact that the maps are in local coordinates and the Irish and Swedish stations being separated longitudinally by about 20 degrees.*

4.5 The Onsala 20 m telescope

[Modules 4,6]

In 2022, the control software was upgraded in various ways of which two examples are discussed here.

In 2021, the powerful Earth observing microwave radar satellite CloudSat could no longer maintain strict nadir radar emissions and thus became a concern for the 3 mm SIS receiver since the telescope is often observing at elevations now high enough to potentially stare into the radar source and pick up a signal strong enough to the destroy the expensive mixer blocks. After a period of manual and/or semi-automatic makeshift solutions, we in 2022 implemented a robust protection in the software that relies on officially published overhead passages and if needed takes over control and moves the telescope close to the horizon as well as actively blocks the signal path in to the receiver using one of the existing movable mirrors in the optics assembly for the duration of the passage, and then resumes the previous activity.

We also commissioned a new observing mode for pointing measurements which allows us to use weaker pointing sources and get reliable results during worse weather conditions by eliminating the need for long integration times in situations with poor signal-to-noise ratio (high noise/weak source). This is accomplished by co-adding many short integrations before trying to find the direction of maximum signal (and thus determine the current pointing offsets).

On the hardware side, we inspected and renovated four of the original elevation gearboxes that are used to downshift the revs of the electric motors when driving the main elevation axis. The safety was improved by adding key-controlled main power breakers and a key lock box for personnel working on the telescope or in the skylift.

4.6 Geoscience

[Module 6]

During 2022 we worked on an improvement of the receiver position of the western Onsala twin telescope (Ow). The receiver was positioned in different, well-defined positions, and corresponding system equivalent flux density (SEFD) measurements were performed. On 11 July 2022, the preliminary best receiver position was determined to be +15 mm and has been used since then in all VGOS observations.

Tests were performed during 2022 to improve the level of the phase calibration signal for the broad-band VGOS observations with the Onsala twin telescopes (OTT). For this purpose, an equalizer was temporarily installed at the cable delay measurement system (CDMS) that also provides the phase calibration signal.

The storage capacity of the flexbuff system was increased in 2022.

4.7 Development of new millimetre/sub-millimetre devices

[Module 8]

During 2022, GARD worked on several internal and external projects. GARD designed, built, and commissioned a laboratory cryostat for 10 K operation, aiming at for the testing of the micro fabricated components and amplifiers. This enables the device model and noise characterization of the AlGaN/GaN HEMT transistors at cryogenic temperature in a current study run at GARD in collaboration with the Microtechnology and Nanoscience department at Chalmers for prospective use such devices in radio-astronomy receivers. AlGaN/GaN HEMT technology was shown to deliver promising results, presented in the licentiate thesis of A. M. Mebarki, defended in December 2022. Some devices show noise temperatures comparable to other semiconductor technologies yet having still some space for optimization and improvements.

GARD also designed and is currently building a complete test setup for the characterization of superconducting mixers. In a first phase, an add-on to the 4 K cryostat commissioned last year has been developed and is currently operational for noise performance measurements. In a second phase, extra hardware allowing the characterization of the side-band-rejection ratio of the mixers would be implemented. For both phases, a specific software for controlling the measurement equipment and data acquisition has been developed for most efficient device characterization at 4 K. This mixer characterization setup will serve as a base for testing novel SIS mixers covering several ALMA bands with a single receiver.

In fact, GARD ran several studies targeting the development of such ultra-wideband receivers. One study within the framework of ESO ALMA upgrade is dedicated to the process development for the new type of superconducting tunnel junctions, SIS, with AlN tunnel barrier and having a junction area down to a square micron area, with in end-goal to serve next generation receivers for ALMA. In September 2022, the important milestone in the study, Mid-Project Review, was successfully passed. Also, the AlN-barrier SIS junction process development at GARD was presented at the ISSTT2022 Conference. Figure 4.5 shows an example of current-voltage characteristic and micro photo of a Nb/Al-AlN/Nb SIS junction with the R_nA product of 8.4 Ohm·μm^2 with the area of ca. 0.88 μm^2 fabricated and characterized in the course of the study. Another project targets a Band 6 and 7 cold cartridge demonstrator for ALMA aiming to explore instantaneous IF bandwidth up to 16 GHz (e.g. frequency range 4–20 GHz). In the 2022, the both projects progressed significantly towards their project goals and passed the mid-term review. The two studies are strongly interrelated as the second one relies on the outcome of the SIS process development being performed in the first one, and simultaneously, gives immediate feedback to it.

While the two ESO studies on wideband SIS receivers focus on a more conventional approach to the mixer chips, a third parallel internal OSO study aims at the demonstration of ground-breaking mixer technology enabling more tolerant and robust mixer assemblies for mm-wave and sub-mm-wave mixers. Enabling wideband operation of the receivers, is not only limited the development of improved mixer chips, but also requires widening the band of operation of all components in the RF signal path. Therefore, within the frame of the internal OSO study, a wideband waveguide twist was developed to enable suitable wideband interfacing of two mixer chains with an orthomode transducer (OMT). The twist was designed to be machinable using standard CNC milling machine. The performance of the twist (Fig. 4.6) was later verified and demonstrated excellent performance (Fig. 4.7) and hence suitability for future wideband waveguide mixer designs covering ALMA band 6 and Band 7, exhibiting a return loss better than 20 dB over a 56 % fractional bandwidth.

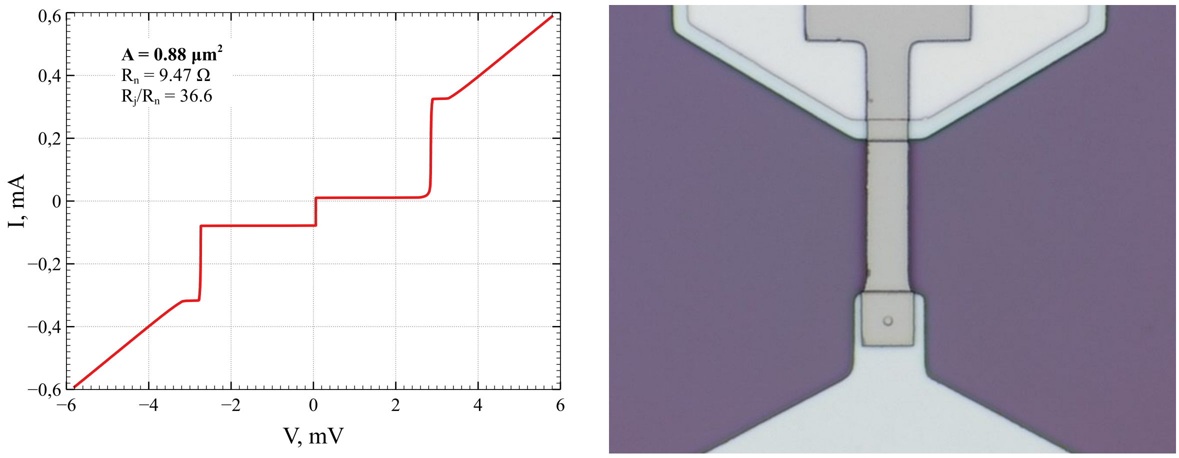


Figure 4.5. *Current-voltage characteristic (left) and micro photo (right) of a Nb/Al-AlN/Nb SIS junction with the R_nA product of 8.4 Ohm·µm^2 with the area of ca. 0.88 µm^2.*

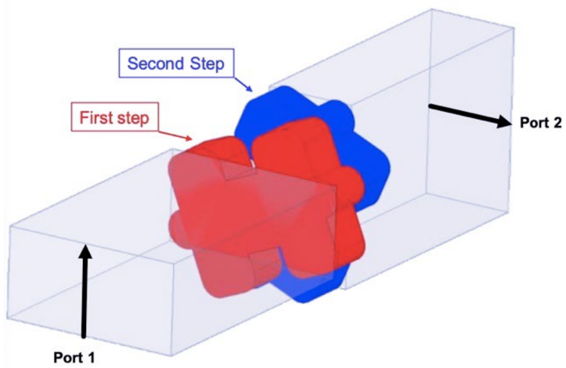


Figure 4.6. *Conceptual schematic of the compact twist.*

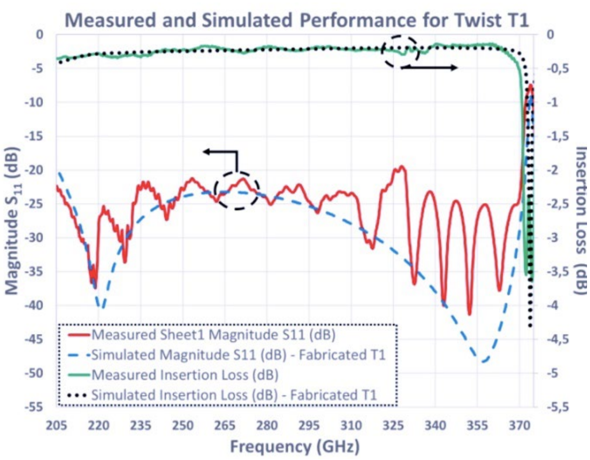


Figure 4.7. *Measured performance of the fabricated twists.*

5 SKA – The Square Kilometre Array

[Module 9]

5.1 Introduction

The Square Kilometre Array is the next major step forward in centimetre and metre wave radio astronomy, consisting of two new interferometric arrays with greatly enhanced sensitivity and sky survey speed compared to existing radio telescopes. The part of SKA1 operating at cm wavelengths (SKA1-mid) will be constructed in South Africa by adding 133 dishes to the existing 64 dish MeerKAT array. The metre wavelength part (SKA1-low) will be built in Australia utilizing the infrastructure of the MWA SKA precursor telescope. The global headquarters of the SKA project are located at Jodrell Band in the UK.

During 2022 SKA construction operations moved into high gear with many high value construction contracts being signed. In December 2022 a series of coordinated international media events were organised to officially mark the start of SKA construction (even if some of the first contracts were issued already in 2021). These media events created worldwide public attention for the SKA project.

Sweden has, since the establishment of the SKAObs Intergovernmental Organization in early 2021, been attending council meetings as an Observer (with Sweden represented by Lars Börjesson from Chalmers and Mathias Hamberg from VR). All the national funding required for Sweden to participate in the SKA1 construction and operations phase is identified and is committed. Sweden currently formally participates in SKA via a two-year bilateral agreement between the SKA Observatory and Chalmers signed in October 2021. This agreement identifies Chalmers as a collaborating organisation within the framework of the SKA international convention. This status gives full industrial and scientific rights to Swedish companies and scientists in return for our financial contribution. During 2022 the Swedish Research council (VR) officially submitted a request to the Swedish government to sign the SKA convention and therefore become a full SKA Observatory member. Signing the convention will establish a permamnent relationship between SKA and the SKA Observatory and will give Sweden the right to vote at the SKA Council. At the time of writing this request is being processed by the Swedish government.

5.2 Swedish industrial contributions to SKA1 constructions

Sweden is the 'Level 1' lead for two work packages within SKA construction, namely for the SKA1-mid Band 1 receiver and for SKA1-mid Digitizers. In addition, a Swedish company (Low Noise Factory) is working as a Level 2 supplier of Low Noise Amplifiers to at least one other SKA1-mid receiver band in addition to Band 1. For the digitizer work that Sweden leads at Level 1 the Gothenburg company Qamcon continued during 2022 to work under contract on industrialization of the SKA1-mid Band 1, 2, 3 Digitizer design, with that being internationally reviewed and passing its Critical Design Review (CDR) in Gothenburg in July 2022.

5.3 SKA Regional Centre planning and SKA Data Challenges

A vital component of the SKA project will be a network of SKA Regional Centres (SRCs) which will collectively form the permanent data archive and higher-level processing layer for SKA data. At computer centres close to the SKA1-mid and SKA1-low telescopes in South Africa and Australia raw SKA data will first be converted into Observatory Data Products (such as data cubes of radio intensity versus spatial coordinates and frequency) – which will then be transferred to the distributed SRC Network sites. At these SRC sites/nodes these ODPs will be converted into Advanced Data Products (ADPs) such as catalogues of sources (requiring AI and Machine Learning processing). Sweden is expected to provide its share of SRC resources in terms of data storage and computation. During 2022 Sweden fully participated in the SRC Steering Committee (SRCSC) whose mission is to plan in detail this worldwide SRC network.

During the year a new SRC Network Architect was appointed at the SKA Observatory headquarters and he initiated a set of multinational prototyping teams that have began implementing aspects of the SRC Network system. Sweden primarily began working within the 'Coral' team which is deploying test 'data lake' solutions between European SRCNet partners. The Swedish SRCNet node is being established as a close collaboration between OSO and Chalmers e-commons incorporating the C3SE data centre. During 2022 three new permanent people were hired to form the form the nucleus of the Swedish SRC node (with other domain expertise being added from those aleady working supporting interferometers such as ALMA). Amongst the three new employees hired is Dejan Vitlacil who is employed by e-commons (but largely financed by OSO) and who works as the technical lead of the node. He began his position in October 2022. Franz Kirsten who has a background in data intensive radio astronomy was hired as an OSO employee within the node and began his position in December. Finally during the year Kelley Hess was recruited to Chalmers as a new Senior Researcher to act as the scientific lead of the Swedish SRC node – with a projected start date at Chalmers of April 2023.

In addition to initial prototyping efforts and the above new staff hired as described above existing members of the OSO Observatory Support unit were involved in organizing training in "Hands-on containerisation" as one of the first SRC community training efforts. This event was held online (6 sessions during the period 27 January – 14 February 2022) and had more than 100 participants from all around the globe. This was the first training event of a series that are planned by the SRC Network in order to prepare users for the challenge of SKA data.

Following on from the highly successful OSO led contribution to SKA Data Challenge 2 during 2021, when the Swedish team came a close second in the HI source finding challenge, the Swedish teams results were presented at EAS2022 and a paper was prepared and submitted to A&A. A dedicated Source Finding working group was established under the umbrella of the SKA HI Science WG to follow-up on the second SKA cata challenge, with OSO participants working as active members of this group.

6 Computers and networks

[Module 10]

During 2022 additional high-speed fibers were laid between the 20 m building and the computer hall in the administration building which allowed a third 100 Gbps link between the buildings to be realised. This gives the capability for each of the OTT DBBC3s to send 64 Gbps directly via their own 100 Gbps fiber, whilst leaving the third 100 Gbps link for external data transfers and astronomy data recording. A DBBC3 2L2H for astronomy was installed and a new flexbuff for this was also bought, consisting of a single AMD Threadripper with 32 cores, 512 GB RAM and 24 × 18 TB disks.

Tests of recording VLBI data at rates greater than 16 Gbps on a single thread have been undertaken. The current recording software jive5ab can pass a maximum of ca 22 Gbps in a single thread at present, which means that logically splitting data streams of rates greater than 16 Gbps is needed, increasing the complexity for the recording and observation control. Instead, various options to 'offload' have been looked at to facilitate this. One method allowed for 32 Gbps (likely 64 Gbps also, but there the disks become a bottleneck), however this requires a specific brand of network cards and always caused small data losses at the beginning of each recording. Other more generic alternatives are still being looked at.

A new machine was purchased and is in the process of being added to the NAFCI-1 (NAtional Facility Computer InfraStructure) cluster at OSO, which will replace the two oldest machines in NAFCI-1. The new machine has 64 cores and 1 TB RAM, which is significantly more than twice as powerful as the two older machines being replaced combined. This will assist in the processing of ever larger data sets for ALMA large programs. Once this replacement is complete, NAFCI-1 will consist of 136 cores with a storage capacity of 530 TB. A separate system at Onsala consisting of 20 cores and 280 TB as well as a Tesla T4 GPU, is dedicated to searching for Fast Radio Bursts (FRB).

The OSO NAFCI-2 cluster at the NAISS–C3SE, (NAISS: National Academic Infrastructure for Supercomputing in Sweden; C3SE: Chalmers Centre for Computational Science and Engineering) node at Chalmers consists of a five-node cluster with 32 cores each and a dedicated NFS storage server with a capacity of 583 TB, enabling the processing of ever larger data sets from ALMA and LOFAR (earlier dimensioned to allow an international LOFAR data set, 40 TB, plus two large ALMA data sets, 20 TB, to be processed).

Network connections to OSO presently support the transmission needs of geodetic VLBI (1 Gbit/s), astronomical VLBI (1–4 Gbit/s) and LOFAR (3 Gbit/s). OSO is a fully-fledged node of SUNET. Presently OSO rents multiple 10 Gbit/s fibre connections to SUNET, used for ordinary network traffic, plus a dedicated lightpath to the Netherlands for transfer of LOFAR and astronomical VLBI data. There is also an option to transmit data in IP format, used for sending data to other stations/correlators.

7 Frequency protection

[Module 10]

On behalf of European radio astronomers, the Committee on Radio Astronomy Frequencies (CRAF) of the European Science Foundation (ESF) coordinates activities to keep the frequency bands used by radio astronomy and space sciences free from interference. CRAF has Member Institutes (radio observatories, national academies, or funding agencies) in 20 countries, sometimes more than one per country. CRAF has a chairperson and a secretary, and it employs a full-time Frequency Manager. Sweden is represented in CRAF via OSO. In addition, OSO is also contributing to the expenses of the CRAF Frequency Manager, currently stationed at JIVE, The Netherlands. CRAF represents European Radio astronomy at international meetings where possible threats to radio astronomy occur.

Work in CRAF is divided into several small teams, so-called Work Item (WI) teams, which deal with well-defined topics such as satellite services (including the so-called mega-constellations) or questions of spectrum engineering. Some of the WI teams are active on both International Telecommunication Union Radiocommunication Sector (ITU-R) and European Conference of Postal and Telecommunications Administrations Correspondance Group (CEPT) related issues.

During 2022, final preparations for World Radio Conference 2023 (WRC23) have been underway. The ITU-R Study Groups have been preparing the Conference Preparatory Meeting (CPM) Report, which contains all potential methods and Draft Resolutions that may solve current Agenda Item issues for WRC23. CRAF has been successful in adding appropriate clauses, compatibility study results and summaries to the CPM Report, which should help to protect the RAS from possible new allocations. This has been a great success. However, the CPM Report is still not completed and the CPM meeting in Spring 2023 will require full attention of CRAF to protect the achievements. Two Agenda Items have the potential to do great harm to radio astronomy: AI 1.2 concerns the possible allocation of frequencies to cell phone networks at 6.6 GHz and 10.5 GHz; AI 1.4 concerns the introduction of flying base stations. The 6.6 GHz allocation might lead to a situation where observations of the Methanol spectral line in the frequency range 6650-6675 MHz might become impossible in Europe.

A big success at the ITU-R level during 2022 has been the publication of a new ITU-R Report concerned with the VLBI Global Observing System (VGOS), which it is hoped will be a foot in the door towards better protection of Geodetic VLBI observations in the future.

Regarding European issues, several new ECC Decisions and Reports are close to being published to which CRAF has significantly contributed. Among them are deliverables regarding car radars at millimetre wavelengths, cell-phone equipment on board drones and aircraft, the introduction of 43 GHz 5G networks in Europe, a new Iridium Report and many more. CRAF is also leading a work item in the ECC satellite working group, SE40_45, concerning the impact of aggregation effects resulting from multiple, large, low-Earth orbit, satellite constellations.

The ESF initiated a review process of CRAF in late 2021. The CRAF management team produced a detailed self-evaluation report covering the last 10 years, which was assessed by the Review Panel (led by Dr. Pierre Cox, with Dr. Markus Dreis, Prof. Hermann Opgenoorth, and Prof. Liese van Zee). A written report by the review panel has been received (see Fig. 7.1) which was very positive.

The OSO CRAF member, apart from being part of the CRAF Management Team and being involved in the points above, focuses also on interference issues at local and national levels (e.g., via contacts with the Swedish Post- och telestyrelsen, PTS).

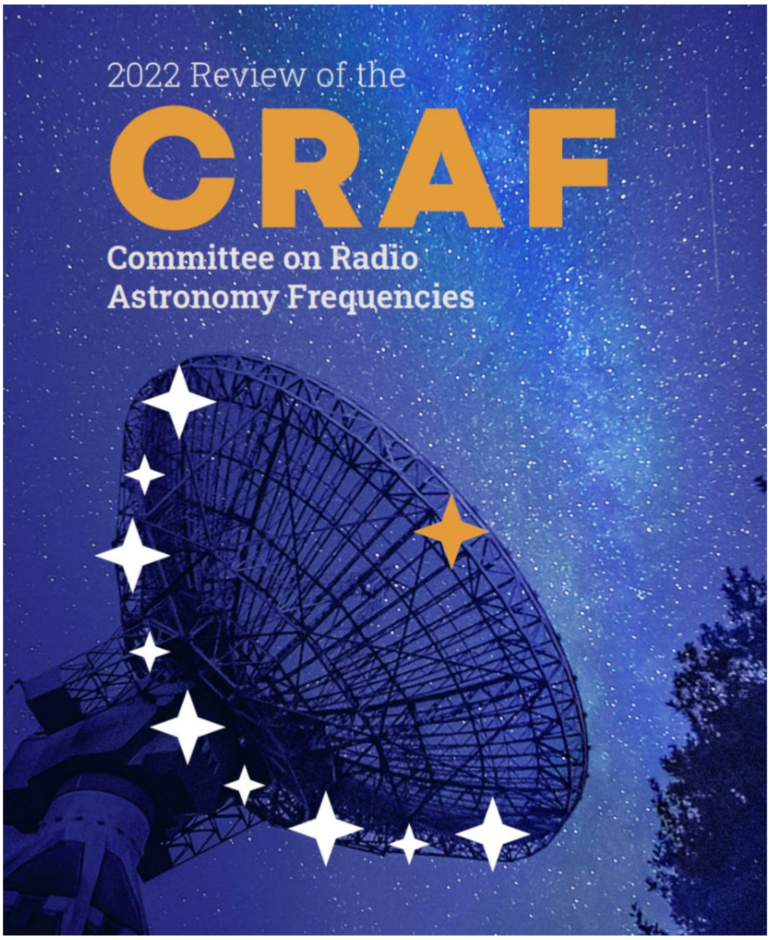


Figure 7.1. *Frontpage of the CRAF review report.*

8 Memberships of International Committees

During 2022 OSO was represented on the following international boards and coordinating committees. The OSO Infrastructure Director John Conway serves on many of these boards.

- *The European VLBI Network (EVN)* for astronomical VLBI (the Director is a member of the board, and Michael Lindqvist is member of the Programme Committee))
- *The Joint Institute for VLBI ERIC (JIVE),* a European Research Infrastructure Consortium that operates the EVN correlator in Dwingeloo (NL) and supports the EVN activities (the Director is a council member)
- *The APEX project board* – representing the three partners that operate the 12 m diameter sub-mm telescope APEX in northern Chile (the Director is a board member)
- *The International LOFAR Telescope (ILT)* Board, which oversees the operation of the ILT (the Director is a board member)
- *ORP (OPTICON RadioNet Pilot,* an EU-financed Horizon 2020 project which coordinates optical and radio astronomy facilities in Europe (the Director is a board member)
- *SKA Regional Centre Steering Committee* (The Director is a member).
- *SKA communications steering committee* (Robert Cumming is a member)
- *International Astronomical Union Office for Astronomy Outreach* (Robert Cumming is the IAU National Outreach Coordinator for Sweden)
- *LOFAR for Space Weather (LOFAR4SW)*, an EC funded (H2020 INFRADEV) design project (the Director represents Chalmers in the project). This project ended in early 2022.
- *International VLBI Service for Geodesy and Astrometry (IVS*), which operates geodetic VLBI (Rüdiger Haas is the chairperson of the IVS Directing board)
- *International Earth Rotation and Reference Frame Service (IERS*) (Rüdiger Haas is a board member)
- *The European VLBI Group for Geodesy and Astrometry (EVGA*) (Rüdiger Haas is Chairman)
- *Inter-Commission Committee on Marine Geodesy (ICCM)* (Rüdiger Haas is an IERS Representative to the Steering Committee)
- *International DORIS Service (IDS)* (Karine Le Bail is member of the IDS Governing Board)
- *The GCOS Reference Upper-Air Network (GRUAN) Global Navigation Satellite Systems (GNSS) precipitable water (GNSS-PW) Task Team (TT)* (Gunnar Elgered is member of the TT)
- *Inter-Commission Committee on Geodesy for Climate Research (ICCC)* (Gunnar Elgered is a member of JWG C.2 Quality control methods for climate applications of geodetic tropospheric parameters)
- *Galileo Scientific Advisory Committee (GSAC) of the European Space Agency* (Gunnar Elgered is a member)
- *ESF Committee on Radio Astronomy Frequencies (CRAF)* for the protection of the radio band for radio astronomical use (Michael Lindqvist is a member)
- The *Program Committee Effelsberg (PKE)* at Max Planck Institute for Radio Astronomy (Per Bergman is a member evaluating proposals for the Effelsberg 100 m radio telescope)
- *LOFAR Users Committee* (Maria Carmen Toribio is a member)
- *Scientific advisory committee of the International Symposium on Space TeraHertz techniques, ISSTT2022* (Victor Belitsky is a member)

9 EU projects

[Modules 3, 4, 5, 9]

During the year OSO participated in two EU Horizon 2020 projects (proposals submitted in respectively 2017 and 2020): LOFAR4SW and ORP.

9.1 LOFAR4SW

The LOFAR for Space Weather (LOFAR4SW) project will deliver the full conceptual and technical design for creating a new leading-edge European research facility for space weather science. It also supports outreach and dialogue with a range of stakeholders in the space weather community, regarding the possible subsequent implementation, potential future use, and governance aspects of a LOFAR4SW data monitoring facility.

Designing for LOFAR a significant upgrade in hardware, algorithms, and software will allow to create, at a fraction of the cost of building a new facility, a large-scale cutting-edge research facility providing simultaneous independent access to both the radio astronomy and the space weather research communities. LOFAR4SW will in particular address capabilities to monitor Solar dynamic spectra, scintillation measurements of densities and velocities in the inner heliosphere, and high-resolution measurements of Total Electron Content (TEC) variations in the Earth's ionosphere. A strong point of the LOFAR4SW is to uniquely enable provision of the missing link of global measurements of the interplanetary magnetic field – a key parameter in forecasting the severity of geomagnetic storms. LOFAR4SW started December 2017 and will run for 3.5 years. In 2020, the project was extended to 28 February 2022, in order to minimise the impact of Covid-19 into the project activities.

9.2 ORP

The OPTICON RadioNet Pilot (ORP) project brings together the well-established ground-based astronomy community, in an effort to support and develop seamless access to radio and optical facilities in an efficient, co-ordinated and future-looking programme. It offers access to an unrivalled set of major and specialised observatories across Europe (and around the world) covering the optical, infra-red, sub-mm and radio wavebands to open the way to new discoveries. OSO is part of the Transnational Access (TA) program via APEX and the EVN.

10 Conferences, workshops, schools, etc.

The Nordic ARC node took part in the organization of several schools, conferences, trainings, and workshops for the ALMA user community in 2022:

- The Nordic ARC node coordinated the series of online training events I-TRAIN with the European ARC Network, a regular series of *Interactive Training in Reduction and Analysis of INterferometric data*. In 2022 a total of 6 online trainings were hosted featuring European ARC Network experts and software tools. Besides coordination, the Nordic ARC actively hosted 2 of the events and were tutors in one of them. The live sessions were well attended, with an average number of ~35 participants. The series has also an important legacy value, as all trainings are uploaded in the YouTube channel of the European ARC Network.
- The first Meeting of ALMA Young Astronomers (MAYA 2022 conference) was held online on 2−4 March 2022. The meeting was well received and well attended by young

researchers, who presented their science cases (more than 60 talks all available online) and gave room for discussions and interactions.

- The Nordic ARC node hosted three online workshops dedicated to the ALMA Cycle 9 Call for Proposals. The node gave a general introduction to interferometry and ALMA and dedicated two full sessions to support proposal preparation with the ALMA Observing Tool.
- The node organized a one-day event to present the future upgrade of the ALMA telescope towards 2030, the ALMA2030 Wideband Sensitivity Upgrade, and discuss the future user needs and developments in Sweden. The event was attended by ~20 participants, including astronomers from Chalmers and ALMA receiver experts from GARD.
- The European ARC Network and the Nordic ARC had representation during the European Astronomical Society conference (EAS 2022) that was held in Valencia 27 June – 1 July 2022), which included a Symposium and a Lunch Session organized by ARC node staff (Symposium S7 - Building bridges: The lifecycle of dust and gas in the Milky Way with ALMA and SKA and Lunch Session LS6 - ALMA in Europe: support by the European ALMA Regional Centre Network and new ways of interacting with data through the ALMA Science Archive).
- Nordic ARC node staff were SOC members of the European Radio Interferometry School 2022 (Dwingeloo, 19–23 September 2022), and the first ALMA Archive School (Bologna, 5–7 October 2021).
- Staff was part of the LOC of Astronomdagarna 2022 (Göteborg, 6–8 October 2022). During the event, there was a dedicated stand and a presentation on the Nordic ARC node support to the Swedish astronomical community.

On behalf of the Swedish SKA Regional Center:

- The first SKA Regional Center training was organized: Hands-on containerization. The event was held online (6 session within 27 January – 14 February 2022) and had more than 100 participants worldwide.

11 Education

The OSO national infrastructure staff are only involved in a minimal way within the academic teaching at Chalmers. The infrastructure does however support teaching by making a small fraction of the time on its telescopes available for exercises by students on Chalmers and other Swedish academic courses. The staff are also sometimes involved in teaching and providing exercises at specialised graduate level schools that are organised from time to time at the Observatory. Specifically, at Chalmers, the 20 m telescope and SALSA (see Fig. 11.1) were used in astronomy and physics courses, the 25 m telescope and SALSA in a satellite-communication course, GNSS equipment in a satellite-positioning course, and laboratory equipment in courses on microwave, millimetre wave, and THz technology. Students in the Engineering physics programme at Chalmers visited the Observatory for a half-day, designed as part of the course Experimental physics. Students from Stockholm University used the 20 m telescope to learn about radio astronomy.

Figure 11.1. *One of the SALSA antennas in Onsala used for education and outreach, in front of the new visitor centre and with the 25 m telescope in the background. Credit: Magnus Thomasson*

12 Outreach

With the exception of the project *SALSA för högstadiet* (see below), outreach activities at OSO are funded by Chalmers and are not part of the national infrastructure's VR funding.

The observatory's new visitor centre was inaugurated on 27 September 2022 (see Figs. 12.1 and 12.2). OSO secured a second 1 MSEK grant from the Hasselblad Foundation to cover continued costs for the centre's new exhibition. A four-person team worked on developing content for the exhibition, in collaboration with colleagues from Chalmers' division for interaction design, and using input from school pupils and adults.

Visits from schools and the public during 2021 were kept to a minimum due to work on the new visitor centre. We organised one public event, in October in collaboration with Naturum Fjärås Bräcka, which allowed 100 visitors to see the visitor centre for the first time. We supported 22 guided tours for internal and partner organisations. During the autumn term we used these opportunities to test the new exhibition.

We continued offering occasional question-and-answer sessions with school classes, and worked with the project Rymdskolan, developed by astronomers Chiara Ceccobello and Kiana Kade at our host department, which provided digital interactive lessons in astronomy for high-school students in Gothenburg schools.

Our project working together with Lövgärdesskolan in Göteborg continued, aimed at increasing science capital among students, as part of the city-wide initiative *Skolan som arena*. Year 6 classes from both this school and Kollaskola, Kungsbacka, took part in the inauguration of the visitor centre.

We concluded our VR-funded MINT project *SALSA för högstadiet*. The project developed a new user interface for our small SALSA radio telescopes, and supported the undergraduate network Upprymd. During 2022 the network took part in several outreach assignments, and monthly workshops focused on building skills in astronomy and space-related science communication.

Our SALSA telescopes continued to be an important online resource for students, schools and amateur astronomers. During 2022 the telescopes were booked for an average of 68 hours per week, with bookings of on average 4 h from in total 19 countries, among them Sweden, India, Italy and Ukraine. The number of hours booked doubled compared to 2021, likely because of the new third SALSA telescope, and the increasing use of remote telescopes in physics courses during the covid-19 pandemic.

Staff handled media enquiries on astronomical topics and were regularly quoted in news media and participated in public events (e.g, public talks at Universeum, Göteborg).

We communicated news from Onsala facilities and research by Chalmers scientists to the media in collaboration with Chalmers press office and partner organisations. We reported for example on the Event Horizon Telescope's image of the black hole Sgr A*, the start of construction for the SKA, and fast radio bursts from a globular cluster.

Figure 12.1. *Chalmers President Stefan Bengtsson inaugurates the new visitor centre at the observatory on 27 September 2022. Credit: Chalmers/Anna-Lena Lundqvist.*

Figure 12.2. *The new visitor centre in Onsala, with the 25 m telescope, a SALSA antenna, and one of the OTT antennas in the background. Credit: Magnus Thomasson.*

13 Changes in organisation

[Module 1]

During 2022 there were no significant changes in internal organisation affecting the OSO infrastructure. With the OSO Time Allocation Committee Sabine König stepped down and Daniel Tafoya joined as the Observatory member. During the year Jan-Petter Hansen left as Head (prefekt) of the Chalmers department (Space, Earth and Environment or SEE) that hosts the OSO infrastructure. The new SEE Head of Department is Peter Forkman who comes from a long career working at Onsala as part of the OSO infrastructure.

14 Importance to society

Onsala Space Observatory supports basic research within astronomy and geoscience. Both astronomy and geoscience research have a strong appeal to the curiosity of people of all ages, and this is used in our outreach activities as described above. In addition, geoscience is of importance for understanding the system "Earth", and therefore of importance for e.g. climate applications, such as monitoring of ozone in the atmosphere and determining changes in the absolute sea level. Geodetic VLBI provides the fundamental terrestrial reference frame, which is the basis for all navigational applications. As a by-product of its VLBI activities, the observatory also contributes to establishing the official Swedish time and international time, through two hydrogen maser clocks and one cesium clock. The OSO staff and instruments are also involved in education at all levels from bachelor to graduate studies at Chalmers, and through organised schools.

15 Importance to industry

Currently the major industrial impact of OSO's work is connected with the SKA project. The SKA is on such a scale that its components must be provided by industry. The ongoing Swedish involvement in SKA construction will have a large financial payback to Swedish companies. During 2022 Patrik Carlsson of Chalmers Industrial Technology and Big Science Sweden continued to fulfil the Swedish SKA Industrial Liaison Officer (ILO) role. Big Science Sweden (https://www.bigsciencesweden.se) is an organisation which promotes technological and industrial return to Sweden from international Big Science infrastructures.

During 2022 Chalmers Level 1 leadership of the SKA1-mid Band 1 and SKA1-mid Digitizer work packages continued with involvement of the Qamcom company in the final industrial design of the SKA1-mid telescope digitizers. In addition, preparations began for the selection of a Swedish company to act as the prime contractor for the delivery of the SKA1-mid Band 1 receiver package.

Acronyms

A&A	Astronomy & Astrophysics (a scientific journal)
ADP	Advanced Data Products (for SKA)
AG	Absolute gravimeter
AGB	Asymptotic Giant Branch (AGB stars are giant evolved stars)
AI	Artificial Intelligence
ALMA	Atacama Large Millimeter/submillimeter Array (Chile)
APEX	Atacama Pathfinder Experiment (Chile)
ApJ	Astrophysical Journal (a scientific journal)
ARC	ALMA Regional Centre
ASTRON	Netherlands Institute for Radio Astronomy
C3SE	Chalmers Centre for Computational Science and Engineering
CEPT	European Conference of Postal and Telecommunications Administrations Correspondance Group
CO	Carbon monoxide (molecule frequently observed by radio telescopes)
CPM	Conference Preparatory Meeting
CRAF	Committee on Radio Astronomy Frequencies (ESF)
DBBC	Digital Base Band Converter (equipment for VLBI observations)
EAS	European Astronomical Society
EC	European Commission
ECC	Electronic Communications Committee
EHT	Event Horizon Telescope
ERIC	European Research Infrastructure Consortium
ESF	European Science Foundation
ESO	European Southern Observatory
EUREF	IAG Reference Frame Sub-Commission for Europe
EVGA	The European VLBI Group for Geodesy and Astrometry
EVN	European VLBI Network
FRB	Fast radio burst
FTE	Full-time equivalent
GARD	Group for Advanced Receiver Development (part of OSO)
GLONASS	Globalnaja navigatsionnaja sputnikovaja sistema
GMVA	Global Millimeter VLBI Array
GNSS	Global Navigational Satellite Systems
GPS	Global Positioning System
GPU	Graphics Processor Unit
GSAC	Galileo Scientific Advisory Committee of the European Space Agency
IAG	The International Association of Geodesy
IAU	International Astronomical Union
ICCC	Inter-Commission Committee on Geodesy for Climate Research
ICCM	Inter-Commission Committee on Marine Geodesy
ICSU	International Council for Science
IERS	International Earth Rotation and Reference Frame Service

IF	Intermediate frequency
IGETS	International Geodynamics and Earth Tide Service
IGS	The International GNSS Service
ILO	Industrial Liaison Officer
ILT	International LOFAR Telescope
IMBH	Intermediate mass black hole
InSAR	Interferometric synthetic aperture radar
I-TRAIN	Interactive Training in Reduction and Analysis of INterferometric data (activity within the European ARC Network)
ITRF	International Terrestrial Reference Frame
ITU	International Telecommunication Union
IVS	International VLBI Service for Geodesy and Astrometry
JIVE	Joint Institute for VLBI in Europe (NL)
LOFAR	Low Frequency Array
LOFAR4SW	LOFAR for Space Weather (EU Horizon 2020 project)
LoTSS	LOw-Frequency ARray (LOFAR) Two-metre Sky Survey
MINT	Matematik, ingenjörsvetenskap, naturvetenskap och teknikvetenskap (STEM: science, technology, engineering and mathematics)
MNRAS	Monthly Notices of the Royal Astronomical Society (a scientific journal)
MPIfR	Max-Planck-Institut für Radioastronomie
MWA	Murchison Widefield Array
NAFCI	NAtional Facility Computer InfraStructure
NAISS	National Academic Infrastructure for Supercomputing in Sweden
NDACC	Network for the Detection of Atmospheric Composition Change
NOVA	Nederlandse Onderzoekschool Voor Astronomie (The Netherlands Research School for Astronomy)
ODP	Observatory Data Products (SKA)
OMT	Orthomode transducer
ONSA	OSO's primary GNSS station
ORP	OPTICON RadioNet Pilot (an EU-financed Horizon 2020 project)
OSO	Onsala Space Observatory
OTT	Onsala Twin Telescope
PI	Principal Investigator
RadioNet	Advanced Radio Astronomy in Europe (EU Horizon 2020 project)
RISE	Research Institutes of Sweden
SALSA	Small antennas at OSO for education and outreach
SEE	Department of Space, Earth and Environment (OSO's host department at Chalmers)
SEPIA	Swedish ESO PI receiver for APEX
SEST	Swedish-ESO Submillimetre Telescope (Chile)
SG	Superconducting gravimeter

SIS	Superconductor-isolator-superconductor (a type of mixers)
SKA	Square Kilometre Array
SKAO	Square Kilometre Array Organisation
SLR	Satellite Laser Ranging
SMHI	Sveriges meteorologiska och hydrologiska institut (Swedish Meteorological and Hydrological Institute)
SNR	Signal-to-Noise Ratio
SNSN	Svenska nationella seismiska nätverket
SRC	SKA Regional Centre
SUNET	Swedish University Computer Network
SWEPOS	The Swedish permanent GNSS network, hosted by Lantmäteriet
TAC	Time Allocation Committee
TEC	Total Electron Content
USNO	US Naval Observatory
UT1	The principal form of Universal Time (which is based on Earth's rotation)
UTC	Coordinated Universal Time (an atomic timescale that approximates UT1)
VGOS	VLBI Geodetic Observing System
VLBI	Very Long Baseline Interferometry
VR	Vetenskapsrådet, The Swedish Research Council
WDS	World Data System, an Interdisciplinary Body of the International Council for Science (ICSU)
WP	Work Package
WRC23	World Radio Conference 2023
WVR	Water vapour radiometers

Publications 2022

This section lists publications in refereed journals 2022 enabled by the Onsala infrastructure, divided by instrument and separated in two groups: with or without a Swedish author. *For more detailed information about the publication list, see Sect. 2.1*. The number of publications per instrument is given below. Two figures are given: total number of publications/number of publications with at least one Swedish author (for ALMA, the first figure is instead the number of papers with at least one Nordic author).

- **ALMA** observations, publications with Nordic authors (106/43) *(Nordic/Swedish)*
  thereof with explicit Nordic ARC node support (28/16) *(Nordic/Swedish)*
- **APEX** observations (all APEX partners' observing time) (76/17) *(total/Swedish)*
- **Astronomical VLBI** obs. w. EHT, EVN or GMVA, or using JIVE (50/24) *(total/Swedish)*
- **LOFAR** observations (119/12) *(total/Swedish)*
- **Geoscience** (OSO instruments specifically stated) (27/5) *(total/Swedish)*
- **Onsala 20 m telescope, single-dish** observations (7/4) *(total/Swedish)*
- **Technical** publications about, e.g., receiver development, by OSO staff (13)

In addition to the publications listed below, in 2022 there was one publication using astronomical data from the satellite *Odin* (now operating mainly in aeronomy mode), and two publications using data from the Swedish-ESO Submillimetre Telescope *SEST* (closed in 2003).

Note:
- The publications are separated in two groups: with or without a Swedish author.
- In each section, the publications are sorted by first author.
- An excel file with the publications is provided separately.
- For information about the level of ARCnode support for the ALMA publications, see the separate excel file.
- For information about which of the APEX publications are based on observations on Swedish time, see the separate excel file.

Acronyms:

A&A	Astronomy & Astrophysics
A&A Rev	Astronomy and Astrophysics Review
Adv. Space Res.	Advances in Space Research
AJ	Astronomical Journal
ApJ	Astrophysical Journal
ApJSS	Astrophysical Journal Supplement Series
Astron. Nachr.	Astronomische Nachrichten
Atmos. Meas. Tech.	Atmospheric Measurement Techniques
Exp. Astron.	Experimental Astronomy
FrASS	Frontiers in Astronomy and Space Sciences
Geophys. J. Int.	Geophysical Journal International
Geopohys. Res. L.	Geopohysical Research Letters
IEEE Trans. GRS	IEEE Transactions on Geoscience and Remote Sensing
IEEE Trans. Microw. Theory Techn.	IEEE Transactions on Microwave Theory and Techniques
IEEE Trans. THz Sci. Technol.	IEEE Transactions on Terahertz Science and Technology
J. Astrophys. Astron.	Journal of Astrophysics and Astronomy
J. Geod.	Journal of Geodesy

J. Geo. Res. (Solid Earth)	Journal of Geophysical Research (Solid Earth)
JATIS	Journal of Astronomical Telescopes, Instruments, and Systems
MNRAS	Monthly Notices of the Royal Astronomical Society
NatAs	Nature Astronomy
PASJ	Publications of the Astronomical Society of Japan
PASP	Publications of the Astronomical Society of the Pacific
Phys. Rev. D	Physical Review D
Phys. Status Solidi A	Physica Status Solidi (A) Applications and Materials Science
Radiophys. Quantum El.	Radiophysics and Quantum Electronics
Res. Astron. Astrophys.	Research in Astronomy and Astrophysics
ScienceA	Science Advances

ALMA, publications in refereed journals 2022, with Nordic authors

Swedish authors (ALMA)

ALMA Reveals Extended Cool Gas and Hot Ionized Outflows in a Typical Star-forming Galaxy at z = 7.13
Akins, H. B., Fujimoto, S., Finlator, K., Watson, D., Knudsen, K. K., Richard, J., Bakx, T. J. L. C., Hashimoto, T., Inoue, A. K., Matsuo, H., Michalowski, M. J., & Tamura, Y.
ApJ 934, 64 (2022)
10.3847/1538-4357/ac795b

DEATHSTAR—CO Envelope Size and Asymmetry of Nearby AGB Stars
Andriantsalaraza, M., Vlemmings, W., Ramstedt, D., De Beck, E.
Galaxies 10, 33 (2022)
10.3390/galaxies10010033

Tracing Interstellar Heating: An ALCHEMI Measurement of the HCN Isomers in NGC 253
Behrens, E., Mangum, J. G., Holdship, J., Viti, S., Harada, N., Martin, S., Sakamoto, K., Muller, S., Tanaka, K., Nakanishi, K., Herrero-Illana, R., Yoshimura, Y., Aladro, R., Colzi, L., Emig, K. L., Henkel, C., Huang, K.-Y., Humire, P. K., Meier, D. S., Rivilla, V. M., van der Werf, P. P., & Alma Comprehensive High-Resolution Extragalactic Molecular Inventory (Alchemi) Collaboration
ApJ 939, 119 (2022)
10.3847/1538-4357/ac91ce

Radiative transfer modeling of the observed line profiles in G31.41+0.31
Bhat, B., Gorai, P., Mondal, S. K., Chakrabarti, S. K., & Das, A.
Adv. Space Res. 69, 415 (2022)
10.1016/j.asr.2021.07.011

Characterizing and Mitigating Intraday Variability: Reconstructing Source Structure in Accreting Black Holes with mm-VLBI
Broderick, A.E., Gold, R., Georgiev, B., Pesce, D.W., Tiede, P., Ni, C., Moriyama, K., Akiyama, K., Alberdi, A., Alef, W., Algaba, J.C., Anantua, R., Asada, K., Azulay, R., Bach, U., Baczko, A.-K., Ball, D., Baloković, M., Barrett, J., Bauböck, M., Benson, B.A., Bintley, D., Blackburn, L., Blundell, R., Bouman, K.L., Bower, G.C., Boyce, H., Bremer, M.,

Brinkerink, C.D., Brissenden, R., Britzen, S., Broguiere, D., Bronzwaer, T., Bustamante, S., Byun, D.-Y., Carlstrom, J.E., Ceccobello, C., Chael, A., Chan, C.-kwan, Chatterjee, K., Chatterjee, S., Chen, M.-T., Chen, Y., Cheng, X., Cho, I., Christian, P., Conroy, N.S., Conway, J.E., Cordes, J.M., Crawford, T.M., Crew, G.B., Cruz-Osorio, A., Cui, Y., Davelaar, J., De Laurentis, M., Deane, R., Dempsey, J., Desvignes, G., Dexter, J., Dhruv, V., Doeleman, S.S., Dougal, S., Dzib, S.A., Eatough, R.P., Emami, R., Falcke, H., Farah, J., Fish, V.L., Fomalont, E., Ford, H.A., Fraga-Encinas, R., Freeman, W.T., Friberg, P., Fromm, C.M., Fuentes, A., Galison, P., Gammie, C.F., García, R., Gentaz, O., Goddi, C., Gómez-Ruiz, A.I., Gómez, J.L., Gu, M., Gurwell, M., Hada, K., Haggard, D., Haworth, K., Hecht, M.H., Hesper, R., Heumann, D., Ho, L.C., Ho, P., Honma, M., Huang, C.-W.L., Huang, L., Hughes, D.H., Ikeda, S., Impellizzeri, C.M.V., Inoue, M., Issaoun, S., James, D.J., Jannuzi, B.T., Janssen, M., Jeter, B., Jiang, W., Jiménez-Rosales, A., Johnson, M.D., Jorstad, S., Joshi, A.V., Jung, T., Karami, M., Karuppusamy, R., Kawashima, T., Keating, G.K., Kettenis, M., Kim, D.-J., Kim, J.-Y., Kim, J., Kim, J., Kino, M., Koay, J.Y., Kocherlakota, P., Kofuji, Y., Koch, P.M., Koyama, S., Kramer, C., Kramer, M., Krichbaum, T.P., Kuo, C.-Y., La Bella, N., Lauer, T.R., Lee, D., Lee, S.-S., Leung, P.K., Levis, A., Li, Z., Lico, R., Lindahl, G., Lindqvist, M., Lisakov, M., Liu, J., Liu, K., Liuzzo, E., Lo, W.-P., Lobanov, A.P., Loinard, L., Lonsdale, C.J., Lu, R.-S., Mao, J., Marchili, N., Markoff, S., Marrone, D.P., Marscher, A.P., Martí-Vidal, I., Matsushita, S., Matthews, L.D., Menten, K.M., Michalik, D., Mizuno, I., Mizuno, Y., Moran, J.M., Moscibrodzka, M., Müller, C., Mus, A., Musoke, G., Myserlis, I., Nadolski, A., Nagai, H., Nagar, N.M., Nakamura, M., Narayan, R., Narayanan, G., Natarajan, I., Nathanail, A., Navarro Fuentes, S., Neilsen, J., Neri, R., Noutsos, A., Nowak, M.A., Oh, J., Okino, H., Olivares, H., Ortiz-León, G.N., Oyama, T., Palumbo, D.C.M., Paraschos, G.F., Park, J., Parsons, H., Patel, N., Pen, U.-L., Piétu, V., Plambeck, R., PopStefanija, A., Porth, O., Pötzl, F.M., Prather, B., Preciado-López, J.A., Pu, H.-Y., Ramakrishnan, V., Rao, R., Rawlings, M.G., Raymond, A.W., Rezzolla, L., Ricarte, A., Ripperda, B., Roelofs, F., Rogers, A., Ros, E., Romero-Cañizales, C., Roshanineshat, A., Rottmann, H., Roy, A.L., Ruiz, I., Ruszczyk, C., Rygl, K.L.J., Sánchez, S., Sánchez-Argüelles, D., Sánchez-Portal, M., Sasada, M., Satapathy, K., Savolainen, T., Schloerb, F.P., Schonfeld, J., Schuster, K.-F., Shao, L., Shen, Z., Small, D., Sohn, B.W., SooHoo, J., Souccar, K., Sun, H., Tazaki, F., Tetarenko, A.J., Tilanus, R.P.J., Titus, M., Torne, P., Traianou, E., Trent, T., Trippe, S., Turk, M., van Bemmel, I., van Langevelde, H.J., van Rossum, D.R., Vos, J., Wagner, J., Ward-Thompson, D., Wardle, J., Weintroub, J., Wex, N., Wharton, R., Wielgus, M., Wiik, K., Witzel, G., Wondrak, M.F., Wong, G.N., Wu, Q., Yamaguchi, P., Yoon, D., Young, A., Young, K., Younsi, Z., Yuan, F., Yuan, Y.-F., Zensus, J.A., Zhao, G.-Y., Zhang, S., Zhao, S.-S.
ApJ 930, L21 (2022)
10.3847/2041-8213/ac6584

The Disk Population in a Distant Massive Protocluster
Cheng, Y., Tan, J. C., Tobin, J. J., Fedriani, R., Andersen, M., & Wang, J.
ApJ 940, 124 (2022)
10.3847/1538-4357/ac9b54

Heating of the solar chromosphere through current dissipation
da Silva Santos, J. M., Danilovic, S., Leenaarts, J., de la Cruz Rodriguez, J., Zhu, X., White, S. M., Vissers, G. J. M., & Rempel, M.
A&A 661, A59 (2022)
10.1051/0004-6361/202243191

The symbiotic and bipolar nebula M 2-9: Morphological variability of the collimated ionized wind arising from the core
de la Fuente, E., Trinidad, M. A., Tafoya, D., Toledano-Juarez, I., & Garcia-Flores, S.
PASJ 74, 594 (2022)
10.1093/pasj/psac020

First Sagittarius A Event Horizon Telescope Results. VI. Testing the Black Hole Metric*
Event Horizon Telescope Collaboration, Akiyama, K., Alberdi, A., Alef, W., Algaba, J.C., Anantua, R., Asada, K., Azulay, R., Bach, U., Baczko, A.-K., Ball, D., Baloković, M., Barrett, J., Bauböck, M., Benson, B.A., Bintley, D., Blackburn, L., Blundell, R., Bouman, K.L., Bower, G.C., Boyce, H., Bremer, M., Brinkerink, C.D., Brissenden, R., Britzen, S., Broderick, A.E., Broguiere, D., Bronzwaer, T., Bustamante, S., Byun, D.-Y., Carlstrom, J.E., Ceccobello, C., Chael, A., Chan, C.-kwan, Chatterjee, K., Chatterjee, S., Chen, M.-T., Chen, Y., Cheng, X., Cho, I., Christian, P., Conroy, N.S., Conway, J.E., Cordes, J.M., Crawford, T.M., Crew, G.B., Cruz-Osorio, A., Cui, Y., Davelaar, J., De Laurentis, M., Deane, R., Dempsey, J., Desvignes, G., Dexter, J., Dhruv, V., Doeleman, S.S., Dougal, S., Dzib, S.A., Eatough, R.P., Emami, R., Falcke, H., Farah, J., Fish, V.L., Fomalont, E., Ford, H.A., Fraga-Encinas, R., Freeman, W.T., Friberg, P., Fromm, C.M., Fuentes, A., Galison, P., Gammie, C.F., García, R., Gentaz, O., Georgiev, B., Goddi, C., Gold, R., Gómez-Ruiz, A.I., Gómez, J.L., Gu, M., Gurwell, M., Hada, K., Haggard, D., Haworth, K., Hecht, M.H., Hesper, R., Heumann, D., Ho, L.C., Ho, P., Honma, M., Huang, C.-W.L., Huang, L., Hughes, D.H., Ikeda, S., Impellizzeri, C.M.V., Inoue, M., Issaoun, S., James, D.J., Jannuzi, B.T., Janssen, M., Jeter, B., Jiang, W., Jiménez-Rosales, A., Johnson, M.D., Jorstad, S., Joshi, A.V., Jung, T., Karami, M., Karuppusamy, R., Kawashima, T., Keating, G.K., Kettenis, M., Kim, D.-J., Kim, J.-Y., Kim, J., Kim, J., Kino, M., Koay, J.Y., Kocherlakota, P., Kofuji, Y., Koch, P.M., Koyama, S., Kramer, C., Kramer, M., Krichbaum, T.P., Kuo, C.-Y., La Bella, N., Lauer, T.R., Lee, D., Lee, S.-S., Leung, P.K., Levis, A., Li, Z., Lico, R., Lindahl, G., Lindqvist, M., Lisakov, M., Liu, J., Liu, K., Liuzzo, E., Lo, W.-P., Lobanov, A.P., Loinard, L., Lonsdale, C.J., Lu, R.-S., Mao, J., Marchili, N., Markoff, S., Marrone, D.P., Marscher, A.P., Martí-Vidal, I., Matsushita, S., Matthews, L.D., Medeiros, L., Menten, K.M., Michalik, D., Mizuno, I., Mizuno, Y., Moran, J.M., Moriyama, K., Moscibrodzka, M., Müller, C., Mus, A., Musoke, G., Myserlis, I., Nadolski, A., Nagai, H., Nagar, N.M., Nakamura, M., Narayan, R., Narayanan, G., Natarajan, I., Nathanail, A., Fuentes, S.N., Neilsen, J., Neri, R., Ni, C., Noutsos, A., Nowak, M.A., Oh, J., Okino, H., Olivares, H., Ortiz-León, G.N., Oyama, T., Özel, F., Palumbo, D.C.M., Paraschos, G.F., Park, J., Parsons, H., Patel, N., Pen, U.-L., Pesce, D.W., Piétu, V., Plambeck, R., PopStefanija, A., Porth, O., Pötzl, F.M., Prather, B., Preciado-López, J.A., Psaltis, D., Pu, H.-Y., Ramakrishnan, V., Rao, R., Rawlings, M.G., Raymond, A.W., Rezzolla, L., Ricarte, A., Ripperda, B., Roelofs, F., Rogers, A., Ros, E., Romero-Cañizales, C., Roshanineshat, A., Rottmann, H., Roy, A.L., Ruiz, I., Ruszczyk, C., Rygl, K.L.J., Sánchez, S., Sánchez-Argüelles, D., Sánchez-Portal, M., Sasada, M., Satapathy, K., Savolainen, T., Schloerb, F.P., Schonfeld, J., Schuster, K.-F., Shao, L., Shen, Z., Small, D., Sohn, B.W., SooHoo, J., Souccar, K., Sun, H., Tazaki, F., Tetarenko, A.J., Tiede, P., Tilanus, R.P.J., Titus, M., Torne, P., Traianou, E., Trent, T., Trippe, S., Turk, M., van Bemmel, I., van Langevelde, H.J., van Rossum, D.R., Vos, J., Wagner, J., Ward-Thompson, D., Wardle, J., Weintroub, J., Wex, N., Wharton, R., Wielgus, M., Wiik, K., Witzel, G., Wondrak, M.F., Wong, G.N., Wu, Q., Yamaguchi, P., Yoon, D., Young, A., Young, K., Younsi, Z., Yuan, F., Yuan, Y.-F., Zensus, J.A., Zhang, S.,

Zhao, G.-Y., and Zhao, S.-S.
ApJ 930, L17 (2022)
10.3847/2041-8213/ac6756

First Sagittarius A Event Horizon Telescope Results. V. Testing Astrophysical Models of the Galactic Center Black Hole*
Event Horizon Telescope Collaboration, Akiyama, K., Alberdi, A., Alef, W., Algaba, J.C., Anantua, R., Asada, K., Azulay, R., Bach, U., Baczko, A.-K., Ball, D., Baloković, M., Barrett, J., Bauböck, M., Benson, B.A., Bintley, D., Blackburn, L., Blundell, R., Bouman, K.L., Bower, G.C., Boyce, H., Bremer, M., Brinkerink, C.D., Brissenden, R., Britzen, S., Broderick, A.E., Broguiere, D., Bronzwaer, T., Bustamante, S., Byun, D.-Y., Carlstrom, J.E., Ceccobello, C., Chael, A., Chan, C.-kwan, Chatterjee, K., Chatterjee, S., Chen, M.-T., Chen, Y., Cheng, X., Cho, I., Christian, P., Conroy, N.S., Conway, J.E., Cordes, J.M., Crawford, T.M., Crew, G.B., Cruz-Osorio, A., Cui, Y., Davelaar, J., De Laurentis, M., Deane, R., Dempsey, J., Desvignes, G., Dexter, J., Dhruv, V., Doeleman, S.S., Dougal, S., Dzib, S.A., Eatough, R.P., Emami, R., Falcke, H., Farah, J., Fish, V.L., Fomalont, E., Ford, H.A., Fraga-Encinas, R., Freeman, W.T., Friberg, P., Fromm, C.M., Fuentes, A., Galison, P., Gammie, C.F., García, R., Gentaz, O., Georgiev, B., Goddi, C., Gold, R., Gómez-Ruiz, A.I., Gómez, J.L., Gu, M., Gurwell, M., Hada, K., Haggard, D., Haworth, K., Hecht, M.H., Hesper, R., Heumann, D., Ho, L.C., Ho, P., Honma, M., Huang, C.-W.L., Huang, L., Hughes, D.H., Ikeda, S., Violette Impellizzeri, C.M., Inoue, M., Issaoun, S., James, D.J., Jannuzi, B.T., Janssen, M., Jeter, B., Jiang, W., Jiménez-Rosales, A., Johnson, M.D., Jorstad, S., Joshi, A.V., Jung, T., Karami, M., Karuppusamy, R., Kawashima, T., Keating, G.K., Kettenis, M., Kim, D.-J., Kim, J.-Y., Kim, J., Kim, J., Kino, M., Koay, J.Y., Kocherlakota, P., Kofuji, Y., Koch, P.M., Koyama, S., Kramer, C., Kramer, M., Krichbaum, T.P., Kuo, C.-Y., La Bella, N., Lauer, T.R., Lee, D., Lee, S.-S., Leung, P.K., Levis, A., Li, Z., Lico, R., Lindahl, G., Lindqvist, M., Lisakov, M., Liu, J., Liu, K., Liuzzo, E., Lo, W.-P., Lobanov, A.P., Loinard, L., Lonsdale, C.J., Lu, R.-S., Mao, J., Marchili, N., Markoff, S., Marrone, D.P., Marscher, A.P., Martí-Vidal, I., Matsushita, S., Matthews, L.D., Medeiros, L., Menten, K.M., Michalik, D., Mizuno, I., Mizuno, Y., Moran, J.M., Moriyama, K., Moscibrodzka, M., Müller, C., Mus, A., Musoke, G., Myserlis, I., Nadolski, A., Nagai, H., Nagar, N.M., Nakamura, M., Narayan, R., Narayanan, G., Natarajan, I., Nathanail, A., Navarro Fuentes, S., Neilsen, J., Neri, R., Ni, C., Noutsos, A., Nowak, M.A., Oh, J., Okino, H., Olivares, H., Ortiz-León, G.N., Oyama, T., Özel, F., Palumbo, D.C.M., Filippos Paraschos, G., Park, J., Parsons, H., Patel, N., Pen, U.-L., Pesce, D.W., Piétu, V., Plambeck, R., PopStefanija, A., Porth, O., Pötzl, F.M., Prather, B., Preciado-López, J.A., Psaltis, D., Pu, H.-Y., Ramakrishnan, V., Rao, R., Rawlings, M.G., Raymond, A.W., Rezzolla, L., Ricarte, A., Ripperda, B., Roelofs, F., Rogers, A., Ros, E., Romero-Cañizales, C., Roshanineshat, A., Rottmann, H., Roy, A.L., Ruiz, I., Ruszczyk, C., Rygl, K.L.J., Sánchez, S., Sánchez-Argüelles, D., Sánchez-Portal, M., Sasada, M., Satapathy, K., Savolainen, T., Schloerb, F.P., Schonfeld, J., Schuster, K.-F., Shao, L., Shen, Z., Small, D., Sohn, B.W., SooHoo, J., Souccar, K., Sun, H., Tazaki, F., Tetarenko, A.J., Tiede, P., Tilanus, R.P.J., Titus, M., Torne, P., Traianou, E., Trent, T., Trippe, S., Turk, M., van Bemmel, I., van Langevelde, H.J., van Rossum, D.R., Vos, J., Wagner, J., Ward-Thompson, D., Wardle, J., Weintroub, J., Wex, N., Wharton, R., Wielgus, M., Wiik, K., Witzel, G., Wondrak, M.F., Wong, G.N., Wu, Q., Yamaguchi, P., Yoon, D., Young, A., Young, K., Younsi, Z., Yuan, F., Yuan, Y.-F., Zensus, J.A., Zhang, S., Zhao, G.-Y., Zhao, S.-S., Chan, T.L., Qiu, R., Ressler, S., and White, C.
ApJ 930, L16 (2022)
10.3847/2041-8213/ac6672

First Sagittarius A Event Horizon Telescope Results. IV. Variability, Morphology, and Black Hole Mass*

Event Horizon Telescope Collaboration, Akiyama, K., Alberdi, A., Alef, W., Algaba, J.C., Anantua, R., Asada, K., Azulay, R., Bach, U., Baczko, A.-K., Ball, D., Baloković, M., Barrett, J., Bauböck, M., Benson, B.A., Bintley, D., Blackburn, L., Blundell, R., Bouman, K.L., Bower, G.C., Boyce, H., Bremer, M., Brinkerink, C.D., Brissenden, R., Britzen, S., Broderick, A.E., Broguiere, D., Bronzwaer, T., Bustamante, S., Byun, D.-Y., Carlstrom, J.E., Ceccobello, C., Chael, A., Chan, C.-kwan, Chatterjee, K., Chatterjee, S., Chen, M.-T., Chen, Y., Cheng, X., Cho, I., Christian, P., Conroy, N.S., Conway, J.E., Cordes, J.M., Crawford, T.M., Crew, G.B., Cruz-Osorio, A., Cui, Y., Davelaar, J., De Laurentis, M., Deane, R., Dempsey, J., Desvignes, G., Dexter, J., Dhruv, V., Doeleman, S.S., Dougal, S., Dzib, S.A., Eatough, R.P., Emami, R., Falcke, H., Farah, J., Fish, V.L., Fomalont, E., Ford, H.A., Fraga-Encinas, R., Freeman, W.T., Friberg, P., Fromm, C.M., Fuentes, A., Galison, P., Gammie, C.F., García, R., Gentaz, O., Georgiev, B., Goddi, C., Gold, R., Gómez-Ruiz, A.I., Gómez, J.L., Gu, M., Gurwell, M., Hada, K., Haggard, D., Haworth, K., Hecht, M.H., Hesper, R., Heumann, D., Ho, L.C., Ho, P., Honma, M., Huang, C.-W.L., Huang, L., Hughes, D.H., Ikeda, S., Impellizzeri, C.M.V., Inoue, M., Issaoun, S., James, D.J., Jannuzi, B.T., Janssen, M., Jeter, B., Jiang, W., Jiménez-Rosales, A., Johnson, M.D., Jorstad, S., Joshi, A.V., Jung, T., Karami, M., Karuppusamy, R., Kawashima, T., Keating, G.K., Kettenis, M., Kim, D.-J., Kim, J.-Y., Kim, J., Kim, J., Kino, M., Koay, J.Y., Kocherlakota, P., Kofuji, Y., Koch, P.M., Koyama, S., Kramer, C., Kramer, M., Krichbaum, T.P., Kuo, C.-Y., La Bella, N., Lauer, T.R., Lee, D., Lee, S.-S., Leung, P.K., Levis, A., Li, Z., Lico, R., Lindahl, G., Lindqvist, M., Lisakov, M., Liu, J., Liu, K., Liuzzo, E., Lo, W.-P., Lobanov, A.P., Loinard, L., Lonsdale, C.J., Lu, R.-S., Mao, J., Marchili, N., Markoff, S., Marrone, D.P., Marscher, A.P., Martí-Vidal, I., Matsushita, S., Matthews, L.D., Medeiros, L., Menten, K.M., Michalik, D., Mizuno, I., Mizuno, Y., Moran, J.M., Moriyama, K., Moscibrodzka, M., Müller, C., Mus, A., Musoke, G., Myserlis, I., Nadolski, A., Nagai, H., Nagar, N.M., Nakamura, M., Narayan, R., Narayanan, G., Natarajan, I., Nathanail, A., Fuentes, S.N., Neilsen, J., Neri, R., Ni, C., Noutsos, A., Nowak, M.A., Oh, J., Okino, H., Olivares, H., Ortiz-León, G.N., Oyama, T., Palumbo, D.C.M., Paraschos, G.F., Park, J., Parsons, H., Patel, N., Pen, U.-L., Pesce, D.W., Piétu, V., Plambeck, R., PopStefanija, A., Porth, O., Pötzl, F.M., Prather, B., Preciado-López, J.A., Pu, H.-Y., Ramakrishnan, V., Rao, R., Rawlings, M.G., Raymond, A.W., Rezzolla, L., Ricarte, A., Ripperda, B., Roelofs, F., Rogers, A., Ros, E., Romero-Cañizales, C., Roshanineshat, A., Rottmann, H., Roy, A.L., Ruiz, I., Ruszczyk, C., Rygl, K.L.J., Sánchez, S., Sánchez-Argüelles, D., Sánchez-Portal, M., Sasada, M., Satapathy, K., Savolainen, T., Schloerb, F.P., Schonfeld, J., Schuster, K.-F., Shao, L., Shen, Z., Small, D., Sohn, B.W., SooHoo, J., Souccar, K., Sun, H., Tazaki, F., Tetarenko, A.J., Tiede, P., Tilanus, R.P.J., Titus, M., Torne, P., Traianou, E., Trent, T., Trippe, S., Turk, M., van Bemmel, I., van Langevelde, H.J., van Rossum, D.R., Vos, J., Wagner, J., Ward-Thompson, D., Wardle, J., Weintroub, J., Wex, N., Wharton, R., Wielgus, M., Wiik, K., Witzel, G., Wondrak, M.F., Wong, G.N., Wu, Q., Yamaguchi, P., Yoon, D., Young, A., Young, K., Younsi, Z., Yuan, F., Yuan, Y.-F., Zensus, J.A., Zhang, S., Zhao, G.-Y., Zhao, S.-S., and Chang, D.O.

ApJ 930, L15 (2022)

10.3847/2041-8213/ac6736

First Sagittarius A Event Horizon Telescope Results. III. Imaging of the Galactic Center Supermassive Black Hole*
Event Horizon Telescope Collaboration, Akiyama, K., Alberdi, A., Alef, W., Algaba, J.C., Anantua, R., Asada, K., Azulay, R., Bach, U., Baczko, A.-K., Ball, D., Baloković, M., Barrett, J., Bauböck, M., Benson, B.A., Bintley, D., Blackburn, L., Blundell, R., Bouman, K.L., Bower, G.C., Boyce, H., Bremer, M., Brinkerink, C.D., Brissenden, R., Britzen, S., Broderick, A.E., Broguiere, D., Bronzwaer, T., Bustamante, S., Byun, D.-Y., Carlstrom, J.E., Ceccobello, C., Chael, A., Chan, C.-kwan, Chatterjee, K., Chatterjee, S., Chen, M.-T., Chen, Y., Cheng, X., Cho, I., Christian, P., Conroy, N.S., Conway, J.E., Cordes, J.M., Crawford, T.M., Crew, G.B., Cruz-Osorio, A., Cui, Y., Davelaar, J., De Laurentis, M., Deane, R., Dempsey, J., Desvignes, G., Dexter, J., Dhruv, V., Doeleman, S.S., Dougal, S., Dzib, S.A., Eatough, R.P., Emami, R., Falcke, H., Farah, J., Fish, V.L., Fomalont, E., Ford, H.A., Fraga-Encinas, R., Freeman, W.T., Friberg, P., Fromm, C.M., Fuentes, A., Galison, P., Gammie, C.F., García, R., Gentaz, O., Georgiev, B., Goddi, C., Gold, R., Gómez-Ruiz, A.I., Gómez, J.L., Gu, M., Gurwell, M., Hada, K., Haggard, D., Haworth, K., Hecht, M.H., Hesper, R., Heumann, D., Ho, L.C., Ho, P., Honma, M., Huang, C.-W.L., Huang, L., Hughes, D.H., Ikeda, S., Impellizzeri, C.M.V., Inoue, M., Issaoun, S., James, D.J., Jannuzi, B.T., Janssen, M., Jeter, B., Jiang, W., Jiménez-Rosales, A., Johnson, M.D., Jorstad, S., Joshi, A.V., Jung, T., Karami, M., Karuppusamy, R., Kawashima, T., Keating, G.K., Kettenis, M., Kim, D.-J., Kim, J.-Y., Kim, J., Kim, J., Kino, M., Koay, J.Y., Kocherlakota, P., Kofuji, Y., Koch, P.M., Koyama, S., Kramer, C., Kramer, M., Krichbaum, T.P., Kuo, C.-Y., La Bella, N., Lauer, T.R., Lee, D., Lee, S.-S., Leung, P.K., Levis, A., Li, Z., Lico, R., Lindahl, G., Lindqvist, M., Lisakov, M., Liu, J., Liu, K., Liuzzo, E., Lo, W.-P., Lobanov, A.P., Loinard, L., Lonsdale, C.J., Lu, R.-S., Mao, J., Marchili, N., Markoff, S., Marrone, D.P., Marscher, A.P., Martí-Vidal, I., Matsushita, S., Matthews, L.D., Medeiros, L., Menten, K.M., Michalik, D., Mizuno, I., Mizuno, Y., Moran, J.M., Moriyama, K., Moscibrodzka, M., Müller, C., Mus, A., Musoke, G., Myserlis, I., Nadolski, A., Nagai, H., Nagar, N.M., Nakamura, M., Narayan, R., Narayanan, G., Natarajan, I., Nathanail, A., Fuentes, S.N., Neilsen, J., Neri, R., Ni, C., Noutsos, A., Nowak, M.A., Oh, J., Okino, H., Olivares, H., Ortiz-León, G.N., Oyama, T., Özel, F., Palumbo, D.C.M., Paraschos, G.F., Park, J., Parsons, H., Patel, N., Pen, U.-L., Pesce, D.W., Piétu, V., Plambeck, R., PopStefanija, A., Porth, O., Pötzl, F.M., Prather, B., Preciado-López, J.A., Psaltis, D., Pu, H.-Y., Ramakrishnan, V., Rao, R., Rawlings, M.G., Raymond, A.W., Rezzolla, L., Ricarte, A., Ripperda, B., Roelofs, F., Rogers, A., Ros, E., Romero-Cañizales, C., Roshanineshat, A., Rottmann, H., Roy, A.L., Ruiz, I., Ruszczyk, C., Rygl, K.L.J., Sánchez, S., Sánchez-Argüelles, D., Sánchez-Portal, M., Sasada, M., Satapathy, K., Savolainen, T., Schloerb, F.P., Schonfeld, J., Schuster, K.-F., Shao, L., Shen, Z., Small, D., Sohn, B.W., SooHoo, J., Souccar, K., Sun, H., Tazaki, F., Tetarenko, A.J., Tiede, P., Tilanus, R.P.J., Titus, M., Torne, P., Traianou, E., Trent, T., Trippe, S., Turk, M., van Bemmel, I., van Langevelde, H.J., van Rossum, D.R., Vos, J., Wagner, J., Ward-Thompson, D., Wardle, J., Weintroub, J., Wex, N., Wharton, R., Wielgus, M., Wiik, K., Witzel, G., Wondrak, M.F., Wong, G.N., Wu, Q., Yamaguchi, P., Yoon, D., Young, A., Young, K., Younsi, Z., Yuan, F., Yuan, Y.-F., Zensus, J.A., Zhang, S., Zhao, G.-Y., and Zhao, S.-S.
ApJ 930, L14 (2022)
10.3847/2041-8213/ac6429

First Sagittarius A Event Horizon Telescope Results. II. EHT and Multiwavelength Observations, Data Processing, and Calibration*
Event Horizon Telescope Collaboration, Akiyama, K., Alberdi, A., Alef, W., Algaba, J.C., Anantua, R., Asada, K., Azulay, R., Bach, U., Baczko, A.-K., Ball, D., Baloković, M., Barrett, J., Bauböck, M., Benson, B.A., Bintley, D., Blackburn, L., Blundell, R., Bouman, K.L., Bower, G.C., Boyce, H., Bremer, M., Brinkerink, C.D., Brissenden, R., Britzen, S., Broderick, A.E., Broguiere, D., Bronzwaer, T., Bustamante, S., Byun, D.-Y., Carlstrom, J.E., Ceccobello, C., Chael, A., Chan, C.-kwan, Chatterjee, K., Chatterjee, S., Chen, M.-T., Chen, Y., Cheng, X., Cho, I., Christian, P., Conroy, N.S., Conway, J.E., Cordes, J.M., Crawford, T.M., Crew, G.B., Cruz-Osorio, A., Cui, Y., Davelaar, J., De Laurentis, M., Deane, R., Dempsey, J., Desvignes, G., Dexter, J., Dhruv, V., Doeleman, S.S., Dougal, S., Dzib, S.A., Eatough, R.P., Emami, R., Falcke, H., Farah, J., Fish, V.L., Fomalont, E., Ford, H.A., Fraga-Encinas, R., Freeman, W.T., Friberg, P., Fromm, C.M., Fuentes, A., Galison, P., Gammie, C.F., García, R., Gentaz, O., Georgiev, B., Goddi, C., Gold, R., Gómez-Ruiz, A.I., Gómez, J.L., Gu, M., Gurwell, M., Hada, K., Haggard, D., Haworth, K., Hecht, M.H., Hesper, R., Heumann, D., Ho, L.C., Ho, P., Honma, M., Huang, C.-W.L., Huang, L., Hughes, D.H., Ikeda, S., Impellizzeri, C.M.V., Inoue, M., Issaoun, S., James, D.J., Jannuzi, B.T., Janssen, M., Jeter, B., Jiang, W., Jiménez-Rosales, A., Johnson, M.D., Jorstad, S., Joshi, A.V., Jung, T., Karami, M., Karuppusamy, R., Kawashima, T., Keating, G.K., Kettenis, M., Kim, D.-J., Kim, J.-Y., Kim, J., Kim, J., Kino, M., Koay, J.Y., Kocherlakota, P., Kofuji, Y., Koch, P.M., Koyama, S., Kramer, C., Kramer, M., Krichbaum, T.P., Kuo, C.-Y., La Bella, N., Lauer, T.R., Lee, D., Lee, S.-S., Leung, P.K., Levis, A., Li, Z., Lico, R., Lindahl, G., Lindqvist, M., Lisakov, M., Liu, J., Liu, K., Liuzzo, E., Lo, W.-P., Lobanov, A.P., Loinard, L., Lonsdale, C.J., Lu, R.-S., Mao, J., Marchili, N., Markoff, S., Marrone, D.P., Marscher, A.P., Martí-Vidal, I., Matsushita, S., Matthews, L.D., Medeiros, L., Menten, K.M., Michalik, D., Mizuno, I., Mizuno, Y., Moran, J.M., Moriyama, K., Moscibrodzka, M., Müller, C., Mus, A., Musoke, G., Myserlis, I., Nadolski, A., Nagai, H., Nagar, N.M., Nakamura, M., Narayan, R., Narayanan, G., Natarajan, I., Nathanail, A., Fuentes, S.N., Neilsen, J., Neri, R., Ni, C., Noutsos, A., Nowak, M.A., Oh, J., Okino, H., Olivares, H., Ortiz-León, G.N., Oyama, T., Özel, F., Palumbo, D.C.M., Paraschos, G.F., Park, J., Parsons, H., Patel, N., Pen, U.-L., Pesce, D.W., Piétu, V., Plambeck, R., PopStefanija, A., Porth, O., Pötzl, F.M., Prather, B., Preciado-López, J.A., Psaltis, D., Pu, H.-Y., Ramakrishnan, V., Rao, R., Rawlings, M.G., Raymond, A.W., Rezzolla, L., Ricarte, A., Ripperda, B., Roelofs, F., Rogers, A., Ros, E., Romero-Cañizales, C., Roshanineshat, A., Rottmann, H., Roy, A.L., Ruiz, I., Ruszczyk, C., Rygl, K.L.J., Sánchez, S., Sánchez-Argüelles, D., Sánchez-Portal, M., Sasada, M., Satapathy, K., Savolainen, T., Schloerb, F.P., Schonfeld, J., Schuster, K.-F., Shao, L., Shen, Z., Small, D., Sohn, B.W., SooHoo, J., Souccar, K., Sun, H., Tazaki, F., Tetarenko, A.J., Tiede, P., Tilanus, R.P.J., Titus, M., Torne, P., Traianou, E., Trent, T., Trippe, S., Turk, M., van Bemmel, I., van Langevelde, H.J., van Rossum, D.R., Vos, J., Wagner, J., Ward-Thompson, D., Wardle, J., Weintroub, J., Wex, N., Wharton, R., Wielgus, M., Wiik, K., Witzel, G., Wondrak, M.F., Wong, G.N., Wu, Q., Yamaguchi, P., Yoon, D., Young, A., Young, K., Younsi, Z., Yuan, F., Yuan, Y.-F., Zensus, J.A., Zhang, S., Zhao, G.-Y., Zhao, S.-S., Agurto, C., Araneda, J.P., Arriagada, O., Bertarini, A., Berthold, R., Blanchard, J., Brown, K., Cárdenas, M., Cantzler, M., Caro, P., Chuter, T.C., Ciechanowicz, M., Coulson, I.M., Crowley, J., Degenaar, N., Dornbusch, S., Durán, C.A., Forster, K., Geertsema, G., González, E., Graham, D., Gueth, F., Han, C.-C., Herrera, C., Herrero-Illana, R., Heyminck, S., Hoge, J., Huang, Y.-D., Jiang, H., John, D., Klein, T., Kubo, D., Kuroda, J., Kwon, C., Laing, R., Liu, C.-T., Liu, K.-Y., Mac-Auliffe, F., Martin-Cocher, P., Matulonis, C., Messias, H., Meyer-Zhao, Z., Montenegro-Montes, F.,

Montgomerie, W., Muders, D., Nishioka, H., Norton, T.J., Olivares, R., Pérez-Beaupuits, J.P., Parra, R., Poirier, M., Pradel, N., Raffin, P.A., Ramírez, J., Reynolds, M., Saez-Madain, A.F., Santana, J., Silva, K.M., Sousa, D., Stahm, W., Torstensson, K., Venegas, P., Walther, C., Wieching, G., Wijnands, R., and Wouterloot, J.G.A.
ApJ 930, L13 (2022)
10.3847/2041-8213/ac6675

First Sagittarius A Event Horizon Telescope Results. I. The Shadow of the Supermassive Black Hole in the Center of the Milky Way*
Event Horizon Telescope Collaboration, Akiyama, K., Alberdi, A., Alef, W., Algaba, J.C., Anantua, R., Asada, K., Azulay, R., Bach, U., Baczko, A.-K., Ball, D., Baloković, M., Barrett, J., Bauböck, M., Benson, B.A., Bintley, D., Blackburn, L., Blundell, R., Bouman, K.L., Bower, G.C., Boyce, H., Bremer, M., Brinkerink, C.D., Brissenden, R., Britzen, S., Broderick, A.E., Broguiere, D., Bronzwaer, T., Bustamante, S., Byun, D.-Y., Carlstrom, J.E., Ceccobello, C., Chael, A., Chan, C.-kwan, Chatterjee, K., Chatterjee, S., Chen, M.-T., Chen, Y., Cheng, X., Cho, I., Christian, P., Conroy, N.S., Conway, J.E., Cordes, J.M., Crawford, T.M., Crew, G.B., Cruz-Osorio, A., Cui, Y., Davelaar, J., De Laurentis, M., Deane, R., Dempsey, J., Desvignes, G., Dexter, J., Dhruv, V., Doeleman, S.S., Dougal, S., Dzib, S.A., Eatough, R.P., Emami, R., Falcke, H., Farah, J., Fish, V.L., Fomalont, E., Ford, H.A., Fraga-Encinas, R., Freeman, W.T., Friberg, P., Fromm, C.M., Fuentes, A., Galison, P., Gammie, C.F., García, R., Gentaz, O., Georgiev, B., Goddi, C., Gold, R., Gómez-Ruiz, A.I., Gómez, J.L., Gu, M., Gurwell, M., Hada, K., Haggard, D., Haworth, K., Hecht, M.H., Hesper, R., Heumann, D., Ho, L.C., Ho, P., Honma, M., Huang, C.-W.L., Huang, L., Hughes, D.H., Ikeda, S., Impellizzeri, C.M.V., Inoue, M., Issaoun, S., James, D.J., Jannuzi, B.T., Janssen, M., Jeter, B., Jiang, W., Jiménez-Rosales, A., Johnson, M.D., Jorstad, S., Joshi, A.V., Jung, T., Karami, M., Karuppusamy, R., Kawashima, T., Keating, G.K., Kettenis, M., Kim, D.-J., Kim, J.-Y., Kim, J., Kim, J., Kino, M., Koay, J.Y., Kocherlakota, P., Kofuji, Y., Koch, P.M., Koyama, S., Kramer, C., Kramer, M., Krichbaum, T.P., Kuo, C.-Y., La Bella, N., Lauer, T.R., Lee, D., Lee, S.-S., Leung, P.K., Levis, A., Li, Z., Lico, R., Lindahl, G., Lindqvist, M., Lisakov, M., Liu, J., Liu, K., Liuzzo, E., Lo, W.-P., Lobanov, A.P., Loinard, L., Lonsdale, C.J., Lu, R.-S., Mao, J., Marchili, N., Markoff, S., Marrone, D.P., Marscher, A.P., Martí-Vidal, I., Matsushita, S., Matthews, L.D., Medeiros, L., Menten, K.M., Michalik, D., Mizuno, I., Mizuno, Y., Moran, J.M., Moriyama, K., Moscibrodzka, M., Müller, C., Mus, A., Musoke, G., Myserlis, I., Nadolski, A., Nagai, H., Nagar, N.M., Nakamura, M., Narayan, R., Narayanan, G., Natarajan, I., Nathanail, A., Fuentes, S.N., Neilsen, J., Neri, R., Ni, C., Noutsos, A., Nowak, M.A., Oh, J., Okino, H., Olivares, H., Ortiz-León, G.N., Oyama, T., Özel, F., Palumbo, D.C.M., Paraschos, G.F., Park, J., Parsons, H., Patel, N., Pen, U.-L., Pesce, D.W., Piétu, V., Plambeck, R., PopStefanija, A., Porth, O., Pötzl, F.M., Prather, B., Preciado-López, J.A., Psaltis, D., Pu, H.-Y., Ramakrishnan, V., Rao, R., Rawlings, M.G., Raymond, A.W., Rezzolla, L., Ricarte, A., Ripperda, B., Roelofs, F., Rogers, A., Ros, E., Romero-Cañizales, C., Roshanineshat, A., Rottmann, H., Roy, A.L., Ruiz, I., Ruszczyk, C., Rygl, K.L.J., Sánchez, S., Sánchez-Argüelles, D., Sánchez-Portal, M., Sasada, M., Satapathy, K., Savolainen, T., Schloerb, F.P., Schonfeld, J., Schuster, K.-F., Shao, L., Shen, Z., Small, D., Sohn, B.W., SooHoo, J., Souccar, K., Sun, H., Tazaki, F., Tetarenko, A.J., Tiede, P., Tilanus, R.P.J., Titus, M., Torne, P., Traianou, E., Trent, T., Trippe, S., Turk, M., van Bemmel, I., van Langevelde, H.J., van Rossum, D.R., Vos, J., Wagner, J., Ward-Thompson, D., Wardle, J., Weintroub, J., Wex, N., Wharton, R., Wielgus, M., Wiik, K., Witzel, G., Wondrak, M.F., Wong, G.N., Wu, Q., Yamaguchi, P., Yoon, D., Young, A., Young, K., Younsi, Z., Yuan, F., Yuan, Y.-F., Zensus, J.A., Zhang, S.,

Zhao, G.-Y., Zhao, S.-S., Agurto, C., Allardi, A., Amestica, R., Araneda, J.P., Arriagada, O., Berghuis, J.L., Bertarini, A., Berthold, R., Blanchard, J., Brown, K., Cárdenas, M., Cantzler, M., Caro, P., Castillo-Domínguez, E., Chan, T.L., Chang, C.-C., Chang, D.O., Chang, S.-H., Chang, S.-C., Chen, C.-C., Chilson, R., Chuter, T.C., Ciechanowicz, M., Colin-Beltran, E., Coulson, I.M., Crowley, J., Degenaar, N., Dornbusch, S., Durán, C.A., Everett, W.B., Faber, A., Forster, K., Fuchs, M.M., Gale, D.M., Geertsema, G., González, E., Graham, D., Gueth, F., Halverson, N.W., Han, C.-C., Han, K.-C., Hasegawa, Y., Hernández-Rebollar, J.L., Herrera, C., Herrero-Illana, R., Heyminck, S., Hirota, A., Hoge, J., Hostler Schimpf, S.R., Howie, R.E., Huang, Y.-D., Jiang, H., Jinchi, H., John, D., Kimura, K., Klein, T., Kubo, D., Kuroda, J., Kwon, C., Lacasse, R., Laing, R., Leitch, E.M., Li, C.-T., Liu, C.-T., Liu, K.-Y., Lin, L.C.-C., Lu, L.-M., Mac-Auliffe, F., Martin-Cocher, P., Matulonis, C., Maute, J.K., Messias, H., Meyer-Zhao, Z., Montaña, A., Montenegro-Montes, F., Montgomerie, W., Moreno Nolasco, M.E., Muders, D., Nishioka, H., Norton, T.J., Nystrom, G., Ogawa, H., Olivares, R., Oshiro, P., Pérez-Beaupuits, J.P., Parra, R., Phillips, N.M., Poirier, M., Pradel, N., Qiu, R., Raffin, P.A., Rahlin, A.S., Ramírez, J., Ressler, S., Reynolds, M., Rodríguez-Montoya, I., Saez-Madain, A.F., Santana, J., Shaw, P., Shirkey, L.E., Silva, K.M., Snow, W., Sousa, D., Sridharan, T.K., Stahm, W., Stark, A.A., Test, J., Torstensson, K., Venegas, P., Walther, C., Wei, T.-S., White, C., Wieching, G., Wijnands, R., Wouterloot, J.G.A., Yu, C.-Y., Yu (于威), W., and Zeballos, M.
ApJ 930, L12 (2022)
10.3847/2041-8213/ac6674

Selective Dynamical Imaging of Interferometric Data
Farah, J., Galison, P., Akiyama, K., Bouman, K.L., Bower, G.C., Chael, A., Fuentes, A., Gómez, J.L., Honma, M., Johnson, M.D., Kofuji, Y., Marrone, D.P., Moriyama, K., Narayan, R., Pesce, D.W., Tiede, P., Wielgus, M., Zhao, G.-Y., Alberdi, A., Alef, W., Algaba, J.C., Anantua, R., Asada, K., Azulay, R., Baczko, A.-K., Ball, D., Baloković, M., Barrett, J., Benson, B.A., Bintley, D., Blackburn, L., Blundell, R., Boland, W., Boyce, H., Bremer, M., Brinkerink, C.D., Brissenden, R., Britzen, S., Broderick, A.E., Broguiere, D., Bronzwaer, T., Bustamente, S., Byun, D.-Y., Carlstrom, J.E., Chan, C.-kwan, Chatterjee, K., Chatterjee, S., Chen, M.-T., Chen, Y., Cho, I., Christian, P., Conway, J.E., Cordes, J.M., Crawford, T.M., Crew, G.B., Cruz-Osorio, A., Cui, Y., Davelaar, J., De Laurentis, M., Deane, R., Dempsey, J., Desvignes, G., Doeleman, S.S., Eatough, R.P., Falcke, H., Fish, V.L., Fomalont, E., Ford, H.A., Fraga-Encinas, R., Friberg, P., Fromm, C.M., Gammie, C.F., Garc'a, R., Gentaz, O., Goddi, C., Gold, R., Gómez-Ruiz, A.I., Gu, M., Gurwell, M., Hada, K., Haggard, D., Hecht, M.H., Hesper, R., Ho, L.C., Ho, P., Huang, C.-W.L., Huang, L., Hughes, D.H., Ikeda, S., Inoue, M., Issaoun, S., James, D.J., Jannuzi, B.T., Janssen, M., Jeter, B., Jiang, W., Jimenez-Rosales, A., Jorstad, S., Jung, T., Karami, M., Karuppusamy, R., Kawashima, T., Keating, G.K., Kettenis, M., Kim, D.-J., Kim, J.-Y., Kim, J., Kim, J., Kino, M., Koay, J.Y., Koch, P.M., Koyama, S., Kramer, C., Kramer, M., Krichbaum, T.P., Kuo, C.-Y., Lauer, T.R., Lee, S.-S., Levis, A., Li, Y.-R., Li, Z., Lico, R., Lindahl, G., Lindqvist, M., Liu, J., Liu, K., Liuzzo, E., Lo, W.-P., Lobanov, A.P., Loinard, L., Lonsdale, C., Lu, R.-S., MacDonald, N.R., Mao, J., Marchili, N., Markoff, S., Marscher, A.P., Martí-Vidal, I., Matsushita, S., Matthews, L.D., Medeiros, L., Menten, K.M., Mizuno, I., Mizuno, Y., Moran, J.M., Moscibrodzka, M., Müller, C., Mejas, A.M., Musoke, G., Nagai, H., Nagar, N.M., Nakamura, M., Narayanan, G., Natarajan, I., Nathanail, A., Neilsen, J., Neri, R., Ni, C., Noutsos, A., Nowak, M.A., Okino, H., Olivares, H., Ortiz-León, G.N., Oyama, T., zel, F., Palumbo, D.C.M., Park, J., Patel, N., Pen, U.-L., Piétu, V., Plambeck, R., PopStefanija, A., Porth, O., Pötzl, F.M., Prather, B., Preciado-López, J.A.,

Psaltis, D., Pu, H.-Y., Ramakrishnan, V., Rao, R., Rawlings, M.G., Raymond, A.W., Rezzolla, L., Ripperda, B., Roelofs, F., Rogers, A., Ros, E., Rose, M., Roshanineshat, A., Rottmann, H., Roy, A.L., Ruszczyk, C., Rygl, K.L.J., Sánchez, S., Sánchez-Arguelles, D., Sasada, M., Savolainen, T., Schloerb, F.P., Schuster, K.-F., Shao, L., Shen, Z., Small, D., Sohn, B.W., SooHoo, J., Sun, H., Tazaki, F., Tetarenko, A.J., Tilanus, R.P.J., Titus, M., Toma, K., Torne, P., Traianou, E., Trent, T., Trippe, S., van Bemmel, I., van Langevelde, H.J., van Rossum, D.R., Wagner, J., Ward-Thompson, D., Wardle, J., Weintroub, J., Wex, N., Wharton, R., Wiik, K., Wong, G.N., Wu, Q., Yoon, D., Young, A., Young, K., Younsi, Z., Yuan, F., Yuan, Y.-F., Zensus, J.A., Zhao, S.-S., and Event Horizon Telescope Collaboration
ApJ 930, L18 (2022)
10.3847/2041-8213/ac6615

The molecular gas resolved by ALMA in the low-metallicity merging dwarf galaxy Haro 11
Gao, Y., Gu, Q., Shi, Y., Zhou, L., Bao, M., Yu, X., Zhang, Z.-Y., Wang, T., Madden, S. C., Hayes, M., Lu, S., & Xu, K.
A&A 661, A136 (2022)
10.1051/0004-6361/202142309

A Universal Power-law Prescription for Variability from Synthetic Images of Black Hole Accretion Flows
Georgiev, B., Pesce, D.W., Broderick, A.E., Wong, G.N., Dhruv, V., Wielgus, M., Gammie, C.F., Chan, C.-kwan, Chatterjee, K., Emami, R., Mizuno, Y., Gold, R., Fromm, C.M., Ricarte, A., Yoon, D., Joshi, A.V., Prather, B., Cruz-Osorio, A., Johnson, M.D., Porth, O., Olivares, H., Younsi, Z., Rezzolla, L., Vos, J., Qiu, R., Nathanail, A., Narayan, R., Chael, A., Anantua, R., Moscibrodzka, M., Akiyama, K., Alberdi, A., Alef, W., Algaba, J.C., Asada, K., Azulay, R., Bach, U., Baczko, A.-K., Ball, D., Baloković, M., Barrett, J., Bauböck, M., Benson, B.A., Bintley, D., Blackburn, L., Blundell, R., Bouman, K.L., Bower, G.C., Boyce, H., Bremer, M., Brinkerink, C.D., Brissenden, R., Britzen, S., Broguiere, D., Bronzwaer, T., Bustamante, S., Byun, D.-Y., Carlstrom, J.E., Ceccobello, C., Chatterjee, S., Chen, M.-T., Chen, Y., Cheng, X., Cho, I., Christian, P., Conroy, N.S., Conway, J.E., Cordes, J.M., Crawford, T.M., Crew, G.B., Cui, Y., Davelaar, J., De Laurentis, M., Deane, R., Dempsey, J., Desvignes, G., Dexter, J., Doeleman, S.S., Dougal, S., Dzib, S.A., Eatough, R.P., Falcke, H., Farah, J., Fish, V.L., Fomalont, E., Ford, H.A., Fraga-Encinas, R., Freeman, W.T., Friberg, P., Fuentes, A., Galison, P., García, R., Gentaz, O., Goddi, C., Gómez-Ruiz, A.I., Gómez, J.L., Gu, M., Gurwell, M., Hada, K., Haggard, D., Haworth, K., Hecht, M.H., Hesper, R., Heumann, D., Ho, L.C., Ho, P., Honma, M., Huang, C.-W.L., Huang, L., Hughes, D.H., Ikeda, S., Impellizzeri, C.M.V., Inoue, M., Issaoun, S., James, D.J., Jannuzi, B.T., Janssen, M., Jeter, B., Jiang, W., Jiménez-Rosales, A., Jorstad, S., Jung, T., Karami, M., Karuppusamy, R., Kawashima, T., Keating, G.K., Kettenis, M., Kim, D.-J., Kim, J.-Y., Kim, J., Kim, J., Kino, M., Koay, J.Y., Kocherlakota, P., Kofuji, Y., Koch, P.M., Koyama, S., Kramer, C., Kramer, M., Krichbaum, T.P., Kuo, C.-Y., La Bella, N., Lauer, T.R., Lee, D., Lee, S.-S., Lehner, L., Leung, P.K., Levis, A., Li, Z., Lico, R., Lindahl, G., Lindqvist, M., Lisakov, M., Liu, J., Liu, K., Liuzzo, E., Lo, W.-P., Lobanov, A.P., Loinard, L., Lonsdale, C.J., Lu, R.-S., Mao, J., Marchili, N., Markoff, S., Marrone, D.P., Marscher, A.P., Martí-Vidal, I., Matsushita, S., Matthews, L.D., Menten, K.M., Michalik, D., Mizuno, I., Moran, J.M., Moriyama, K., Müller, C., Mus, A., Musoke, G., Myserlis, I., Nadolski, A., Nagai, H., Nagar, N.M., Nakamura, M., Narayanan, G., Natarajan, I., Navarro Fuentes, S., Neilsen, J., Neri, R., Ni, C., Noutsos, A., Nowak, M.A., Oh, J., Okino, H., Ortiz-León, G.N., Oyama, T.,

Palumbo, D.C.M., Paraschos, G.F., Park, J., Parsons, H., Patel, N., Pen, U.-L., Piétu, V., Plambeck, R., PopStefanija, A., Pötzl, F.M., Preciado-López, J.A., Pu, H.-Y., Ramakrishnan, V., Rao, R., Rawlings, M.G., Raymond, A.W., Ripperda, B., Roelofs, F., Rogers, A., Ros, E., Romero-Cañizales, C., Roshanineshat, A., Rottmann, H., Roy, A.L., Ruiz, I., Ruszczyk, C., Rygl, K.L.J., Sánchez, S., Sánchez-Argüelles, D., Sánchez-Portal, M., Sasada, M., Satapathy, K., Savolainen, T., Schloerb, F.P., Schonfeld, J., Schuster, K.-F., Shao, L., Shen, Z., Small, D., Sohn, B.W., SooHoo, J., Souccar, K., Sun, H., Tazaki, F., Tetarenko, A.J., Tiede, P., Tilanus, R.P.J., Titus, M., Torne, P., Traianou, E., Trent, T., Trippe, S., Turk, M., van Bemmel, I., van Langevelde, H.J., van Rossum, D.R., Wagner, J., Ward-Thompson, D., Wardle, J., Weintroub, J., Wex, N., Wharton, R., Wiik, K., Witzel, G., Wondrak, M.F., Wu, Q., Yamaguchi, P., Young, A., Young, K., Yuan, F., Yuan, Y.-F., Zensus, J.A., Zhang, S., Zhao, G.-Y., and Zhao, S.-S.
ApJ 930, L20 (2022)
10.3847/2041-8213/ac65eb

Phenol in High-mass Star-forming Regions
Ghosh, R., Sil, M., Kumar Mondal, S., Gorai, P., Sahu, D., Kumar Kushwaha, R., Sivaraman, B., & Das, A.
Res. Astron. Astrophys. 22, 65021 (2022)
10.1088/1674-4527/ac6aa9

ATOMIUM: ALMA tracing the origins of molecules in dust forming oxygen rich M-type stars. Motivation, sample, calibration, and initial results
Gottlieb, C. A., Decin, L., Richards, A. M. S., De Ceuster, F., Homan, W., Wallström, S. H. J., Danilovich, T., Millar, T. J., Montarges, M., Wong, K. T., McDonald, I., Baudry, A., Bolte, J., Cannon, E., De Beck, E., de Koter, A., El Mellah, I., Etoka, S., Gobrecht, D., Gray, M., Herpin, F., Jeste, M., Kervella, P., Khouri, T., Lagadec, E., Maes, S., Malfait, J., Menten, K. M., Müller, H. S. P., Pimpanuwat, B., Plane, J. M. C., Sahai, R., Van de Sande, M., Waters, L. B. F. M., Yates, J., & Zijlstra, A.
A&A 660, A94 (2022)
10.1051/0004-6361/202140431

First extragalactic detection of a phosphorus-bearing molecule with ALCHEMI: Phosphorus nitride (PN)
Haasler, D., Rivilla, V. M., Martin, S., Holdship, J., Viti, S., Harada, N., Mangum, J., Sakamoto, K., Muller, S., Tanaka, K., Yoshimura, Y., Nakanishi, K., Colzi, L., Hunt, L., Emig, K. L., Aladro, R., Humire, P., Henkel, C., & van der Werf, P.
A&A 659, A158 (2022)
10.1051/0004-6361/202142032

ALCHEMI Finds a "Shocking" Carbon Footprint in the Starburst Galaxy NGC 253
Harada, N., Martin, S., Mangum, J. G., Sakamoto, K., Muller, S., Rivilla, V. M., Henkel, C., Meier, D. S., Colzi, L., Yamagishi, M., Tanaka, K., Nakanishi, K., Herrero-Illana, R., Yoshimura, Y., Humire, P. K., Aladro, R., van der Werf, P. P., & Emig, K. L.
ApJ 938, 80 (2022)
10.3847/1538-4357/ac8dfc

Energizing Star Formation: The Cosmic-Ray Ionization Rate in NGC 253 Derived from ALCHEMI Measurements of H3O⁺ and SO
Holdship, J., Mangum, J. G., Viti, S., Behrens, E., Harada, N., Martin, S., Sakamoto, K., Muller, S., Tanaka, K., Nakanishi, K., Herrero-Illana, R., Yoshimura, Y., Aladro, R., Colzi, L., Emig, K. L., Henkel, C., Nishimura, Y., Rivilla, V. M., van der Werf, P. P., & Alma Comprehensive High-Resolution Extragalactic Molecular Inventory (Alchemi) Collaboration
ApJ 931, 89 (2022)
10.3847/1538-4357/ac6753

Methanol masers in NGC 253 with ALCHEMI
Humire, P. K., Henkel, C., Hernandez-Gomez, A., Martin, S., Mangum, J., Harada, N., Muller, S., Sakamoto, K., Tanaka, K., Yoshimura, Y., Nakanishi, K., Mühle, S., Herrero-Illana, R., Meier, D. S., Caux, E., Aladro, R., Mauersberger, R., Viti, S., Colzi, L., Rivilla, V. M., Gorski, M., Menten, K. M., Huang, K.-Y., Aalto, S., van der Werf, P. P., & Emig, K. L.
A&A 663, A33 (2022)
10.1051/0004-6361/202243384

Resolving the Inner Parsec of the Blazar J1924-2914 with the Event Horizon Telescope
Issaoun, S., Wielgus, M., Jorstad, S., Krichbaum, T.P., Blackburn, L., Janssen, M., Chan, C.-kwan, Pesce, D.W., Gómez, J.L., Akiyama, K., Mościbrodzka, M., Martí-Vidal, I., Chael, A., Lico, R., Liu, J., Ramakrishnan, V., Lisakov, M., Fuentes, A., Zhao, G.-Y., Moriyama, K., Broderick, A.E., Tiede, P., MacDonald, N.R., Mizuno, Y., Traianou, E., Loinard, L., Davelaar, J., Gurwell, M., Lu, R.-S., Alberdi, A., Alef, W., Algaba, J.C., Anantua, R., Asada, K., Azulay, R., Bach, U., Baczko, A.-K., Ball, D., Baloković, M., Barrett, J., Bauböck, M., Benson, B.A., Bintley, D., Blundell, R., Boland, W., Bouman, K.L., Bower, G.C., Boyce, H., Bremer, M., Brinkerink, C.D., Brissenden, R., Britzen, S., Broguiere, D., Bronzwaer, T., Bustamante, S., Byun, D.-Y., Carlstrom, J.E., Ceccobello, C., Chatterjee, K., Chatterjee, S., Chen, M.-T., Chen, Y., Cho, I., Christian, P., Conroy, N.S., Conway, J.E., Cordes, J.M., Crawford, T.M., Crew, G.B., Cruz-Osorio, A., Cui, Y., De Laurentis, M., Deane, R., Dempsey, J., Desvignes, G., Dexter, J., Doeleman, S.S., Dhruv, V., Dzib Quijano, S.A., Eatough, R.P., Emami, R., Falcke, H., Farah, J., Fish, V.L., Fomalont, E., Ford, H.A., Fraga-Encinas, R., Freeman, W.T., Friberg, P., Fromm, C.M., Galison, P., Gammie, C.F., García, R., Gentaz, O., Georgiev, B., Goddi, C., Gold, R., Gómez-Ruiz, A.I., Gu, M., Hada, K., Haggard, D., Hecht, M.H., Hesper, R., Ho, L.C., Ho, P., Honma, M., Huang, C.-W.L., Huang, L., Hughes, D.H., Ikeda, S., Impellizzeri, C.M.V., Inoue, M., James, D.J., Jannuzi, B.T., Jeter, B., Jiang, W., Jimenez-Rosales, A., Johnson, M.D., Joshi, A.V., Jung, T., Karami, M., Karuppusamy, R., Kawashima, T., Keating, G.K., Kettenis, M., Kim, D.-J., Kim, J.-Y., Kim, J., Kim, J., Kino, M., Koay, J.Y., Kocherlakota, P., Kofuji, Y., Koch, P.M., Koyama, S., Kramer, C., Kramer, M., Kuo, C.-Y., La Bella, N., Lauer, T.R., Lee, D., Lee, S.-S., Leung, P.K., Levis, A., Li, Z., Lico, R., Lindahl, G., Lindqvist, M., Liu, K., Liuzzo, E., Lo, W.-P., Lobanov, A.P., Lonsdale, C., Mao, J., Marchili, N., Markoff, S., Marrone, D.P., Marscher, A.P., Matsushita, S., Matthews, L.D., Medeiros, L., Menten, K.M., Michalik, D., Mizuno, I., Mizuno, Y., Moran, J.M., Müller, C., Mus, A., Musoke, G., Myserlis, I., Nadolski, A., Nagai, H., Nagar, N.M., Nakamura, M., Narayan, R., Narayanan, G., Natarajan, I., Nathanail, A., Neilsen, J., Neri, R., Ni, C., Noutsos, A., Nowak, M.A., Oh, J., Okino, H., Olivares, H., Ortiz-León, G.N., Oyama, T., Özel, F., Palumbo, D.C.M., Paraschos, G.F., Park, J., Parsons, H., Patel, N., Pen, U.-L., Piétu, V., Plambeck, R., PopStefanija, A., Porth, O., Pötzl, F.M., Prather, B., Preciado-López, J.A., Psaltis, D., Pu, H.-Y., Rao, R., Rawlings, M.G., Raymond, A.W., Rezzolla, L.,

Ricarte, A., Ripperda, B., Roelofs, F., Rogers, A., Ros, E., Romero-Canizales, C., Roshanineshat, A., Rottmann, H., Roy, A.L., Ruiz, I., Ruszczyk, C., Rygl, K.L.J., Sánchez, S., Sánchez-Arguelles, D., Sanchez-Portal, M., Sasada, M., Satapathy, K., Savolainen, T., Schloerb, F.P., Schuster, K.-F., Shao, L., Shen, Z., Small, D., Sohn, B.W., SooHoo, J., Souccar, K., Sun, H., Tazaki, F., Tetarenko, A.J., Tiede, P., Tilanus, R.P.J., Titus, M., Torne, P., Trent, T., Trippe, S., van Bemmel, I., van Langevelde, H.J., van Rossum, D.R., Vos, J., Wagner, J., Ward-Thompson, D., Wardle, J., Weintroub, J., Wex, N., Wharton, R., Wiik, K., Witzel, G., Wondrak, M., Wong, G.N., Wu, Q., Yamaguchi, P., Yoon, D., Young, A., Young, K., Younsi, Z., Yuan, F., Yuan, Y.-F., Zensus, J.A., Zhang, S., and Zhao, S.-S.
ApJ 934, 145 (2022)
10.3847/1538-4357/ac7a40

Physics of ULIRGs with MUSE and ALMA: The PUMA project. IV. No tight relation between cold molecular outflow rates and AGN luminosities
Lamperti, I., Pereira-Santaella, M., Perna, M., Colina, L., Arribas, S., Garcia-Burillo, S., Gonzalez-Alfonso, E., Aalto, S., Alonso-Herrero, A., Combes, F., Labiano, A., Piqueras-Lopez, J., Rigopoulou, D., & van der Werf, P.
A&A 668, A45 (2022)
10.1051/0004-6361/202244054

Isolated Massive Star Formation in G28.20-0.05
Law, C.-Y., Tan, J. C., Gorai, P., Zhang, Y., Fedriani, R., Tafoya, D., Tanaka, K. E. I., Cosentino, G., Yang, Y.-L., Mardones, D., Beltran, M. T., & Garay, G.
ApJ 939, 120 (2022)
10.3847/1538-4357/ac90c7

The Morpho-kinematic Architecture of Super Star Clusters in the Center of NGC 253
Levy, R. C., Bolatto, A. D., Leroy, A. K., Sormani, M. C., Emig, K. L., Gorski, M., Lenkic, L., Mills, E. A. C., Tarantino, E., Teuben, P., Veilleux, S., & Walter, F.
ApJ 935, 19 (2022)
10.3847/1538-4357/ac7b7a

The ALMA Survey of 70 μm Dark High-mass Clumps in Early Stages (ASHES). VII. Chemistry of Embedded Dense Cores
Li, S., Sanhueza, P., Lu, X., Lee, C. W., Zhang, Q., Bovino, S., Sabatini, G., Liu, T., Kim, K.-T., Morii, K., Tafoya, D., Tatematsu, K., Sakai, T., Wang, J., Li, F., Silva, A., Izumi, N., & Allingham, D.
ApJ 939, 102 (2022)
10.3847/1538-4357/ac94d4

Characterization of Two 2 mm detected Optically Obscured Dusty Star-forming Galaxies
Manning, S. M., Casey, C. M., Zavala, J. A., Magdis, G. E., Drew, P. M., Champagne, J. B., Aravena, M., Bethermin, M., Clements, D. L., Finkelstein, S. L., Fujimoto, S., Hayward, C. C., Hodge, J. A., Ilbert, O., Kartaltepe, J. S., Knudsen, K. K., Koekemoer, A. M., Man, A. W. S., Sanders, D. B., Sheth, K., Spilker, J. S., Staguhn, J., Talia, M., Treister, E., & Yun, M. S.
ApJ 925, 23 (2022)
10.3847/1538-4357/ac366a

Radial profiles of lensed z ~ 1 galaxies on sub-kiloparsec scales
Nagy, D., Dessauges-Zavadsky, M., Richard, J., Schaerer, D., Combes, F., Messa, M., & Chisholm, J.
A&A 657, A25 (2022)
10.1051/0004-6361/202141557

CO line observations of OH/IR stars in the inner Galactic Bulge: Characteristics of stars at the tip of the AGB
Olofsson, H., Khouri, T., Sargent, B. A., Winnberg, A., Blommaert, J. A. D. L., Groenewegen, M. A. T., Muller, S., Kastner, J. H., Meixner, M., Otsuka, M., Patel, N., Ryde, N., & Srinivasan, S.
A&A 665, A82 (2022)
10.1051/0004-6361/202244053

MUSE-ALMA haloes VII: survey science goals & design, data processing and final catalogues
Peroux, C., Weng, S., Karki, A., Augustin, R., Kulkarni, V. P., Szakacs, R., Klitsch, A., Hamanowicz, A., Fresco, A. Y., Zwaan, M. A., Biggs, A., Fox, A. J., Hayes, M., Howk, J. C., Kacprzak, G. G., Kassin, S., Kuntschner, H., Nelson, D., & Pettini, M.
MNRAS 516, 5618 (2022)
10.1093/mnras/stac2546

The ALMA Survey of 70 µm Dark High-mass Clumps in Early Stages (ASHES). VI. The Core-scale CO Depletion
Sabatini, G., Bovino, S., Sanhueza, P., Morii, K., Li, S., Redaelli, E., Zhang, Q., Lu, X., Feng, S., Tafoya, D., Izumi, N., Sakai, T., Tatematsu, K., & Allingham, D.
ApJ 936, 80 (2022)
10.3847/1538-4357/ac83aa

First detection of AlF line emission towards M-type AGB stars
Saberi, M., Khouri, T., Velilla-Prieto, L., Fonfria, J. P., Vlemmings, W. H. T., & Wedemeyer, S.
A&A 663, A54 (2022)
10.1051/0004-6361/202141704

The Variability of the Black Hole Image in M87 at the Dynamical Timescale
Satapathy, K., Psaltis, D., Özel, F., Medeiros, L., Dougall, S.T., Chan, C.-K., Wielgus, M., Prather, B.S., Wong, G.N., Gammie, C.F., Akiyama, K., Alberdi, A., Alef, W., Algaba, J.C., Anantua, R., Asada, K., Azulay, R., Baczko, A.-K., Ball, D., Baloković, M., Barrett, J., Benson, B.A., Bintley, D., Blackburn, L., Blundell, R., Boland, W., Bouman, K.L., Bower, G.C., Boyce, H., Bremer, M., Brinkerink, C.D., Brissenden, R., Britzen, S., Broderick, A.E., Broguiere, D., Bronzwaer, T., Bustamente, S., Byun, D.-Y., Carlstrom, J.E., Chael, A., Chatterjee, K., Chatterjee, S., Chen, M.-T., Chen, Y., Cho, I., Christian, P., Conway, J.E., Cordes, J.M., Crawford, T.M., Crew, G.B., Cruz-Osorio, A., Cui, Y., Davelaar, J., De Laurentis, M., Deane, R., Dempsey, J., Desvignes, G., Dexter, J., Doeleman, S.S., Eatough, R.P., Falcke, H., Farah, J., Fish, V.L., Fomalont, E., Ford, H.A., Fraga-Encinas, R., Friberg, P., Fromm, C.M., Fuentes, A., Galison, P., García, R., Gentaz, O., Georgiev, B., Goddi, C., Gold, R., Gómez-Ruiz, A.I., Gómez, J.L., Gu, M., Gurwell, M., Hada, K., Haggard, D., Hecht, M.H., Hesper, R., Ho, L.C., Ho, P., Honma, M.,

Huang, C.-W.L., Huang, L., Hughes, D.H., Ikeda, S., Inoue, M., Issaoun, S., James, D.J., Jannuzi, B.T., Janssen, M., Jeter, B., Jiang, W., Jimenez-Rosales, A., Johnson, M.D., Jorstad, S., Jung, T., Karami, M., Karuppusamy, R., Kawashima, T., Keating, G.K., Kettenis, M., Kim, D.-J., Kim, J.-Y., Kim, J., Kim, J., Kino, M., Koay, J.Y., Kofuji, Y., Koch, P.M., Koyama, S., Kramer, C., Kramer, M., Krichbaum, T.P., Kuo, C.-Y., Lauer, T.R., Lee, S.-S., Levis, A., Li, Y.-R., Li, Z., Lindqvist, M., Lico, R., Lindahl, G., Liu, J., Liu, K., Liuzzo, E., Lo, W.-P., Lobanov, A.P., Loinard, L., Lonsdale, C., Lu, R.-S., MacDonald, N.R., Mao, J., Marchili, N., Markoff, S., Marrone, D.P., Marscher, A.P., Martí-Vidal, I., Matsushita, S., Matthews, L.D., Menten, K.M., Mizuno, I., Mizuno, Y., Moran, J.M., Moriyama, K., Moscibrodzka, M., Müller, C., Mejías, A.M., Musoke, G., Nagai, H., Nagar, N.M., Nakamura, M., Narayan, R., Narayanan, G., Natarajan, I., Nathanail, A., Neilsen, J., Neri, R., Ni, C., Noutsos, A., Nowak, M.A., Okino, H., Olivares, H., Ortiz-León, G.N., Oyama, T., Palumbo, D.C.M., Park, J., Patel, N., Pen, U.-L., Pesce, D.W., Piétu, V., Plambeck, R., PopStefanija, A., Porth, O., Pötzl, F.M., Preciado-López, J.A., Pu, H.-Y., Ramakrishnan, V., Rao, R., Rawlings, M.G., Raymond, A.W., Rezzolla, L., Ripperda, B., Roelofs, F., Rogers, A., Ros, E., Rose, M., Roshanineshat, A., Rottmann, H., Roy, A.L., Ruszczyk, C., Rygl, K.L.J., Sánchez, S., Sánchez-Arguelles, D., Sasada, M., Savolainen, T., Schloerb, F.P., Schuster, K.-F., Shao, L., Shen, Z., Small, D., Sohn, B.W., SooHoo, J., Sun, H., Tazaki, F., Tetarenko, A.J., Tiede, P., Tilanus, R.P.J., Titus, M., Toma, K., Torne, P., Traianou, E., Trent, T., Trippe, S., van Bemmel, I., van Langevelde, H.J., van Rossum, D.R., Wagner, J., Ward-Thompson, D., Wardle, J., Weintroub, J., Wex, N., Wharton, R., Wiik, K., Wu, Q., Yoon, D., Young, A., Young, K., Younsi, Z., Yuan, F., Yuan, Y.-F., Zensus, J.A., Zhao, G.-Y., and Zhao, S.-S.
ApJ 925, 13 (2022)
10.3847/1538-4357/ac332e

First Images of the Molecular Gas around a Born-again Star Revealed by ALMA
Tafoya, D., Toala, J. A., Unnikrishnan, R., Vlemmings, W. H. T., Guerrero, M. A., Kimeswenger, S., van Hoof, P. A. M., Zapata, L. A., Trevino-Morales, S. P., & Rodriguez-Gonzalez, J. B.
ApJ 925, L4 (2022)
10.3847/2041-8213/ac4a5b

Vibrationally Excited Lines of HC3N Associated with the Molecular Disk around the G24.78+0.08 A1 Hypercompact H II Region
Taniguchi, K., Tanaka, K. E. I., Zhang, Y., Fedriani, R., Tan, J. C., Takakuwa, S., Nakamura, F., Saito, M., Majumdar, L., & Herbst, E.
ApJ 931, 99 (2022)
10.3847/1538-4357/ac69d1

Possible Systematic Rotation in the Mature Stellar Population of a z = 9.1 Galaxy
Tokuoka, T., Inoue, A. K., Hashimoto, T., Ellis, R. S., Laporte, N., Sugahara, Y., Matsuo, H., Tamura, Y., Fudamoto, Y., Moriwaki, K., Roberts-Borsani, G., Shimizu, I., Yamanaka, S., Yoshida, N., Zackrisson, E., & Zheng, W.
ApJ 933, L19 (2022)
10.3847/2041-8213/ac7447

A Highly Settled Disk around Oph163131
Villenave, M., Stapelfeldt, K. R., Duchene, G., Menard, F., Lambrechts, M., Sierra, A., Flores, C., Dent, W. R. F., Wolff, S., Ribas, A., Benisty, M., Cuello, N., & Pinte, C.
ApJ 930, 11 (2022)
10.3847/1538-4357/ac5fae

Millimeter Light Curves of Sagittarius A Observed during the 2017 Event Horizon Telescope Campaign*
Wielgus, M., Marchili, N., Martí-Vidal, I., Keating, G.K., Ramakrishnan, V., Tiede, P., Fomalont, E., Issaoun, S., Neilsen, J., Nowak, M.A., Blackburn, L., Gammie, C.F., Goddi, C., Haggard, D., Lee, D., Moscibrodzka, M., Tetarenko, A.J., Bower, G.C., Chan, C.-kwan, Chatterjee, K., Chesler, P.M., Dexter, J., Doeleman, S.S., Georgiev, B., Gurwell, M., Johnson, M.D., Marrone, D.P., Mus, A., Psaltis, D., Ripperda, B., Witzel, G., Akiyama, K., Alberdi, A., Alef, W., Algaba, J.C., Anantua, R., Asada, K., Azulay, R., Bach, U., Baczko, A.-K., Ball, D., Baloković, M., Barrett, J., Bauböck, M., Benson, B.A., Bintley, D., Blundell, R., Boland, W., Bouman, K.L., Boyce, H., Bremer, M., Brinkerink, C.D., Brissenden, R., Britzen, S., Broderick, A.E., Broguiere, D., Bronzwaer, T., Bustamante, S., Byun, D.-Y., Carlstrom, J.E., Ceccobello, C., Chael, A., Chatterjee, S., Chen, M.-T., Chen, Y., Cho, I., Christian, P., Conroy, N.S., Conway, J.E., Cordes, J.M., Crawford, T.M., Crew, G.B., Cruz-Osorio, A., Cui, Y., Davelaar, J., De Laurentis, M., Deane, R., Dempsey, J., Desvignes, G., Dhruv, V., Dzib, S.A., Eatough, R.P., Emami, R., Falcke, H., Farah, J., Fish, V.L., Ford, H.A., Fraga-Encinas, R., Freeman, W.T., Friberg, P., Fromm, C.M., Fuentes, A., Galison, P., García, R., Gentaz, O., Gold, R., Gómez-Ruiz, A.I., Gómez, J.L., Gu, M., Hada, K., Haworth, K., Hecht, M.H., Hesper, R., Ho, L.C., Ho, P., Honma, M., Huang, C.-W.L., Huang, L., Hughes, D.H., Ikeda, S., Impellizzeri, C.M.V., Inoue, M., James, D.J., Jannuzi, B.T., Janssen, M., Jeter, B., Jiang, W., Jiménez-Rosales, A., Jorstad, S., Joshi, A.V., Jung, T., Karami, M., Karuppusamy, R., Kawashima, T., Kettenis, M., Kim, D.-J., Kim, J.-Y., Kim, J., Kim, J., Kino, M., Koay, J.Y., Kocherlakota, P., Kofuji, Y., Koch, P.M., Koyama, S., Kramer, C., Kramer, M., Krichbaum, T.P., Kuo, C.-Y., La Bella, N., Lauer, T.R., Lee, S.-S., Leung, P.K., Levis, A., Li, Z., Lico, R., Lindahl, G., Lindqvist, M., Lisakov, M., Liu, J., Liu, K., Liuzzo, E., Lo, W.-P., Lobanov, A.P., Loinard, L., Lonsdale, C., Lu, R.-S., Mao, J., Markoff, S., Marscher, A.P., Matsushita, S., Matthews, L.D., Medeiros, L., Menten, K.M., Michalik, D., Mizuno, I., Mizuno, Y., Moran, J.M., Moriyama, K., Müller, C., Musoke, G., Myserlis, I., Nadolski, A., Nagai, H., Nagar, N.M., Nakamura, M., Narayan, R., Narayanan, G., Natarajan, I., Nathanail, A., Navarro Fuentes, S., Neri, R., Ni, C., Noutsos, A., Oh, J., Okino, H., Olivares, H., Ortiz-León, G.N., Oyama, T., Özel, F., Palumbo, D.C.M., Paraschos, G.F., Park, J., Parsons, H., Patel, N., Pen, U.-L., Pesce, D.W., Piétu, V., Plambeck, R., PopStefanija, A., Porth, O., Pötzl, F.M., Prather, B., Preciado-López, J.A., Pu, H.-Y., Rao, R., Rawlings, M.G., Raymond, A.W., Rezzolla, L., Ricarte, A., Roelofs, F., Rogers, A., Ros, E., Romero-Canizales, C., Roshanineshat, A., Rottmann, H., Roy, A.L., Ruiz, I., Ruszczyk, C., Rygl, K.L.J., Sánchez, S., Sánchez-Argüelles, D., Sánchez-Portal, M., Sasada, M., Satapathy, K., Savolainen, T., Schloerb, F.P., Schuster, K.-F., Shao, L., Shen, Z., Small, D., Won Sohn, B., SooHoo, J., Souccar, K., Sun, H., Tazaki, F., Tilanus, R.P.J., Titus, M., Torne, P., Traianou, E., Trent, T., Trippe, S., van Bemmel, I., van Langevelde, H.J., van Rossum, D.R., Vos, J., Wagner, J., Ward-Thompson, D., Wardle, J., Weintroub, J., Wex, N., Wharton, R., Wiik, K., Wondrak, M.F., Wong, G.N., Wu, Q., Yamaguchi, P., Yoon, D., Young, A., Young, K., Younsi, Z., Yuan, F., Yuan, Y.-F., Zensus, J.A., Zhang, S., Zhao, G.-Y., and Zhao, S.-S.
ApJ 930, L19 (2022)
10.3847/2041-8213/ac6428

Is there a sub-parsec-scale jet base in the nearby dwarf galaxy NGC 4395?
Yang, J., Yang, X., Wrobel, J. M., Paragi, Z., Gurvits, L. I., Ho, L. C., Nyland, K., Fan, L., & Tafoya, D.
MNRAS 514, 6215 (2022)
10.1093/mnras/stac1753

Massive Protostars in a Protocluster - A Multi-scale ALMA View of G35.20-0.74N.
Zhang, Y., Tanaka, K. E. I., Tan, J. C., Yang, Y.-L., Greco, E., Beltran, M. T., Sakai, N., De Buizer, J. M., Rosero, V., Fedriani, R., & Garay, G.
ApJ 936, 68 (2022)
10.3847/1538-4357/ac847f

Dense Gas and Star Formation in Nearby Infrared-bright Galaxies: APEX Survey of HCN and HCO^+ $J = 2\text{-}1$
Zhou, J., Zhang, Z.-Y., Gao, Y., Wang, J., Shi, Y., Gu, Q., Yang, C., Wang, T., & Tan, Q.-H.
ApJ 936, 58 (2022)
10.3847/1538-4357/ac82eb

Nordic authors (ALMA)

Physical properties of accretion shocks toward the Class I protostellar system Oph-IRS 44
Artur de la Villarmois, E., Guzman, V. V., Jørgensen, J. K., Kristensen, L. E., Bergin, E. A., Harsono, D., Sakai, N., van Dishoeck, E. F., & Yamamoto, S.
A&A 667, A20 (2022)
10.1051/0004-6361/202244312

Compact molecular gas emission in local LIRGs among low- and high-z galaxies
Bellocchi, E., Pereira-Santaella, M., Colina, L., Labiano, A., Sanchez-Garcia, M., Alonso-Herrero, A., Arribas, S., Garcia-Burillo, S., Villar-Martin, M., Rigopoulou, D., Valentino, F., Puglisi, A., Diaz-Santos, T., Cazzoli, S., & Usero, A.
A&A 664, A60 (2022)
10.1051/0004-6361/202142802

Now You See It, Now You Don't: Star Formation Truncation Precedes the Loss of Molecular Gas by 100 Myr in Massive Poststarburst Galaxies at z ~ 0.6
Bezanson, R., Spilker, J. S., Suess, K. A., Setton, D. J., Feldmann, R., Greene, J. E., Kriek, M., Narayanan, D., & Verrico, M.
ApJ 925, 153 (2022)
10.3847/1538-4357/ac3dfa

Radio and X-Ray Observations of the Luminous Fast Blue Optical Transient AT 2020xnd
Bright, J. S., Margutti, R., Matthews, D., Brethauer, D., Coppejans, D., Wieringa, M. H., Metzger, B. D., DeMarchi, L., Laskar, T., Romero, C., Alexander, K. D., Horesh, A., Migliori, G., Chornock, R., Berger, E., Bietenholz, M., Devlin, M. J., Dicker, S. R., Jacobson-Galan, W. V., Mason, B. S., Milisavljevic, D., Motta, S. E., Mroczkowski, T., Ramirez-Ruiz, E., Rhodes, L., Sarazin, C. L., Sfaradi, I., & Sievers, J.
ApJ 926, 112 (2022)
10.3847/1538-4357/ac4506

The Central 1000 au of a Prestellar Core Revealed with ALMA. II. Almost Complete Freeze-out
Caselli, P., Pineda, J. E., Sipilä, O., Zhao, B., Redaelli, E., Spezzano, S., Maureira, M. J., Alves, F., Bizzocchi, L., Bourke, T. L., Chacon-Tanarro, A., Friesen, R., Galli, D., Harju, J., Jimenez-Serra, I., Keto, E., Li, Z.-Y., Padovani, M., Schmiedeke, A., Tafalla, M., & Vastel, C.
ApJ 929, 13 (2022)
[10.3847/1538-4357/ac5913](https://doi.org/10.3847/1538-4357/ac5913)

An ALMA Spectroscopic Survey of the Brightest Submillimeter Galaxies in the SCUBA-2-COSMOS Field (AS2COSPEC): Survey Description and First Results
Chen, C.-C., Liao, C.-L., Smail, I., Swinbank, A. M., Ao, Y., Bunker, A. J., Chapman, S. C., Hatsukade, B., Ivison, R. J., Lee, M. M., Serjeant, S., Umehata, H., Wang, W.-H., & Zhao, Y.
ApJ 929, 159 (2022)
[10.3847/1538-4357/ac61df](https://doi.org/10.3847/1538-4357/ac61df)

Asteroid Measurements at Millimeter Wavelengths with the South Pole Telescope
Chichura, P. M., Foster, A., Patel, C., Ossa-Jaen, N., Ade, P. A. R., Ahmed, Z., Anderson, A. J., Archipley, M., Austermann, J. E., Avva, J. S., Balkenhol, L., Barry, P. S., Thakur, R. B., Beall, J. A., Benabed, K., Bender, A. N., Benson, B. A., Bianchini, F., Bleem, L. E., Bouchet, F. R., Bryant, L., Byrum, K., Carlstrom, J. E., Carter, F. W., Cecil, T. W., Chang, C. L., Chaubal, P., Chen, G., Chiang, H. C., Cho, H.-M., Chou, T.-L., Citron, R., Cliche, J.-F., Crawford, T. M., Crites, A. T., Cukierman, A., Daley, C. M., Denison, E. V., Dibert, K., Ding, J., Dobbs, M. A., Dutcher, D., Everett, W., Feng, C., Ferguson, K. R., Fu, J., Galli, S., Gallicchio, J., Gambrel, A. E., Gardner, R. W., George, E. M., Goeckner-Wald, N., Gualtieri, R., Guns, S., Gupta, N., Guyser, R., de Haan, T., Halverson, N. W., Harke-Hosemann, A. H., Harrington, N. L., Henning, J. W., Hilton, G. C., Hivon, E., Holder, G. P., Holzapfel, W. L., Hood, J. C., Howe, D., Hrubes, J. D., Huang, N., Hubmayr, J., Irwin, K. D., Jeong, O. B., Jonas, M., Jones, A., Khaire, T. S., Knox, L., Kofman, A. M., Korman, M., Kubik, D. L., Kuhlmann, S., Kuo, C.-L., Lee, A. T., Leitch, E. M., Li, D., Lowitz, A., Lu, C., Marrone, D. P., McMahon, J. J., Meyer, S. S., Michalik, D., Millea, M., Mocanu, L. M., Montgomery, J., Moran, C. C., Nadolski, A., Natoli, T., Nguyen, H., Nibarger, J. P., Noble, G., Novosad, V., Omori, Y., Padin, S., Pan, Z., Paschos, P., Patil, S., Pearson, J., Phadke, K. A., Posada, C. M., Prabhu, K., Pryke, C., Quan, W., Rahlin, A., Reichardt, C. L., Riebel, D., Riedel, B., Rouble, M., Ruhl, J. E., Saliwanchik, B. R., Sayre, J. T., Schaffer, K. K., Schiappucci, E., Shirokoff, E., Sievers, C., Smecher, G., Sobrin, J. A., Springmann, A., Stark, A. A., Stephen, J., Story, K. T., Suzuki, A., Tandoi, C., Thompson, K. L., Thorne, B., Tucker, C., Umilta, C., Vale, L. R., Veach, T., Vieira, J. D., Wang, G., Whitehorn, N., Wu, W. L. K., Yefremenko, V., Yoon, K. W., & Young, M. R.
ApJ 936, 173 (2022)
[10.3847/1538-4357/ac89ec](https://doi.org/10.3847/1538-4357/ac89ec)

The ALMA-PILS survey: First tentative detection of 3-hydroxypropenal (HOCHCHCHO) in the interstellar medium and chemical modeling of the C3H4O2 isomers
Coutens, A., Loison, J.-C., Boulanger, A., Caux, E., Müller, H. S. P., Wakelam, V., Manigand, S., & Jørgensen, J. K.
A&A 660, L6 (2022)
[10.1051/0004-6361/202243038](https://doi.org/10.1051/0004-6361/202243038)

ALMA Survey of Orion Planck Galactic Cold Clumps (ALMASOP): Evidence for a Molecular Jet Launched at an Unprecedented Early Phase of Protostellar Evolution
Dutta, S., Lee, C.-F., Hirano, N., Liu, T., Johnstone, D., Liu, S.-Y., Tatematsu, K., Goldsmith, P. F., Sahu, D., Evans, N. J., Sanhueza, P., Kwon, W., Qin, S.-L., Samal, M. R., Zhang, Q., Kim, K.-T., Shang, H., Lee, C. W., Moraghan, A., Jhan, K.-S., Li, S., Lee, J.-E., Traficante, A., Juvela, M., Bronfman, L., Eden, D., Soam, A., He, J., Liu, H.-li, Kuan, Y.-J., Pelkonen, V.-M., Luo, Q., Yi, H.-W., & Hsu, S.-Y.
ApJ 931, 130 (2022)
10.3847/1538-4357/ac67a1

The ALMA REBELS Survey: Average [C II] 158 μm Sizes of Star-forming Galaxies from z ~ 7 to z ~ 4
Fudamoto, Y., Smit, R., Bowler, R. A. A., Oesch, P. A., Bouwens, R., Stefanon, M., Inami, H., Endsley, R., Gonzalez, V., Schouws, S., Stark, D., Algera, H. S. B., Aravena, M., Barrufet, L., da Cunha, E., Dayal, P., Ferrara, A., Graziani, L., Hodge, J. A., Hygate, A. P. S., Inoue, A. K., Nanayakkara, T., Pallottini, A., Pizzati, E., Schneider, R., Sommovigo, L., Sugahara, Y., Topping, M., van der Werf, P., Bethermin, M., Cassata, P., Dessauges-Zavadsky, M., Ibar, E., Faisst, A. L., Fujimoto, S., Ginolfi, M., Hathi, N., Jones, G. C., Pozzi, F., & Schaerer, D.
ApJ 934, 144 (2022)
10.3847/1538-4357/ac7a47

The uncertain interstellar medium of high-redshift quiescent galaxies: Impact of methodology
Gobat, R., D'Eugenio, C., Liu, D., Caminha, G. B., Daddi, E., & Blanquez, D.
A&A 668, L4 (2022)
10.1051/0004-6361/202244995

GOODS-ALMA 2.0: Source catalog, number counts, and prevailing compact sizes in 1.1 mm galaxies
Gomez-Guijarro, C., Elbaz, D., Xiao, M., Bethermin, M., Franco, M., Magnelli, B., Daddi, E., Dickinson, M., Demarco, R., Inami, H., Rujopakarn, W., Magdis, G. E., Shu, X., Chary, R., Zhou, L., Alexander, D. M., Bournaud, F., Ciesla, L., Ferguson, H. C., Finkelstein, S. L., Giavalisco, M., Iono, D., Juneau, S., Kartaltepe, J. S., Lagache, G., Le Floc'h, E., Leiton, R., Lin, L., Motohara, K., Mullaney, J., Okumura, K., Pannella, M., Papovich, C., Pope, A., Sargent, M. T., Silverman, J. D., Treister, E., & Wang, T.
A&A 658, A43 (2022)
10.1051/0004-6361/202141615

GOODS-ALMA 2.0: Starbursts in the main sequence reveal compact star formation regulating galaxy evolution prequenching
Gomez-Guijarro, C., Elbaz, D., Xiao, M., Kokorev, V. I., Magdis, G. E., Magnelli, B., Daddi, E., Valentino, F., Sargent, M. T., Dickinson, M., Bethermin, M., Franco, M., Pope, A., Kalita, B. S., Ciesla, L., Demarco, R., Inami, H., Rujopakarn, W., Shu, X., Wang, T., Zhou, L., Alexander, D. M., Bournaud, F., Chary, R., Ferguson, H. C., Finkelstein, S. L., Giavalisco, M., Iono, D., Juneau, S., Kartaltepe, J. S., Lagache, G., Le Floc'h, E., Leiton, R., Leroy, L., Lin, L., Motohara, K., Mullaney, J., Okumura, K., Pannella, M., Papovich, C., & Treister, E.
A&A 659, A196 (2022)
10.1051/0004-6361/202142352

Propagation of transverse waves in the solar chromosphere probed at different heights with ALMA sub-bands
Guevara Gomez, J. C., Jafarzadeh, S., Wedemeyer, S., & Szydlarski, M.
A&A 665, L2 (2022)
10.1051/0004-6361/202244387

High resolution spectral imaging of CO(7-6), [CI](2-1), and continuum of three high-z lensed dusty star-forming galaxies using ALMA
Gururajan, G., Bethermin, M., Theule, P., Spilker, J. S., Aravena, M., Archipley, M. A., Chapman, S. C., De Breuck, C., Gonzalez, A., Hayward, C. C., Hezaveh, Y., Hill, R., Jarugula, S., Litke, K. C., Malkan, M., Marrone, D. P., Narayanan, D., Phadke, K. A., Reuter, C., Vieira, J. D., Vizgan, D., & Weiß, A.
A&A 663, A22 (2022)
10.1051/0004-6361/202142172

The ALMA REBELS Survey: The Cosmic H I Gas Mass Density in Galaxies at z ~ 7
Heintz, K. E., Oesch, P. A., Aravena, M., Bouwens, R. J., Dayal, P., Ferrara, A., Fudamoto, Y., Graziani, L., Inami, H., Sommovigo, L., Smit, R., Stefanon, M., Topping, M., Pallottini, A., & van der Werf, P.
ApJ 934, L27 (2022)
10.3847/2041-8213/ac8057

The Solar ALMA Science Archive (SALSA). First release, SALAT, and FITS header standard
Henriques, V. M. J., Jafarzadeh, S., Guevara Gomez, J. C., Eklund, H., Wedemeyer, S., Szydlarski, M., Haugan, S. V. H., & Mohan, A.
A&A 659, A31 (2022)
10.1051/0004-6361/202142291

Rapid build-up of the stellar content in the protocluster core SPT2349-56 at z = 4.3
Hill, R., Chapman, S., Phadke, K. A., Aravena, M., Archipley, M., Ashby, M. L. N., Bethermin, M., Canning, R. E. A., Gonzalez, A., Greve, T. R., Gururajan, G., Hayward, C. C., Hezaveh, Y., Jarugula, S., MacIntyre, D., Marrone, D. P., Miller, T., Rennehan, D., Reuter, C., Rotermund, K. M., Scott, D., Spilker, J., Vieira, J. D., Wang, G., & Weiß, A.
MNRAS 512, 4352 (2022)
10.1093/mnras/stab3539

Unveiling the main sequence to starburst transition region with a sample of intermediate redshift luminous infrared galaxies
Hogan, L., Rigopoulou, D., Garcia-Burillo, S., Alonso-Herrero, A., Barrufet, L., Combes, F., Garcia-Bernete, I., Magdis, G. E., Pereira-Santaella, M., Thatte, N., & Weiß, A.
MNRAS 512, 2371 (2022)
10.1093/mnras/stac520

ALMA Survey of Orion Planck Galactic Cold Clumps (ALMASOP): A Hot Corino Survey toward Protostellar Cores in the Orion Cloud
Hsu, S.-Y., Liu, S.-Y., Liu, T., Sahu, D., Lee, C.-F., Tatematsu, K., Kim, K.-T., Hirano, N., Yang, Y.-L., Johnstone, D., Liu, H., Juvela, M., Bronfman, L., Chen, H.-R. V., Dutta, S., Eden, D. J., Jhan, K.-S., Kuan, Y.-J., Lee, C. W., Lee, J.-E., Li, S., Liu, C.-F., Qin, S.-L., Sanhueza, P., Shang, H., Soam, A., Traficante, A., & Zhou, J.
ApJ 927, 218 (2022)
10.3847/1538-4357/ac49e0

Rotational and rovibrational spectroscopy of CD_3OH with an account of CD_3OH toward IRAS 16293-2422
Ilyushin, V. V., Müller, H. S. P., Jørgensen, J. K., Bauerecker, S., Maul, C., Bakhmat, Y., Alekseev, E. A., Dorovskaya, O., Vlasenko, S., Lewen, F., Schlemmer, S., Berezkin, K., & Lees, R. M.
A&A 658, A127 (2022)
10.1051/0004-6361/202142326

The ALMA REBELS Survey: dust continuum detections at $z > 6.5$
Inami, H., Algera, H. S. B., Schouws, S., Sommovigo, L., Bouwens, R., Smit, R., Stefanon, M., Bowler, R. A. A., Endsley, R., Ferrara, A., Oesch, P., Stark, D., Aravena, M., Barrufet, L., da Cunha, E., Dayal, P., De Looze, I., Fudamoto, Y., Gonzalez, V., Graziani, L., Hodge, J. A., Hygate, A. P. S., Nanayakkara, T., Pallottini, A., Riechers, D. A., Schneider, R., Topping, M., & van der Werf, P.
MNRAS 515, 3126 (2022)
10.1093/mnras/stac1779

Diagnosing deceivingly cold dusty galaxies at $3.5 < z < 6$: A substantial population of compact starbursts with high infrared optical depths
Jin, S., Daddi, E., Magdis, G. E., Liu, D., Weaver, J. R., Tan, Q., Valentino, F., Gao, Y., Schinnerer, E., Calabro, A., Gu, Q., & Sese, D. B.
A&A 665, A3 (2022)
10.1051/0004-6361/202243341

Binarity of a protostar affects the evolution of the disk and planets
Jørgensen, J. K., Kuruwita, R. L., Harsono, D., Haugbølle, T., Kristensen, L. E., & Bergin, E. A.
Nature 606, 272 (2022)
10.1038/s41586-022-04659-4

Magnetic field strengths of the synchrotron self-absorption region in the jet of CTA 102 during radio flares
Kim, S.-H., Lee, S.-S., Lee, J. W., Hodgson, J. A., Kang, S., Algaba, J.-C., Kim, J.-Y., Hodges, M., Agudo, I., Fuentes, A., Escudero, J., Myserlis, I., Traianou, E., Lähteenmäki, A., Tornikoski, M., Tammi, J., Ramakrishnan, V., & Järvel√ä E.
MNRAS 510, 815 (2022)
10.1093/mnras/stab3473

CO excitation and line energy distributions in gas-selected galaxies
Klitsch, A., Christensen, L., Valentino, F., Kanekar, N., Møller, P., Zwaan, M. A., Fynbo, J. P. U., Neeleman, M., & Prochaska, J. X.
MNRAS 514, 2346 (2022)
10.1093/mnras/stac1190

Millimetre-wave spectroscopy of 2-hydroxyprop-2-enal and an astronomical search with ALMA
Koucky, J., Kolesnikova, L., Lukova, K., Vavra, K., Kania, P., Coutens, A., Loison, J.-C., Jørgensen, J. K., Belloche, A., & Urban, S.
A&A 666, A158 (2022)
10.1051/0004-6361/202244376

Multiphase ISM in the z = 5.7 Hyperluminous Starburst SPT 0346-52
Litke, K. C., Marrone, D. P., Aravena, M., Bethermin, M., Chapman, S. C., Dong, C., Hayward, C. C., Hill, R., Jarugula, S., Malkan, M. A., Narayanan, D., Reuter, C. A., Spilker, J. S., Sulzenauer, N., Vieira, J. D., & Weiß, A.
ApJ 928, 179 (2022)
10.3847/1538-4357/ac58f9

ATOMS: ALMA Three-millimeter Observations of Massive Star-forming regions – IX. A pilot study towards IRDC G034.43+00.24 on multi-scale structures and gas kinematics
Liu, H.-L., Tej, A., Liu, T., Goldsmith, P. F., Stutz, A., Juvela, M., Qin, S.-L., Xu, F.-W., Bronfman, L., Evans, N. J., Saha, A., Issac, N., Tatematsu, K., Wang, K., Li, S., Zhang, S., Baug, T., Dewangan, L., Wu, Y.-F., Zhang, Y., Lee, C. W., Liu, X.-C., Zhou, J., & Soam, A.
MNRAS 511, 4480 (2022)
10.1093/mnras/stac378

ATOMS: ALMA Three-millimeter Observations of Massive Star-forming regions – V. Hierarchical fragmentation and gas dynamics in IRDC G034.43+00.24
Liu, H.-L., Tej, A., Liu, T., Issac, N., Saha, A., Goldsmith, P. F., Wang, J.-Z., Zhang, Q., Qin, S.-L., Wang, K., Li, S., Soam, A., Dewangan, L., Lee, C. W., Li, P.-S., Liu, X.-C., Zhang, Y., Ren, Z., Juvela, M., Bronfman, L., Wu, Y.-F., Tatematsu, K., Chen, X., Li, D., Stutz, A., Zhang, S., Viktor Toth, L., Luo, Q.-Y., Xu, F.-W., Li, J., Liu, R., Zhou, J., Zhang, C., Tang, M., Zhang, C., Baug, T., Mannfors, E., Chakali, E., & Dutta, S.
MNRAS 510, 5009 (2022)
10.1093/mnras/stab2757

ATOMS: ALMA three-millimeter observations of massive star-forming regions – VII. A catalogue of SiO clumps from ACA observations
Liu, R., Liu, T., Chen, G., Liu, H.-L., Wang, K., Li, J.-Z., Lee, C. W., Liu, X., Juvela, M., Garay, G., Dewangan, L., Soam, A., Bronfman, L., He, J., Eswaraiah, C., Zhang, S.-J., Zhang, Y., Xu, F.-W., Toth, L. V., Shen, Z.-Q., Li, S., Wu, Y.-F., Qin, S.-L., Ren, Z., Zhang, G., Tej, A., Goldsmith, P. F., Baug, T., Luo, Q., Zhou, J., & Zhang, C.
MNRAS 511, 3618 (2022)
10.1093/mnras/stac101

WISDOM project - XI. Star formation efficiency in the bulge of the AGN-host Galaxy NGC 3169 with SITELLE and ALMA
Lu, A., Boyce, H., Haggard, D., Bureau, M., Liang, F.-H., Liu, L., Choi, W., Cappellari, M., Chemin, L., Chevance, M., Davis, T. A., Drissen, L., Elford, J. S., Gensior, J., Kruijssen, J. M. D., Martin, T., Masse, E., Robert, C., Ruffa, I., Rousseau-Nepton, L., Sarzi, M., Savard, G., & Williams, T. G.
MNRAS 514, 5035 (2022)
10.1093/mnras/stac1583

ALMA Survey of Orion Planck Galactic Cold Clumps (ALMASOP): How Do Dense Core Properties Affect the Multiplicity of Protostars?
Luo, Q.-yi, Liu, T., Tatematsu, K., Liu, S.-Y., Li, P. S., di Francesco, J., Johnstone, D., Goldsmith, P. F., Dutta, S., Hirano, N., Lee, C.-F., Li, D., Kim, K.-T., Won Lee, C., Lee, J.-E., Liu, X.-chuan, Juvela, M., He, J., Qin, S.-L., Liu, H.-L., Eden, D., Kwon, W., Sahu, D., Li, S., Xu, F.-W., Zhang, S.-ju, Hsu, S.-Y., Bronfman, L., Sanhueza, P., Pelkonen, V.-M., Zhou, J.-wen, Liu, R., Gu, Q.-lao, Wu, Y.-fang, Mai, X.-feng, Falgarone, E., & Shen, Z.-Q.
ApJ 931, 158 (2022)
10.3847/1538-4357/ac66d9

EMISSA (Exploring millimetre indicators of solar-stellar activity). II. Towards a robust indicator of stellar activity
Mohan, A., Wedemeyer, S., Hauschildt, P. H., Pandit, S., & Saberi, M.
A&A 664, L9 (2022)
10.1051/0004-6361/202244385

CO(J = 1-0) Mapping Survey of 64 Galaxies in the Fornax Cluster with the ALMA Morita Array
Morokuma-Matsui, K., Bekki, K., Wang, J., Serra, P., Koyama, Y., Morokuma, T., Egusa, F., For, B.-Q., Nakanishi, K., Koribalski, B. S., Okamoto, T., Kodama, T., Lee, B., Maccagni, F. M., Miura, R. E., Espada, D., Takeuchi, T. T., Yang, D., Lee, M. M., Ueda, M., & Matsushita, K.
ApJSS 263, 40 (2022)
10.3847/1538-4365/ac983b

A cold accretion flow onto one component of a multiple protostellar system
Murillo, N. M., van Dishoeck, E. F., Hacar, A., Harsono, D., & Jørgensen, J. K.
A&A 658, A53 (2022)
10.1051/0004-6361/202141250

N-bearing complex organics toward high-mass protostars. Constant ratios pointing to formation in similar pre-stellar conditions across a large mass range
Nazari, P., Meijerhof, J. D., van Gelder, M. L., Ahmadi, A., van Dishoeck, E. F., Tabone, B., Langeroodi, D., Ligterink, N. F. W., Jaspers, J., Beltran, M. T., Fuller, G. A., Sanchez-Monge, A., & Schilke, P.
A&A 668, A109 (2022)
10.1051/0004-6361/202243788

Collimation of the Relativistic Jet in the Quasar 3C 273
Okino, H., Akiyama, K., Asada, K., Gomez, J. L., Hada, K., Honma, M., Krichbaum, T. P., Kino, M., Nagai, H., Bach, U., Blackburn, L., Bouman, K. L., Chael, A., Crew, G. B., Doeleman, S. S., Fish, V. L., Goddi, C., Issaoun, S., Johnson, M. D., Jorstad, S., Koyama, S., Lonsdale, C. J., Lu, R.-S., Mart√≠-Vidal, I., Matthews, L. D., Mizuno, Y., Moriyama, K., Nakamura, M., Pu, H.-Y., Ros, E., Savolainen, T., Tazaki, F., Wagner, J., Wielgus, M., & Zensus, A.
ApJ 940, 65 (2022)
10.3847/1538-4357/ac97e5

ALMA Observations of CO Emission from Luminous Lyman-break Galaxies at z = 6.0293-6.2037
Ono, Y., Fujimoto, S., Harikane, Y., Ouchi, M., Vallini, L., Ferrara, A., Shibuya, T., Pallottini, A., Inoue, A. K., Imanishi, M., Shimasaku, K., Hashimoto, T., Lee, C.-H., Sugahara, Y., Tamura, Y., Kohno, K., & Schramm, M.
ApJ 941, 74 (2022)
10.3847/1538-4357/ac9ea6

Resolved Molecular Gas Observations of MaNGA Post-starbursts Reveal a Tumultuous Past
Otter, J. A., Rowlands, K., Alatalo, K., Leung, H.-H., Wild, V., Luo, Y., Petric, A. O., Sazonova, E., Stark, D. V., Heckman, T., Davis, T. A., Ellison, S., French, K. D., Baker, W., Bluck, A. F. L., Lanz, L., Lin, L., Liu, C., Lopez Coba, C., Masters, K. L., Nair, P., Pan, H.-an, Riffel, R. A., Scudder, J. M., Smercina, A., van de Voort, F., & Weaver, J. R.
ApJ 941, 93 (2022)
10.3847/1538-4357/ac9dee

ATOMS: ALMA Three-millimeter Observations of Massive Star-forming regions – X. Chemical differentiation among the massive cores in G9.62+0.19
Peng, Y., Liu, T., Qin, S.-L., Baug, T., Liu, H.-L., Wang, K., Garay, G., Zhang, C., Chen, L.-F., Lee, C. W., Juvela, M., Li, D., Tatematsu, K., Liu, X.-C., Lee, J.-E., Luo, G., Dewangan, L., Wu, Y.-F., Zhang, L., Bronfman, L., Ge, J., Tang, M., Zhang, Y., Xu, F.-W., Wang, Y., & Zhou, B.
MNRAS 512, 4419 (2022)
10.1093/mnras/stac624

ATOMS: ALMA Three-millimeter Observations of Massive Star-forming regions – VIII. A search for hot cores by using C2H5CN, CH3OCHO, and CH3OH lines
Qin, S.-L., Liu, T., Liu, X., Goldsmith, P. F., Li, D., Zhang, Q., Liu, H.-L., Wu, Y., Bronfman, L., Juvela, M., Lee, C. W., Garay, G., Zhang, Y., He, J., Hsu, S.-Y., Shen, Z.-Q., Lee, J.-E., Wang, K., Tang, N., Tang, M., Zhang, C., Yue, Y., Xue, Q., Li, S., Peng, Y., Dutta, S., Ge, J., Xu, F., Chen, L.-F., Baug, T., Dewangan, L., & Tej, A.
MNRAS 511, 3463 (2022)
10.1093/mnras/stac219

The diverse cold molecular gas contents, morphologies, and kinematics of type-2 quasars as seen by ALMA
Ramos Almeida, C., Bischetti, M., Garcia-Burillo, S., Alonso-Herrero, A., Audibert, A., Cicone, C., Feruglio, C., Tadhunter, C. N., Pierce, J. C. S., Pereira-Santaella, M., & Bessiere, P. S.
A&A 658, A155 (2022)
10.1051/0004-6361/202141906

Dynamical characterization of galaxies up to z ~ 7
Rizzo, F., Kohandel, M., Pallottini, A., Zanella, A., Ferrara, A., Vallini, L., & Toft, S.
A&A 667, A5 (2022)
10.1051/0004-6361/202243582

ATOMS: ALMA three-millimeter observations of massive star-forming regions – XII: Fragmentation and multiscale gas kinematics in protoclusters G12.42+0.50 and G19.88-0.53
Saha, A., Tej, A., Liu, H.-L., Liu, T., Issac, N., Lee, C. W., Garay, G., Goldsmith, P. F., Juvela, M., Qin, S.-L., Stutz, A., Li, S., Wang, K., Baug, T., Bronfman, L., Xu, F.-W., Zhang, Y., & Eswaraiah, C.
MNRAS 516, 1983 (2022)
10.1093/mnras/stac2353

Significant Dust-obscured Star Formation in Luminous Lyman-break Galaxies at z ~ 7-8
Schouws, S., Stefanon, M., Bouwens, R., Smit, R., Hodge, J., Labbe, I., Algera, H., Boogaard, L., Carniani, S., Fudamoto, Y., Holwerda, B. W., Illingworth, G. D., Maiolino, R., Maseda, M., Oesch, P., & van der Werf, P.
ApJ 928, 31 (2022)
10.3847/1538-4357/ac4605

ALMA Observations of Molecular Complexity in the Large Magellanic Cloud: The N 105 Star-forming Region
Sewilo, M., Cordiner, M., Charnley, S. B., Oliveira, J. M., Garcia-Berrios, E., Schilke, P., Ward, J. L., Wiseman, J., Indebetouw, R., Tokuda, K., van Loon, J. T., Sanchez-Monge, A., Allen, V., Chen, C.-H. R., Hamedani Golshan, R., Karska, A., Kristensen, L. E., Kurtz, S. E., Möller, T., Onishi, T., & Zahorecz, S.
ApJ 931, 102 (2022)
10.3847/1538-4357/ac4e8f

The Detection of Deuterated Water in the Large Magellanic Cloud with ALMA
Sewilo, M., Karska, A., Kristensen, L. E., Charnley, S. B., Chen, C.-H. R., Oliveira, J. M., Cordiner, M., Wiseman, J., Sanchez-Monge, A., van Loon, J. T., Indebetouw, R., Schilke, P., & Garcia-Berrios, E.
ApJ 933, 64 (2022)
10.3847/1538-4357/ac6de1

Infrared Spectral Energy Distributions and Dust Masses of Sub-solar Metallicity Galaxies at $z \sim 2.3$
Shivaei, I., Popping, G., Rieke, G., Reddy, N., Pope, A., Kennicutt, R., Mobasher, B., Coil, A., Fudamoto, Y., Kriek, M., Lyu, J., Oesch, P., Sanders, R., Shapley, A., & Siana, B.
ApJ 928, 68 (2022)
10.3847/1538-4357/ac54a9

A galaxy group candidate at $z \sim 3.7$ in the COSMOS field
Sillassen, N. B., Jin, S., Magdis, G. E., Daddi, E., Weaver, J. R., Gobat, R., Kokorev, V., Valentino, F., Finoguenov, A., Shuntov, M., Gomez-Guijarro, C., Coogan, R., Greve, T. R., Toft, S., & Blanquez Sese, D.
A&A 665, L7 (2022)
10.1051/0004-6361/202244661

Chaotic and Clumpy Galaxy Formation in an Extremely Massive Reionization-era Halo
Spilker, J. S., Hayward, C. C., Marrone, D. P., Aravena, M., Bethermin, M., Burgoyne, J., Chapman, S. C., Greve, T. R., Gururajan, G., Hezaveh, Y. D., Hill, R., Litke, K. C., Lovell, C. C., Malkan, M. A., Murphy, E. J., Narayanan, D., Phadke, K. A., Reuter, C., Stark, A. A., Sulzenauer, N., Vieira, J. D., Vizgan, D., & Weiß, A.
ApJ 929, L3 (2022)
10.3847/2041-8213/ac61e6

ALMA Lensing Cluster Survey: ALMA-Herschel Joint Study of Lensed Dusty Star-forming Galaxies across $z \sim 0.5 – 6$
Sun, F., Egami, E., Fujimoto, S., Rawle, T., Bauer, F. E., Kohno, K., Smail, I., Perez-Gonzalez, P. G., Ao, Y., Chapman, S. C., Combes, F., Dessauges-Zavadsky, M., Espada, D., Gonzalez-Lopez, J., Koekemoer, A. M., Kokorev, V., Lee, M. M., Morokuma-Matsui, K., Muñoz Arancibia, A. M., Oguri, M., Pello, R., Ueda, Y., Uematsu, R., Valentino, F., Van der Werf, P., Walth, G. L., Zemcov, M., & Zitrin, A.
ApJ 932, 77 (2022)
10.3847/1538-4357/ac6e3f

Detection of nitrogen and oxygen in a galaxy at the end of reionization
Tadaki, K.-ichi, Tsujita, A., Tamura, Y., Kohno, K., Hatsukade, B., Iono, D., Lee, M. M., Matsuda, Y., Michiyama, T., Nagao, T., Nakanishi, K., Nishimura, Y., Saito, T., Umehata, H., & Zavala, J.
PASJ 74, L9 (2022)
10.1093/pasj/psac018

Central concentration of warm and dense molecular gas in a strongly lensed submillimeter galaxy at $z = 6$
Tsujita, A., Tadaki, K.-ichi, Kohno, K., Hatsukade, B., Egusa, F., Tamura, Y., Nishimura, Y., Zavala, J., Saito, T., Umehata, H., & Lee, M. M.
PASJ 74, 1429 (2022)
10.1093/pasj/psac082

Imaging the Water Snowline around Protostars with Water and HCO^+ Isotopologues
van't Hoff, M. L. R., Harsono, D., van Gelder, M. L., Hsieh, T.-H., Tobin, J. J., Jensen, S. S., Hirano, N., Jørgensen, J. K., Bergin, E. A., & van Dishoeck, E. F.
ApJ 924, 5 (2022)
10.3847/1538-4357/ac3080

The Young Embedded Disk L1527 IRS: Constraints on the Water Snowline and Cosmic-Ray Ionization Rate from HCO^+ Observations
van't Hoff, M. L. R., Leemker, M., Tobin, J. J., Harsono, D., Jørgensen, J. K., & Bergin, E. A.
ApJ 932, 6 (2022)
10.3847/1538-4357/ac63b4

Multiwavelength Vertical Structure in the AU Mic Debris Disk: Characterizing the Collisional Cascade
Vizgan, D., Hughes, A. M., Carter, E. S., Flaherty, K. M., Pan, M., Chiang, E., Schlichting, H., Wilner, D. J., Andrews, S. M., Carpenter, J. M., Moor, A., & MacGregor, M. A.
ApJ 935, 131 (2022)
10.3847/1538-4357/ac80b8

A^3COSMOS: A census on the molecular gas mass and extent of main-sequence galaxies across cosmic time
Wang, T.-M., Magnelli, B., Schinnerer, E., Liu, D., Modak, Z. A., Jiménez-Andrade, E. F., Karoumpis, C., Kokorev, V., & Bertoldi, F.
A&A 660, A142 (2022)
10.1051/0004-6361/202142299

ALMA Measures Molecular Gas Reservoirs Comparable to Field Galaxies in a Low-mass Galaxy Cluster at z = 1.3
Williams, C. C., Alberts, S., Spilker, J. S., Noble, A. G., Stefanon, M., Willmer, C. N. A., Bezanson, R., Narayanan, D., & Whitaker, K. E.
ApJ 929, 35 (2022)
10.3847/1538-4357/ac58fa

ALMA Detections of [O III] and [C II] Emission Lines From A1689-zD1 at z = 7.13
Wong, Y. H. V., Wang, P., Hashimoto, T., Takagi, T., Goto, T., Kim, S. J., Wu, C. K.-W., On, A. Y. L., Santos, D. J. D., Lu, T.-Y., Kilerci-Eser, E., Ho, S. C.-C., & Hsiao, T. Y.-Y.
ApJ 929, 161 (2022)
10.3847/1538-4357/ac5cc7

Starbursts with suppressed velocity dispersion revealed in a forming cluster at z = 2.51
Xiao, M.-Y., Wang, T., Elbaz, D., Iono, D., Lu, X., Bing, L.-J., Daddi, E., Magnelli, B., Gomez-Guijarro, C., Bournaud, F., Gu, Q.-S., Jin, S., Valentino, F., Zanella, A., Gobat, R., Martin, S., Brammer, G., Kohno, K., Schreiber, C., Ciesla, L., Yu, X.-L., & Okumura, K.
A&A 664, A63 (2022)
10.1051/0004-6361/202142843

Unraveling the Innermost Jet Structure of OJ 287 with the First GMVA + ALMA Observations
Zhao, G.-Y., Gómez, J.L., Fuentes, A., Krichbaum, T.P., Traianou, E., Lico, R., Cho, I., Ros, E., Komossa, S., Akiyama, K., Asada, K., Blackburn, L., Britzen, S., Bruni, G., Crew, G.B., Dahale, R., Dey, L., Gold, R., Gopakumar, A., Issaoun, S., Janssen, M., Jorstad, S., Kim, J.-Y., Koay, J.Y., Kovalev, Y.Y., Koyama, S., Lobanov, A.P., Loinard, L., Lu, R.-S., Markoff, S., Marscher, A.P., Martí-Vidal, I., Mizuno, Y., Park, J., Savolainen, T., and Toscano, T.
ApJ 932, 72 (2022)
10.3847/1538-4357/ac6b9c

ATOMS: ALMA Three-millimeter Observations of Massive Star-forming regions – XI. From inflow to infall in hub-filament systems
Zhou, J.-W., Liu, T., Evans, N. J., Garay, G., Goldsmith, P. F., Gomez, G. C., Vazquez-Semadeni, E., Liu, H.-L., Stutz, A. M., Wang, K., Juvela, M., He, J., Li, D., Bronfman, L., Liu, X., Xu, F.-W., Tej, A., Dewangan, L. K., Li, S., Zhang, S., Zhang, C., Ren, Z., Tatematsu, K., Shing Li, P., Won Lee, C., Baug, T., Qin, S.-L., Wu, Y., Peng, Y., Zhang, Y., Liu, R., Luo, Q.-Y., Ge, J., Saha, A., Chakali, E., Zhang, Q., Kim, K.-T., Ristorcelli, I., Shen, Z.-Q., & Li, J.-Z.
MNRAS 514, 6038 (2022)
10.1093/mnras/stac1735

APEX, publications in refereed journals 2022

Note: *Partly based on APEX publications in the ESO Telescope Bibliography* http://telbib.eso.org/.

Swedish authors (APEX)

Characterizing and Mitigating Intraday Variability: Reconstructing Source Structure in Accreting Black Holes with mm-VLBI
Broderick, A.E., Gold, R., Georgiev, B., Pesce, D.W., Tiede, P., Ni, C., Moriyama, K., Akiyama, K., Alberdi, A., Alef, W., Algaba, J.C., Anantua, R., Asada, K., Azulay, R., Bach, U., Baczko, A.-K., Ball, D., Baloković, M., Barrett, J., Bauböck, M., Benson, B.A., Bintley, D., Blackburn, L., Blundell, R., Bouman, K.L., Bower, G.C., Boyce, H., Bremer, M., Brinkerink, C.D., Brissenden, R., Britzen, S., Broguiere, D., Bronzwaer, T., Bustamante, S., Byun, D.-Y., Carlstrom, J.E., Ceccobello, C., Chael, A., Chan, C.-kwan, Chatterjee, K., Chatterjee, S., Chen, M.-T., Chen, Y., Cheng, X., Cho, I., Christian, P., Conroy, N.S., Conway, J.E., Cordes, J.M., Crawford, T.M., Crew, G.B., Cruz-Osorio, A., Cui, Y., Davelaar, J., De Laurentis, M., Deane, R., Dempsey, J., Desvignes, G., Dexter, J., Dhruv, V., Doeleman, S.S., Dougal, S., Dzib, S.A., Eatough, R.P., Emami, R., Falcke, H., Farah, J., Fish, V.L., Fomalont, E., Ford, H.A., Fraga-Encinas, R., Freeman, W.T., Friberg, P., Fromm, C.M., Fuentes, A., Galison, P., Gammie, C.F., García, R., Gentaz, O., Goddi, C., Gómez-Ruiz, A.I., Gómez, J.L., Gu, M., Gurwell, M., Hada, K., Haggard, D., Haworth, K., Hecht, M.H., Hesper, R., Heumann, D., Ho, L.C., Ho, P., Honma, M., Huang, C.-W.L., Huang, L., Hughes, D.H., Ikeda, S., Impellizzeri, C.M.V., Inoue, M., Issaoun, S., James, D.J., Jannuzi, B.T., Janssen, M., Jeter, B., Jiang, W., Jiménez-Rosales, A., Johnson, M.D., Jorstad, S., Joshi, A.V., Jung, T., Karami, M., Karuppusamy, R., Kawashima, T.,

Keating, G.K., Kettenis, M., Kim, D.-J., Kim, J.-Y., Kim, J., Kim, J., Kino, M., Koay, J.Y., Kocherlakota, P., Kofuji, Y., Koch, P.M., Koyama, S., Kramer, C., Kramer, M., Krichbaum, T.P., Kuo, C.-Y., La Bella, N., Lauer, T.R., Lee, D., Lee, S.-S., Leung, P.K., Levis, A., Li, Z., Lico, R., Lindahl, G., Lindqvist, M., Lisakov, M., Liu, J., Liu, K., Liuzzo, E., Lo, W.-P., Lobanov, A.P., Loinard, L., Lonsdale, C.J., Lu, R.-S., Mao, J., Marchili, N., Markoff, S., Marrone, D.P., Marscher, A.P., Martí-Vidal, I., Matsushita, S., Matthews, L.D., Menten, K.M., Michalik, D., Mizuno, I., Mizuno, Y., Moran, J.M., Moscibrodzka, M., Müller, C., Mus, A., Musoke, G., Myserlis, I., Nadolski, A., Nagai, H., Nagar, N.M., Nakamura, M., Narayan, R., Narayanan, G., Natarajan, I., Nathanail, A., Navarro Fuentes, S., Neilsen, J., Neri, R., Noutsos, A., Nowak, M.A., Oh, J., Okino, H., Olivares, H., Ortiz-León, G.N., Oyama, T., Palumbo, D.C.M., Paraschos, G.F., Park, J., Parsons, H., Patel, N., Pen, U.-L., Piétu, V., Plambeck, R., PopStefanija, A., Porth, O., Pötzl, F.M., Prather, B., Preciado-López, J.A., Pu, H.-Y., Ramakrishnan, V., Rao, R., Rawlings, M.G., Raymond, A.W., Rezzolla, L., Ricarte, A., Ripperda, B., Roelofs, F., Rogers, A., Ros, E., Romero-Cañizales, C., Roshanineshat, A., Rottmann, H., Roy, A.L., Ruiz, I., Ruszczyk, C., Rygl, K.L.J., Sánchez, S., Sánchez-Argüelles, D., Sánchez-Portal, M., Sasada, M., Satapathy, K., Savolainen, T., Schloerb, F.P., Schonfeld, J., Schuster, K.-F., Shao, L., Shen, Z., Small, D., Sohn, B.W., SooHoo, J., Souccar, K., Sun, H., Tazaki, F., Tetarenko, A.J., Tilanus, R.P.J., Titus, M., Torne, P., Traianou, E., Trent, T., Trippe, S., Turk, M., van Bemmel, I., van Langevelde, H.J., van Rossum, D.R., Vos, J., Wagner, J., Ward-Thompson, D., Wardle, J., Weintroub, J., Wex, N., Wharton, R., Wielgus, M., Wiik, K., Witzel, G., Wondrak, M.F., Wong, G.N., Wu, Q., Yamaguchi, P., Yoon, D., Young, A., Young, K., Younsi, Z., Yuan, F., Yuan, Y.-F., Zensus, J.A., Zhao, G.-Y., Zhang, S., and Zhao, S.-S.
ApJ 930, L21 (2022)
10.3847/2041-8213/ac6584

First Sagittarius A Event Horizon Telescope Results. VI. Testing the Black Hole Metric*
Event Horizon Telescope Collaboration, Akiyama, K., Alberdi, A., Alef, W., Algaba, J.C., Anantua, R., Asada, K., Azulay, R., Bach, U., Baczko, A.-K., Ball, D., Baloković, M., Barrett, J., Bauböck, M., Benson, B.A., Bintley, D., Blackburn, L., Blundell, R., Bouman, K.L., Bower, G.C., Boyce, H., Bremer, M., Brinkerink, C.D., Brissenden, R., Britzen, S., Broderick, A.E., Broguiere, D., Bronzwaer, T., Bustamante, S., Byun, D.-Y., Carlstrom, J.E., Ceccobello, C., Chael, A., Chan, C.-kwan, Chatterjee, K., Chatterjee, S., Chen, M.-T., Chen, Y., Cheng, X., Cho, I., Christian, P., Conroy, N.S., Conway, J.E., Cordes, J.M., Crawford, T.M., Crew, G.B., Cruz-Osorio, A., Cui, Y., Davelaar, J., De Laurentis, M., Deane, R., Dempsey, J., Desvignes, G., Dexter, J., Dhruv, V., Doeleman, S.S., Dougal, S., Dzib, S.A., Eatough, R.P., Emami, R., Falcke, H., Farah, J., Fish, V.L., Fomalont, E., Ford, H.A., Fraga-Encinas, R., Freeman, W.T., Friberg, P., Fromm, C.M., Fuentes, A., Galison, P., Gammie, C.F., García, R., Gentaz, O., Georgiev, B., Goddi, C., Gold, R., Gómez-Ruiz, A.I., Gómez, J.L., Gu, M., Gurwell, M., Hada, K., Haggard, D., Haworth, K., Hecht, M.H., Hesper, R., Heumann, D., Ho, L.C., Ho, P., Honma, M., Huang, C.-W.L., Huang, L., Hughes, D.H., Ikeda, S., Impellizzeri, C.M.V., Inoue, M., Issaoun, S., James, D.J., Jannuzi, B.T., Janssen, M., Jeter, B., Jiang, W., Jiménez-Rosales, A., Johnson, M.D., Jorstad, S., Joshi, A.V., Jung, T., Karami, M., Karuppusamy, R., Kawashima, T., Keating, G.K., Kettenis, M., Kim, D.-J., Kim, J.-Y., Kim, J., Kim, J., Kino, M., Koay, J.Y., Kocherlakota, P., Kofuji, Y., Koch, P.M., Koyama, S., Kramer, C., Kramer, M., Krichbaum, T.P., Kuo, C.-Y., La Bella, N., Lauer, T.R., Lee, D., Lee, S.-S., Leung, P.K., Levis, A., Li, Z., Lico, R., Lindahl, G., Lindqvist, M., Lisakov, M., Liu, J., Liu, K., Liuzzo, E., Lo, W.-P., Lobanov, A.P., Loinard, L., Lonsdale, C.J., Lu, R.-S., Mao, J.,

Marchili, N., Markoff, S., Marrone, D.P., Marscher, A.P., Martí-Vidal, I., Matsushita, S., Matthews, L.D., Medeiros, L., Menten, K.M., Michalik, D., Mizuno, I., Mizuno, Y., Moran, J.M., Moriyama, K., Moscibrodzka, M., Müller, C., Mus, A., Musoke, G., Myserlis, I., Nadolski, A., Nagai, H., Nagar, N.M., Nakamura, M., Narayan, R., Narayanan, G., Natarajan, I., Nathanail, A., Fuentes, S.N., Neilsen, J., Neri, R., Ni, C., Noutsos, A., Nowak, M.A., Oh, J., Okino, H., Olivares, H., Ortiz-León, G.N., Oyama, T., Özel, F., Palumbo, D.C.M., Paraschos, G.F., Park, J., Parsons, H., Patel, N., Pen, U.-L., Pesce, D.W., Piétu, V., Plambeck, R., PopStefanija, A., Porth, O., Pötzl, F.M., Prather, B., Preciado-López, J.A., Psaltis, D., Pu, H.-Y., Ramakrishnan, V., Rao, R., Rawlings, M.G., Raymond, A.W., Rezzolla, L., Ricarte, A., Ripperda, B., Roelofs, F., Rogers, A., Ros, E., Romero-Cañizales, C., Roshanineshat, A., Rottmann, H., Roy, A.L., Ruiz, I., Ruszczyk, C., Rygl, K.L.J., Sánchez, S., Sánchez-Argüelles, D., Sánchez-Portal, M., Sasada, M., Satapathy, K., Savolainen, T., Schloerb, F.P., Schonfeld, J., Schuster, K.-F., Shao, L., Shen, Z., Small, D., Sohn, B.W., SooHoo, J., Souccar, K., Sun, H., Tazaki, F., Tetarenko, A.J., Tiede, P., Tilanus, R.P.J., Titus, M., Torne, P., Traianou, E., Trent, T., Trippe, S., Turk, M., van Bemmel, I., van Langevelde, H.J., van Rossum, D.R., Vos, J., Wagner, J., Ward-Thompson, D., Wardle, J., Weintroub, J., Wex, N., Wharton, R., Wielgus, M., Wiik, K., Witzel, G., Wondrak, M.F., Wong, G.N., Wu, Q., Yamaguchi, P., Yoon, D., Young, A., Young, K., Younsi, Z., Yuan, F., Yuan, Y.-F., Zensus, J.A., Zhang, S., Zhao, G.-Y., and Zhao, S.-S.
ApJ 930, L17 (2022)
10.3847/2041-8213/ac6756

First Sagittarius A Event Horizon Telescope Results. V. Testing Astrophysical Models of the Galactic Center Black Hole*
Event Horizon Telescope Collaboration, Akiyama, K., Alberdi, A., Alef, W., Algaba, J.C., Anantua, R., Asada, K., Azulay, R., Bach, U., Baczko, A.-K., Ball, D., Baloković, M., Barrett, J., Bauböck, M., Benson, B.A., Bintley, D., Blackburn, L., Blundell, R., Bouman, K.L., Bower, G.C., Boyce, H., Bremer, M., Brinkerink, C.D., Brissenden, R., Britzen, S., Broderick, A.E., Broguiere, D., Bronzwaer, T., Bustamante, S., Byun, D.-Y., Carlstrom, J.E., Ceccobello, C., Chael, A., Chan, C.-kwan, Chatterjee, K., Chatterjee, S., Chen, M.-T., Chen, Y., Cheng, X., Cho, I., Christian, P., Conroy, N.S., Conway, J.E., Cordes, J.M., Crawford, T.M., Crew, G.B., Cruz-Osorio, A., Cui, Y., Davelaar, J., De Laurentis, M., Deane, R., Dempsey, J., Desvignes, G., Dexter, J., Dhruv, V., Doeleman, S.S., Dougal, S., Dzib, S.A., Eatough, R.P., Emami, R., Falcke, H., Farah, J., Fish, V.L., Fomalont, E., Ford, H.A., Fraga-Encinas, R., Freeman, W.T., Friberg, P., Fromm, C.M., Fuentes, A., Galison, P., Gammie, C.F., García, R., Gentaz, O., Georgiev, B., Goddi, C., Gold, R., Gómez-Ruiz, A.I., Gómez, J.L., Gu, M., Gurwell, M., Hada, K., Haggard, D., Haworth, K., Hecht, M.H., Hesper, R., Heumann, D., Ho, L.C., Ho, P., Honma, M., Huang, C.-W.L., Huang, L., Hughes, D.H., Ikeda, S., Violette Impellizzeri, C.M., Inoue, M., Issaoun, S., James, D.J., Jannuzi, B.T., Janssen, M., Jeter, B., Jiang, W., Jiménez-Rosales, A., Johnson, M.D., Jorstad, S., Joshi, A.V., Jung, T., Karami, M., Karuppusamy, R., Kawashima, T., Keating, G.K., Kettenis, M., Kim, D.-J., Kim, J.-Y., Kim, J., Kim, J., Kino, M., Koay, J.Y., Kocherlakota, P., Kofuji, Y., Koch, P.M., Koyama, S., Kramer, C., Kramer, M., Krichbaum, T.P., Kuo, C.-Y., La Bella, N., Lauer, T.R., Lee, D., Lee, S.-S., Leung, P.K., Levis, A., Li, Z., Lico, R., Lindahl, G., Lindqvist, M., Lisakov, M., Liu, J., Liu, K., Liuzzo, E., Lo, W.-P., Lobanov, A.P., Loinard, L., Lonsdale, C.J., Lu, R.-S., Mao, J., Marchili, N., Markoff, S., Marrone, D.P., Marscher, A.P., Martí-Vidal, I., Matsushita, S., Matthews, L.D., Medeiros, L., Menten, K.M., Michalik, D., Mizuno, I., Mizuno, Y., Moran, J.M., Moriyama, K., Moscibrodzka, M., Müller, C., Mus, A., Musoke, G.,

Myserlis, I., Nadolski, A., Nagai, H., Nagar, N.M., Nakamura, M., Narayan, R., Narayanan, G., Natarajan, I., Nathanail, A., Navarro Fuentes, S., Neilsen, J., Neri, R., Ni, C., Noutsos, A., Nowak, M.A., Oh, J., Okino, H., Olivares, H., Ortiz-León, G.N., Oyama, T., Özel, F., Palumbo, D.C.M., Filippos Paraschos, G., Park, J., Parsons, H., Patel, N., Pen, U.-L., Pesce, D.W., Piétu, V., Plambeck, R., PopStefanija, A., Porth, O., Pötzl, F.M., Prather, B., Preciado-López, J.A., Psaltis, D., Pu, H.-Y., Ramakrishnan, V., Rao, R., Rawlings, M.G., Raymond, A.W., Rezzolla, L., Ricarte, A., Ripperda, B., Roelofs, F., Rogers, A., Ros, E., Romero-Cañizales, C., Roshanineshat, A., Rottmann, H., Roy, A.L., Ruiz, I., Ruszczyk, C., Rygl, K.L.J., Sánchez, S., Sánchez-Argüelles, D., Sánchez-Portal, M., Sasada, M., Satapathy, K., Savolainen, T., Schloerb, F.P., Schonfeld, J., Schuster, K.-F., Shao, L., Shen, Z., Small, D., Sohn, B.W., SooHoo, J., Souccar, K., Sun, H., Tazaki, F., Tetarenko, A.J., Tiede, P., Tilanus, R.P.J., Titus, M., Torne, P., Traianou, E., Trent, T., Trippe, S., Turk, M., van Bemmel, I., van Langevelde, H.J., van Rossum, D.R., Vos, J., Wagner, J., Ward-Thompson, D., Wardle, J., Weintroub, J., Wex, N., Wharton, R., Wielgus, M., Wiik, K., Witzel, G., Wondrak, M.F., Wong, G.N., Wu, Q., Yamaguchi, P., Yoon, D., Young, A., Young, K., Younsi, Z., Yuan, F., Yuan, Y.-F., Zensus, J.A., Zhang, S., Zhao, G.-Y., Zhao, S.-S., Chan, T.L., Qiu, R., Ressler, S., and White, C.
ApJ 930, L16 (2022)
10.3847/2041-8213/ac6672

First Sagittarius A Event Horizon Telescope Results. IV. Variability, Morphology, and Black Hole Mass*
Event Horizon Telescope Collaboration, Akiyama, K., Alberdi, A., Alef, W., Algaba, J.C., Anantua, R., Asada, K., Azulay, R., Bach, U., Baczko, A.-K., Ball, D., Baloković, M., Barrett, J., Bauböck, M., Benson, B.A., Bintley, D., Blackburn, L., Blundell, R., Bouman, K.L., Bower, G.C., Boyce, H., Bremer, M., Brinkerink, C.D., Brissenden, R., Britzen, S., Broderick, A.E., Broguiere, D., Bronzwaer, T., Bustamante, S., Byun, D.-Y., Carlstrom, J.E., Ceccobello, C., Chael, A., Chan, C.-kwan, Chatterjee, K., Chatterjee, S., Chen, M.-T., Chen, Y., Cheng, X., Cho, I., Christian, P., Conroy, N.S., Conway, J.E., Cordes, J.M., Crawford, T.M., Crew, G.B., Cruz-Osorio, A., Cui, Y., Davelaar, J., De Laurentis, M., Deane, R., Dempsey, J., Desvignes, G., Dexter, J., Dhruv, V., Doeleman, S.S., Dougal, S., Dzib, S.A., Eatough, R.P., Emami, R., Falcke, H., Farah, J., Fish, V.L., Fomalont, E., Ford, H.A., Fraga-Encinas, R., Freeman, W.T., Friberg, P., Fromm, C.M., Fuentes, A., Galison, P., Gammie, C.F., García, R., Gentaz, O., Georgiev, B., Goddi, C., Gold, R., Gómez-Ruiz, A.I., Gómez, J.L., Gu, M., Gurwell, M., Hada, K., Haggard, D., Haworth, K., Hecht, M.H., Hesper, R., Heumann, D., Ho, L.C., Ho, P., Honma, M., Huang, C.-W.L., Huang, L., Hughes, D.H., Ikeda, S., Impellizzeri, C.M.V., Inoue, M., Issaoun, S., James, D.J., Jannuzi, B.T., Janssen, M., Jeter, B., Jiang, W., Jiménez-Rosales, A., Johnson, M.D., Jorstad, S., Joshi, A.V., Jung, T., Karami, M., Karuppusamy, R., Kawashima, T., Keating, G.K., Kettenis, M., Kim, D.-J., Kim, J.-Y., Kim, J., Kim, J., Kino, M., Koay, J.Y., Kocherlakota, P., Kofuji, Y., Koch, P.M., Koyama, S., Kramer, C., Kramer, M., Krichbaum, T.P., Kuo, C.-Y., La Bella, N., Lauer, T.R., Lee, D., Lee, S.-S., Leung, P.K., Levis, A., Li, Z., Lico, R., Lindahl, G., Lindqvist, M., Lisakov, M., Liu, J., Liu, K., Liuzzo, E., Lo, W.-P., Lobanov, A.P., Loinard, L., Lonsdale, C.J., Lu, R.-S., Mao, J., Marchili, N., Markoff, S., Marrone, D.P., Marscher, A.P., Martí-Vidal, I., Matsushita, S., Matthews, L.D., Medeiros, L., Menten, K.M., Michalik, D., Mizuno, I., Mizuno, Y., Moran, J.M., Moriyama, K., Moscibrodzka, M., Müller, C., Mus, A., Musoke, G., Myserlis, I., Nadolski, A., Nagai, H., Nagar, N.M., Nakamura, M., Narayan, R., Narayanan, G., Natarajan, I., Nathanail, A., Fuentes, S.N., Neilsen, J., Neri, R., Ni, C., Noutsos, A., Nowak, M.A., Oh, J., Okino, H., Olivares, H., Ortiz-León, G.N., Oyama, T.,

Palumbo, D.C.M., Paraschos, G.F., Park, J., Parsons, H., Patel, N., Pen, U.-L., Pesce, D.W., Piétu, V., Plambeck, R., PopStefanija, A., Porth, O., Pötzl, F.M., Prather, B., Preciado-López, J.A., Pu, H.-Y., Ramakrishnan, V., Rao, R., Rawlings, M.G., Raymond, A.W., Rezzolla, L., Ricarte, A., Ripperda, B., Roelofs, F., Rogers, A., Ros, E., Romero-Cañizales, C., Roshanineshat, A., Rottmann, H., Roy, A.L., Ruiz, I., Ruszczyk, C., Rygl, K.L.J., Sánchez, S., Sánchez-Argüelles, D., Sánchez-Portal, M., Sasada, M., Satapathy, K., Savolainen, T., Schloerb, F.P., Schonfeld, J., Schuster, K.-F., Shao, L., Shen, Z., Small, D., Sohn, B.W., SooHoo, J., Souccar, K., Sun, H., Tazaki, F., Tetarenko, A.J., Tiede, P., Tilanus, R.P.J., Titus, M., Torne, P., Traianou, E., Trent, T., Trippe, S., Turk, M., van Bemmel, I., van Langevelde, H.J., van Rossum, D.R., Vos, J., Wagner, J., Ward-Thompson, D., Wardle, J., Weintroub, J., Wex, N., Wharton, R., Wielgus, M., Wiik, K., Witzel, G., Wondrak, M.F., Wong, G.N., Wu, Q., Yamaguchi, P., Yoon, D., Young, A., Young, K., Younsi, Z., Yuan, F., Yuan, Y.-F., Zensus, J.A., Zhang, S., Zhao, G.-Y., Zhao, S.-S., and Chang, D.O.
ApJ 930, L15 (2022)
10.3847/2041-8213/ac6736

First Sagittarius A Event Horizon Telescope Results. III. Imaging of the Galactic Center Supermassive Black Hole*
Event Horizon Telescope Collaboration, Akiyama, K., Alberdi, A., Alef, W., Algaba, J.C., Anantua, R., Asada, K., Azulay, R., Bach, U., Baczko, A.-K., Ball, D., Baloković, M., Barrett, J., Bauböck, M., Benson, B.A., Bintley, D., Blackburn, L., Blundell, R., Bouman, K.L., Bower, G.C., Boyce, H., Bremer, M., Brinkerink, C.D., Brissenden, R., Britzen, S., Broderick, A.E., Broguiere, D., Bronzwaer, T., Bustamante, S., Byun, D.-Y., Carlstrom, J.E., Ceccobello, C., Chael, A., Chan, C.-kwan, Chatterjee, K., Chatterjee, S., Chen, M.-T., Chen, Y., Cheng, X., Cho, I., Christian, P., Conroy, N.S., Conway, J.E., Cordes, J.M., Crawford, T.M., Crew, G.B., Cruz-Osorio, A., Cui, Y., Davelaar, J., De Laurentis, M., Deane, R., Dempsey, J., Desvignes, G., Dexter, J., Dhruv, V., Doeleman, S.S., Dougal, S., Dzib, S.A., Eatough, R.P., Emami, R., Falcke, H., Farah, J., Fish, V.L., Fomalont, E., Ford, H.A., Fraga-Encinas, R., Freeman, W.T., Friberg, P., Fromm, C.M., Fuentes, A., Galison, P., Gammie, C.F., García, R., Gentaz, O., Georgiev, B., Goddi, C., Gold, R., Gómez-Ruiz, A.I., Gómez, J.L., Gu, M., Gurwell, M., Hada, K., Haggard, D., Haworth, K., Hecht, M.H., Hesper, R., Heumann, D., Ho, L.C., Ho, P., Honma, M., Huang, C.-W.L., Huang, L., Hughes, D.H., Ikeda, S., Impellizzeri, C.M.V., Inoue, M., Issaoun, S., James, D.J., Jannuzi, B.T., Janssen, M., Jeter, B., Jiang, W., Jiménez-Rosales, A., Johnson, M.D., Jorstad, S., Joshi, A.V., Jung, T., Karami, M., Karuppusamy, R., Kawashima, T., Keating, G.K., Kettenis, M., Kim, D.-J., Kim, J.-Y., Kim, J., Kim, J., Kino, M., Koay, J.Y., Kocherlakota, P., Kofuji, Y., Koch, P.M., Koyama, S., Kramer, C., Kramer, M., Krichbaum, T.P., Kuo, C.-Y., La Bella, N., Lauer, T.R., Lee, D., Lee, S.-S., Leung, P.K., Levis, A., Li, Z., Lico, R., Lindahl, G., Lindqvist, M., Lisakov, M., Liu, J., Liu, K., Liuzzo, E., Lo, W.-P., Lobanov, A.P., Loinard, L., Lonsdale, C.J., Lu, R.-S., Mao, J., Marchili, N., Markoff, S., Marrone, D.P., Marscher, A.P., Martí-Vidal, I., Matsushita, S., Matthews, L.D., Medeiros, L., Menten, K.M., Michalik, D., Mizuno, I., Mizuno, Y., Moran, J.M., Moriyama, K., Moscibrodzka, M., Müller, C., Mus, A., Musoke, G., Myserlis, I., Nadolski, A., Nagai, H., Nagar, N.M., Nakamura, M., Narayan, R., Narayanan, G., Natarajan, I., Nathanail, A., Fuentes, S.N., Neilsen, J., Neri, R., Ni, C., Noutsos, A., Nowak, M.A., Oh, J., Okino, H., Olivares, H., Ortiz-León, G.N., Oyama, T., Özel, F., Palumbo, D.C.M., Paraschos, G.F., Park, J., Parsons, H., Patel, N., Pen, U.-L., Pesce, D.W., Piétu, V., Plambeck, R., PopStefanija, A., Porth, O., Pötzl, F.M., Prather, B., Preciado-López, J.A., Psaltis, D., Pu, H.-Y., Ramakrishnan, V., Rao, R., Rawlings, M.G.,

Raymond, A.W., Rezzolla, L., Ricarte, A., Ripperda, B., Roelofs, F., Rogers, A., Ros, E., Romero-Cañizales, C., Roshanineshat, A., Rottmann, H., Roy, A.L., Ruiz, I., Ruszczyk, C., Rygl, K.L.J., Sánchez, S., Sánchez-Argüelles, D., Sánchez-Portal, M., Sasada, M., Satapathy, K., Savolainen, T., Schloerb, F.P., Schonfeld, J., Schuster, K.-F., Shao, L., Shen, Z., Small, D., Sohn, B.W., SooHoo, J., Souccar, K., Sun, H., Tazaki, F., Tetarenko, A.J., Tiede, P., Tilanus, R.P.J., Titus, M., Torne, P., Traianou, E., Trent, T., Trippe, S., Turk, M., van Bemmel, I., van Langevelde, H.J., van Rossum, D.R., Vos, J., Wagner, J., Ward-Thompson, D., Wardle, J., Weintroub, J., Wex, N., Wharton, R., Wielgus, M., Wiik, K., Witzel, G., Wondrak, M.F., Wong, G.N., Wu, Q., Yamaguchi, P., Yoon, D., Young, A., Young, K., Younsi, Z., Yuan, F., Yuan, Y.-F., Zensus, J.A., Zhang, S., Zhao, G.-Y., and Zhao, S.-S.
ApJ 930, L14 (2022)
10.3847/2041-8213/ac6429

First Sagittarius A Event Horizon Telescope Results. II. EHT and Multiwavelength Observations, Data Processing, and Calibration*
Event Horizon Telescope Collaboration, Akiyama, K., Alberdi, A., Alef, W., Algaba, J.C., Anantua, R., Asada, K., Azulay, R., Bach, U., Baczko, A.-K., Ball, D., Baloković, M., Barrett, J., Bauböck, M., Benson, B.A., Bintley, D., Blackburn, L., Blundell, R., Bouman, K.L., Bower, G.C., Boyce, H., Bremer, M., Brinkerink, C.D., Brissenden, R., Britzen, S., Broderick, A.E., Broguiere, D., Bronzwaer, T., Bustamante, S., Byun, D.-Y., Carlstrom, J.E., Ceccobello, C., Chael, A., Chan, C.-kwan, Chatterjee, K., Chatterjee, S., Chen, M.-T., Chen, Y., Cheng, X., Cho, I., Christian, P., Conroy, N.S., Conway, J.E., Cordes, J.M., Crawford, T.M., Crew, G.B., Cruz-Osorio, A., Cui, Y., Davelaar, J., De Laurentis, M., Deane, R., Dempsey, J., Desvignes, G., Dexter, J., Dhruv, V., Doeleman, S.S., Dougal, S., Dzib, S.A., Eatough, R.P., Emami, R., Falcke, H., Farah, J., Fish, V.L., Fomalont, E., Ford, H.A., Fraga-Encinas, R., Freeman, W.T., Friberg, P., Fromm, C.M., Fuentes, A., Galison, P., Gammie, C.F., García, R., Gentaz, O., Georgiev, B., Goddi, C., Gold, R., Gómez-Ruiz, A.I., Gómez, J.L., Gu, M., Gurwell, M., Hada, K., Haggard, D., Haworth, K., Hecht, M.H., Hesper, R., Heumann, D., Ho, L.C., Ho, P., Honma, M., Huang, C.-W.L., Huang, L., Hughes, D.H., Ikeda, S., Impellizzeri, C.M.V., Inoue, M., Issaoun, S., James, D.J., Jannuzi, B.T., Janssen, M., Jeter, B., Jiang, W., Jiménez-Rosales, A., Johnson, M.D., Jorstad, S., Joshi, A.V., Jung, T., Karami, M., Karuppusamy, R., Kawashima, T., Keating, G.K., Kettenis, M., Kim, D.-J., Kim, J.-Y., Kim, J., Kim, J., Kino, M., Koay, J.Y., Kocherlakota, P., Kofuji, Y., Koch, P.M., Koyama, S., Kramer, C., Kramer, M., Krichbaum, T.P., Kuo, C.-Y., La Bella, N., Lauer, T.R., Lee, D., Lee, S.-S., Leung, P.K., Levis, A., Li, Z., Lico, R., Lindahl, G., Lindqvist, M., Lisakov, M., Liu, J., Liu, K., Liuzzo, E., Lo, W.-P., Lobanov, A.P., Loinard, L., Lonsdale, C.J., Lu, R.-S., Mao, J., Marchili, N., Markoff, S., Marrone, D.P., Marscher, A.P., Martí-Vidal, I., Matsushita, S., Matthews, L.D., Medeiros, L., Menten, K.M., Michalik, D., Mizuno, I., Mizuno, Y., Moran, J.M., Moriyama, K., Moscibrodzka, M., Müller, C., Mus, A., Musoke, G., Myserlis, I., Nadolski, A., Nagai, H., Nagar, N.M., Nakamura, M., Narayan, R., Narayanan, G., Natarajan, I., Nathanail, A., Fuentes, S.N., Neilsen, J., Neri, R., Ni, C., Noutsos, A., Nowak, M.A., Oh, J., Okino, H., Olivares, H., Ortiz-León, G.N., Oyama, T., Özel, F., Palumbo, D.C.M., Paraschos, G.F., Park, J., Parsons, H., Patel, N., Pen, U.-L., Pesce, D.W., Piétu, V., Plambeck, R., PopStefanija, A., Porth, O., Pötzl, F.M., Prather, B., Preciado-López, J.A., Psaltis, D., Pu, H.-Y., Ramakrishnan, V., Rao, R., Rawlings, M.G., Raymond, A.W., Rezzolla, L., Ricarte, A., Ripperda, B., Roelofs, F., Rogers, A., Ros, E., Romero-Cañizales, C., Roshanineshat, A., Rottmann, H., Roy, A.L., Ruiz, I., Ruszczyk, C., Rygl, K.L.J., Sánchez, S., Sánchez-Argüelles, D., Sánchez-Portal, M., Sasada, M.,

Satapathy, K., Savolainen, T., Schloerb, F.P., Schonfeld, J., Schuster, K.-F., Shao, L., Shen, Z., Small, D., Sohn, B.W., SooHoo, J., Souccar, K., Sun, H., Tazaki, F., Tetarenko, A.J., Tiede, P., Tilanus, R.P.J., Titus, M., Torne, P., Traianou, E., Trent, T., Trippe, S., Turk, M., van Bemmel, I., van Langevelde, H.J., van Rossum, D.R., Vos, J., Wagner, J., Ward-Thompson, D., Wardle, J., Weintroub, J., Wex, N., Wharton, R., Wielgus, M., Wiik, K., Witzel, G., Wondrak, M.F., Wong, G.N., Wu, Q., Yamaguchi, P., Yoon, D., Young, A., Young, K., Younsi, Z., Yuan, F., Yuan, Y.-F., Zensus, J.A., Zhang, S., Zhao, G.-Y., Zhao, S.-S., Agurto, C., Araneda, J.P., Arriagada, O., Bertarini, A., Berthold, R., Blanchard, J., Brown, K., Cárdenas, M., Cantzler, M., Caro, P., Chuter, T.C., Ciechanowicz, M., Coulson, I.M., Crowley, J., Degenaar, N., Dornbusch, S., Durán, C.A., Forster, K., Geertsema, G., González, E., Graham, D., Gueth, F., Han, C.-C., Herrera, C., Herrero-Illana, R., Heyminck, S., Hoge, J., Huang, Y.-D., Jiang, H., John, D., Klein, T., Kubo, D., Kuroda, J., Kwon, C., Laing, R., Liu, C.-T., Liu, K.-Y., Mac-Auliffe, F., Martin-Cocher, P., Matulonis, C., Messias, H., Meyer-Zhao, Z., Montenegro-Montes, F., Montgomerie, W., Muders, D., Nishioka, H., Norton, T.J., Olivares, R., Pérez-Beaupuits, J.P., Parra, R., Poirier, M., Pradel, N., Raffin, P.A., Ramírez, J., Reynolds, M., Saez-Madain, A.F., Santana, J., Silva, K.M., Sousa, D., Stahm, W., Torstensson, K., Venegas, P., Walther, C., Wieching, G., Wijnands, R., and Wouterloot, J.G.A.
ApJ 930, L13 (2022)
10.3847/2041-8213/ac6675

First Sagittarius A Event Horizon Telescope Results. I. The Shadow of the Supermassive Black Hole in the Center of the Milky Way*
Event Horizon Telescope Collaboration, Akiyama, K., Alberdi, A., Alef, W., Algaba, J.C., Anantua, R., Asada, K., Azulay, R., Bach, U., Baczko, A.-K., Ball, D., Baloković, M., Barrett, J., Bauböck, M., Benson, B.A., Bintley, D., Blackburn, L., Blundell, R., Bouman, K.L., Bower, G.C., Boyce, H., Bremer, M., Brinkerink, C.D., Brissenden, R., Britzen, S., Broderick, A.E., Broguiere, D., Bronzwaer, T., Bustamante, S., Byun, D.-Y., Carlstrom, J.E., Ceccobello, C., Chael, A., Chan, C.-kwan, Chatterjee, K., Chatterjee, S., Chen, M.-T., Chen, Y., Cheng, X., Cho, I., Christian, P., Conroy, N.S., Conway, J.E., Cordes, J.M., Crawford, T.M., Crew, G.B., Cruz-Osorio, A., Cui, Y., Davelaar, J., De Laurentis, M., Deane, R., Dempsey, J., Desvignes, G., Dexter, J., Dhruv, V., Doeleman, S.S., Dougal, S., Dzib, S.A., Eatough, R.P., Emami, R., Falcke, H., Farah, J., Fish, V.L., Fomalont, E., Ford, H.A., Fraga-Encinas, R., Freeman, W.T., Friberg, P., Fromm, C.M., Fuentes, A., Galison, P., Gammie, C.F., García, R., Gentaz, O., Georgiev, B., Goddi, C., Gold, R., Gómez-Ruiz, A.I., Gómez, J.L., Gu, M., Gurwell, M., Hada, K., Haggard, D., Haworth, K., Hecht, M.H., Hesper, R., Heumann, D., Ho, L.C., Ho, P., Honma, M., Huang, C.-W.L., Huang, L., Hughes, D.H., Ikeda, S., Impellizzeri, C.M.V., Inoue, M., Issaoun, S., James, D.J., Jannuzi, B.T., Janssen, M., Jeter, B., Jiang, W., Jiménez-Rosales, A., Johnson, M.D., Jorstad, S., Joshi, A.V., Jung, T., Karami, M., Karuppusamy, R., Kawashima, T., Keating, G.K., Kettenis, M., Kim, D.-J., Kim, J.-Y., Kim, J., Kim, J., Kino, M., Koay, J.Y., Kocherlakota, P., Kofuji, Y., Koch, P.M., Koyama, S., Kramer, C., Kramer, M., Krichbaum, T.P., Kuo, C.-Y., La Bella, N., Lauer, T.R., Lee, D., Lee, S.-S., Leung, P.K., Levis, A., Li, Z., Lico, R., Lindahl, G., Lindqvist, M., Lisakov, M., Liu, J., Liu, K., Liuzzo, E., Lo, W.-P., Lobanov, A.P., Loinard, L., Lonsdale, C.J., Lu, R.-S., Mao, J., Marchili, N., Markoff, S., Marrone, D.P., Marscher, A.P., Martí-Vidal, I., Matsushita, S., Matthews, L.D., Medeiros, L., Menten, K.M., Michalik, D., Mizuno, I., Mizuno, Y., Moran, J.M., Moriyama, K., Moscibrodzka, M., Müller, C., Mus, A., Musoke, G., Myserlis, I., Nadolski, A., Nagai, H., Nagar, N.M., Nakamura, M., Narayan, R., Narayanan, G., Natarajan, I., Nathanail, A., Fuentes, S.N., Neilsen, J., Neri, R., Ni, C.,

Noutsos, A., Nowak, M.A., Oh, J., Okino, H., Olivares, H., Ortiz-León, G.N., Oyama, T., Özel, F., Palumbo, D.C.M., Paraschos, G.F., Park, J., Parsons, H., Patel, N., Pen, U.-L., Pesce, D.W., Piétu, V., Plambeck, R., PopStefanija, A., Porth, O., Pötzl, F.M., Prather, B., Preciado-López, J.A., Psaltis, D., Pu, H.-Y., Ramakrishnan, V., Rao, R., Rawlings, M.G., Raymond, A.W., Rezzolla, L., Ricarte, A., Ripperda, B., Roelofs, F., Rogers, A., Ros, E., Romero-Cañizales, C., Roshanineshat, A., Rottmann, H., Roy, A.L., Ruiz, I., Ruszczyk, C., Rygl, K.L.J., Sánchez, S., Sánchez-Argüelles, D., Sánchez-Portal, M., Sasada, M., Satapathy, K., Savolainen, T., Schloerb, F.P., Schonfeld, J., Schuster, K.-F., Shao, L., Shen, Z., Small, D., Sohn, B.W., SooHoo, J., Souccar, K., Sun, H., Tazaki, F., Tetarenko, A.J., Tiede, P., Tilanus, R.P.J., Titus, M., Torne, P., Traianou, E., Trent, T., Trippe, S., Turk, M., van Bemmel, I., van Langevelde, H.J., van Rossum, D.R., Vos, J., Wagner, J., Ward-Thompson, D., Wardle, J., Weintroub, J., Wex, N., Wharton, R., Wielgus, M., Wiik, K., Witzel, G., Wondrak, M.F., Wong, G.N., Wu, Q., Yamaguchi, P., Yoon, D., Young, A., Young, K., Younsi, Z., Yuan, F., Yuan, Y.-F., Zensus, J.A., Zhang, S., Zhao, G.-Y., Zhao, S.-S., Agurto, C., Allardi, A., Amestica, R., Araneda, J.P., Arriagada, O., Berghuis, J.L., Bertarini, A., Berthold, R., Blanchard, J., Brown, K., Cárdenas, M., Cantzler, M., Caro, P., Castillo-Domínguez, E., Chan, T.L., Chang, C.-C., Chang, D.O., Chang, S.-H., Chang, S.-C., Chen, C.-C., Chilson, R., Chuter, T.C., Ciechanowicz, M., Colin-Beltran, E., Coulson, I.M., Crowley, J., Degenaar, N., Dornbusch, S., Durán, C.A., Everett, W.B., Faber, A., Forster, K., Fuchs, M.M., Gale, D.M., Geertsema, G., González, E., Graham, D., Gueth, F., Halverson, N.W., Han, C.-C., Han, K.-C., Hasegawa, Y., Hernández-Rebollar, J.L., Herrera, C., Herrero-Illana, R., Heyminck, S., Hirota, A., Hoge, J., Hostler Schimpf, S.R., Howie, R.E., Huang, Y.-D., Jiang, H., Jinchi, H., John, D., Kimura, K., Klein, T., Kubo, D., Kuroda, J., Kwon, C., Lacasse, R., Laing, R., Leitch, E.M., Li, C.-T., Liu, C.-T., Liu, K.-Y., Lin, L.C.-C., Lu, L.-M., Mac-Auliffe, F., Martin-Cocher, P., Matulonis, C., Maute, J.K., Messias, H., Meyer-Zhao, Z., Montaña, A., Montenegro-Montes, F., Montgomerie, W., Moreno Nolasco, M.E., Muders, D., Nishioka, H., Norton, T.J., Nystrom, G., Ogawa, H., Olivares, R., Oshiro, P., Pérez-Beaupuits, J.P., Parra, R., Phillips, N.M., Poirier, M., Pradel, N., Qiu, R., Raffin, P.A., Rahlin, A.S., Ramírez, J., Ressler, S., Reynolds, M., Rodríguez-Montoya, I., Saez-Madain, A.F., Santana, J., Shaw, P., Shirkey, L.E., Silva, K.M., Snow, W., Sousa, D., Sridharan, T.K., Stahm, W., Stark, A.A., Test, J., Torstensson, K., Venegas, P., Walther, C., Wei, T.-S., White, C., Wieching, G., Wijnands, R., Wouterloot, J.G.A., Yu, C.-Y., Yu (于威), W., and Zeballos, M.
ApJ 930, L12 (2022)
10.3847/2041-8213/ac6674

Selective Dynamical Imaging of Interferometric Data
Farah, J., Galison, P., Akiyama, K., Bouman, K.L., Bower, G.C., Chael, A., Fuentes, A., Gómez, J.L., Honma, M., Johnson, M.D., Kofuji, Y., Marrone, D.P., Moriyama, K., Narayan, R., Pesce, D.W., Tiede, P., Wielgus, M., Zhao, G.-Y., Alberdi, A., Alef, W., Algaba, J.C., Anantua, R., Asada, K., Azulay, R., Baczko, A.-K., Ball, D., Baloković, M., Barrett, J., Benson, B.A., Bintley, D., Blackburn, L., Blundell, R., Boland, W., Boyce, H., Bremer, M., Brinkerink, C.D., Brissenden, R., Britzen, S., Broderick, A.E., Broguiere, D., Bronzwaer, T., Bustamente, S., Byun, D.-Y., Carlstrom, J.E., Chan, C.-kwan, Chatterjee, K., Chatterjee, S., Chen, M.-T., Chen, Y., Cho, I., Christian, P., Conway, J.E., Cordes, J.M., Crawford, T.M., Crew, G.B., Cruz-Osorio, A., Cui, Y., Davelaar, J., De Laurentis, M., Deane, R., Dempsey, J., Desvignes, G., Doeleman, S.S., Eatough, R.P., Falcke, H., Fish, V.L., Fomalont, E., Ford, H.A., Fraga-Encinas, R., Friberg, P., Fromm, C.M., Gammie, C.F., Garc'a, R., Gentaz, O., Goddi, C., Gold, R., Gómez-Ruiz, A.I., Gu, M., Gurwell, M.,

Hada, K., Haggard, D., Hecht, M.H., Hesper, R., Ho, L.C., Ho, P., Huang, C.-W.L., Huang, L., Hughes, D.H., Ikeda, S., Inoue, M., Issaoun, S., James, D.J., Jannuzi, B.T., Janssen, M., Jeter, B., Jiang, W., Jimenez-Rosales, A., Jorstad, S., Jung, T., Karami, M., Karuppusamy, R., Kawashima, T., Keating, G.K., Kettenis, M., Kim, D.-J., Kim, J.-Y., Kim, J., Kim, J., Kino, M., Koay, J.Y., Koch, P.M., Koyama, S., Kramer, C., Kramer, M., Krichbaum, T.P., Kuo, C.-Y., Lauer, T.R., Lee, S.-S., Levis, A., Li, Y.-R., Li, Z., Lico, R., Lindahl, G., Lindqvist, M., Liu, J., Liu, K., Liuzzo, E., Lo, W.-P., Lobanov, A.P., Loinard, L., Lonsdale, C., Lu, R.-S., MacDonald, N.R., Mao, J., Marchili, N., Markoff, S., Marscher, A.P., Martí-Vidal, I., Matsushita, S., Matthews, L.D., Medeiros, L., Menten, K.M., Mizuno, I., Mizuno, Y., Moran, J.M., Moscibrodzka, M., Müller, C., Mejas, A.M., Musoke, G., Nagai, H., Nagar, N.M., Nakamura, M., Narayanan, G., Natarajan, I., Nathanail, A., Neilsen, J., Neri, R., Ni, C., Noutsos, A., Nowak, M.A., Okino, H., Olivares, H., Ortiz-León, G.N., Oyama, T., zel, F., Palumbo, D.C.M., Park, J., Patel, N., Pen, U.-L., Piétu, V., Plambeck, R., PopStefanija, A., Porth, O., Pötzl, F.M., Prather, B., Preciado-López, J.A., Psaltis, D., Pu, H.-Y., Ramakrishnan, V., Rao, R., Rawlings, M.G., Raymond, A.W., Rezzolla, L., Ripperda, B., Roelofs, F., Rogers, A., Ros, E., Rose, M., Roshanineshat, A., Rottmann, H., Roy, A.L., Ruszczyk, C., Rygl, K.L.J., Sánchez, S., Sánchez-Arguelles, D., Sasada, M., Savolainen, T., Schloerb, F.P., Schuster, K.-F., Shao, L., Shen, Z., Small, D., Sohn, B.W., SooHoo, J., Sun, H., Tazaki, F., Tetarenko, A.J., Tilanus, R.P.J., Titus, M., Toma, K., Torne, P., Traianou, E., Trent, T., Trippe, S., van Bemmel, I., van Langevelde, H.J., van Rossum, D.R., Wagner, J., Ward-Thompson, D., Wardle, J., Weintroub, J., Wex, N., Wharton, R., Wiik, K., Wong, G.N., Wu, Q., Yoon, D., Young, A., Young, K., Younsi, Z., Yuan, F., Yuan, Y.-F., Zensus, J.A., Zhao, S.-S., and Event Horizon Telescope Collaboration
ApJ 930, L18 (2022)
10.3847/2041-8213/ac6615

A Universal Power-law Prescription for Variability from Synthetic Images of Black Hole Accretion Flows
Georgiev, B., Pesce, D.W., Broderick, A.E., Wong, G.N., Dhruv, V., Wielgus, M., Gammie, C.F., Chan, C.-kwan, Chatterjee, K., Emami, R., Mizuno, Y., Gold, R., Fromm, C.M., Ricarte, A., Yoon, D., Joshi, A.V., Prather, B., Cruz-Osorio, A., Johnson, M.D., Porth, O., Olivares, H., Younsi, Z., Rezzolla, L., Vos, J., Qiu, R., Nathanail, A., Narayan, R., Chael, A., Anantua, R., Moscibrodzka, M., Akiyama, K., Alberdi, A., Alef, W., Algaba, J.C., Asada, K., Azulay, R., Bach, U., Baczko, A.-K., Ball, D., Baloković, M., Barrett, J., Bauböck, M., Benson, B.A., Bintley, D., Blackburn, L., Blundell, R., Bouman, K.L., Bower, G.C., Boyce, H., Bremer, M., Brinkerink, C.D., Brissenden, R., Britzen, S., Broguiere, D., Bronzwaer, T., Bustamante, S., Byun, D.-Y., Carlstrom, J.E., Ceccobello, C., Chatterjee, S., Chen, M.-T., Chen, Y., Cheng, X., Cho, I., Christian, P., Conroy, N.S., Conway, J.E., Cordes, J.M., Crawford, T.M., Crew, G.B., Cui, Y., Davelaar, J., De Laurentis, M., Deane, R., Dempsey, J., Desvignes, G., Dexter, J., Doeleman, S.S., Dougal, S., Dzib, S.A., Eatough, R.P., Falcke, H., Farah, J., Fish, V.L., Fomalont, E., Ford, H.A., Fraga-Encinas, R., Freeman, W.T., Friberg, P., Fuentes, A., Galison, P., García, R., Gentaz, O., Goddi, C., Gómez-Ruiz, A.I., Gómez, J.L., Gu, M., Gurwell, M., Hada, K., Haggard, D., Haworth, K., Hecht, M.H., Hesper, R., Heumann, D., Ho, L.C., Ho, P., Honma, M., Huang, C.-W.L., Huang, L., Hughes, D.H., Ikeda, S., Impellizzeri, C.M.V., Inoue, M., Issaoun, S., James, D.J., Jannuzi, B.T., Janssen, M., Jeter, B., Jiang, W., Jiménez-Rosales, A., Jorstad, S., Jung, T., Karami, M., Karuppusamy, R., Kawashima, T., Keating, G.K., Kettenis, M., Kim, D.-J., Kim, J.-Y., Kim, J., Kim, J., Kino, M., Koay, J.Y., Kocherlakota, P., Kofuji, Y., Koch, P.M., Koyama, S., Kramer, C.,

Kramer, M., Krichbaum, T.P., Kuo, C.-Y., La Bella, N., Lauer, T.R., Lee, D., Lee, S.-S., Lehner, L., Leung, P.K., Levis, A., Li, Z., Lico, R., Lindahl, G., Lindqvist, M., Lisakov, M., Liu, J., Liu, K., Liuzzo, E., Lo, W.-P., Lobanov, A.P., Loinard, L., Lonsdale, C.J., Lu, R.-S., Mao, J., Marchili, N., Markoff, S., Marrone, D.P., Marscher, A.P., Martí-Vidal, I., Matsushita, S., Matthews, L.D., Menten, K.M., Michalik, D., Mizuno, I., Moran, J.M., Moriyama, K., Müller, C., Mus, A., Musoke, G., Myserlis, I., Nadolski, A., Nagai, H., Nagar, N.M., Nakamura, M., Narayanan, G., Natarajan, I., Navarro Fuentes, S., Neilsen, J., Neri, R., Ni, C., Noutsos, A., Nowak, M.A., Oh, J., Okino, H., Ortiz-León, G.N., Oyama, T., Palumbo, D.C.M., Paraschos, G.F., Park, J., Parsons, H., Patel, N., Pen, U.-L., Piétu, V., Plambeck, R., PopStefanija, A., Pötzl, F.M., Preciado-López, J.A., Pu, H.-Y., Ramakrishnan, V., Rao, R., Rawlings, M.G., Raymond, A.W., Ripperda, B., Roelofs, F., Rogers, A., Ros, E., Romero-Cañizales, C., Roshanineshat, A., Rottmann, H., Roy, A.L., Ruiz, I., Ruszczyk, C., Rygl, K.L.J., Sánchez, S., Sánchez-Argüelles, D., Sánchez-Portal, M., Sasada, M., Satapathy, K., Savolainen, T., Schloerb, F.P., Schonfeld, J., Schuster, K.-F., Shao, L., Shen, Z., Small, D., Sohn, B.W., SooHoo, J., Souccar, K., Sun, H., Tazaki, F., Tetarenko, A.J., Tiede, P., Tilanus, R.P.J., Titus, M., Torne, P., Traianou, E., Trent, T., Trippe, S., Turk, M., van Bemmel, I., van Langevelde, H.J., van Rossum, D.R., Wagner, J., Ward-Thompson, D., Wardle, J., Weintroub, J., Wex, N., Wharton, R., Wiik, K., Witzel, G., Wondrak, M.F., Wu, Q., Yamaguchi, P., Young, A., Young, K., Yuan, F., Yuan, Y.-F., Zensus, J.A., Zhang, S., Zhao, G.-Y., and Zhao, S.-S.
ApJ 930, L20 (2022)
10.3847/2041-8213/ac65eb

Observational identification of a sample of likely recent common-envelope events
Khouri, T., Vlemmings, W.H.T., Tafoya, D., Pérez-Sánchez, A.F., Sánchez Contreras, C., Gómez, J.F., Imai, H., Sahai, R.
NatAs 6, 275 (2022)
10.1038/s41550-021-01528-4

SEPIA345: A 345 GHz dual polarization heterodyne receiver channel for SEPIA at the APEX telescope
Meledin, D., Lapkin, I., Fredrixon, M., Sundin, E., Ferm, S.-E., Pavolotsky, A., Strandberg, M., Desmaris, V., López, C., Bergman, P., Olberg, M., Conway, J., Torstensson, K., Durán, C., Montenegro-Montes, F.M., De Breuck, C., and Belitsky, V.
A&A 668, A2 (2022)
10.1051/0004-6361/202244211

Ionize Hard: Interstellar PO^+ Detection
Rivilla, V.M., García De La Concepción, J., Jiménez-Serra, I., Martín-Pintado, J., Colzi, L., Tercero, B., Megías, A., López-Gallifa, Á., Martínez-Henares, A., Massalkhi, S., Martín, S., Zeng, S., De Vicente, P., Rico-Villas, F., Requena-Torres, M.A., and Cosentino, G.
FrASS 9, 829288 (2022)
10.3389/fspas.2022.829288

The Variability of the Black Hole Image in M87 at the Dynamical Timescale
Satapathy, K., Psaltis, D., Özel, F., Medeiros, L., Dougall, S.T., Chan, C.-K., Wielgus, M., Prather, B.S., Wong, G.N., Gammie, C.F., Akiyama, K., Alberdi, A., Alef, W., Algaba, J.C., Anantua, R., Asada, K., Azulay, R., Baczko, A.-K., Ball, D., Baloković, M., Barrett, J., Benson, B.A., Bintley, D., Blackburn, L., Blundell, R., Boland, W., Bouman, K.L., Bower, G.C., Boyce, H., Bremer, M., Brinkerink, C.D., Brissenden, R., Britzen, S.,

Broderick, A.E., Broguiere, D., Bronzwaer, T., Bustamente, S., Byun, D.-Y., Carlstrom, J.E., Chael, A., Chatterjee, K., Chatterjee, S., Chen, M.-T., Chen, Y., Cho, I., Christian, P., Conway, J.E., Cordes, J.M., Crawford, T.M., Crew, G.B., Cruz-Osorio, A., Cui, Y., Davelaar, J., De Laurentis, M., Deane, R., Dempsey, J., Desvignes, G., Dexter, J., Doeleman, S.S., Eatough, R.P., Falcke, H., Farah, J., Fish, V.L., Fomalont, E., Ford, H.A., Fraga-Encinas, R., Friberg, P., Fromm, C.M., Fuentes, A., Galison, P., García, R., Gentaz, O., Georgiev, B., Goddi, C., Gold, R., Gómez-Ruiz, A.I., Gómez, J.L., Gu, M., Gurwell, M., Hada, K., Haggard, D., Hecht, M.H., Hesper, R., Ho, L.C., Ho, P., Honma, M., Huang, C.-W.L., Huang, L., Hughes, D.H., Ikeda, S., Inoue, M., Issaoun, S., James, D.J., Jannuzi, B.T., Janssen, M., Jeter, B., Jiang, W., Jimenez-Rosales, A., Johnson, M.D., Jorstad, S., Jung, T., Karami, M., Karuppusamy, R., Kawashima, T., Keating, G.K., Kettenis, M., Kim, D.-J., Kim, J.-Y., Kim, J., Kim, J., Kino, M., Koay, J.Y., Kofuji, Y., Koch, P.M., Koyama, S., Kramer, C., Kramer, M., Krichbaum, T.P., Kuo, C.-Y., Lauer, T.R., Lee, S.-S., Levis, A., Li, Y.-R., Li, Z., Lindqvist, M., Lico, R., Lindahl, G., Liu, J., Liu, K., Liuzzo, E., Lo, W.-P., Lobanov, A.P., Loinard, L., Lonsdale, C., Lu, R.-S., MacDonald, N.R., Mao, J., Marchili, N., Markoff, S., Marrone, D.P., Marscher, A.P., Martí-Vidal, I., Matsushita, S., Matthews, L.D., Menten, K.M., Mizuno, I., Mizuno, Y., Moran, J.M., Moriyama, K., Moscibrodzka, M., Müller, C., Mejías, A.M., Musoke, G., Nagai, H., Nagar, N.M., Nakamura, M., Narayan, R., Narayanan, G., Natarajan, I., Nathanail, A., Neilsen, J., Neri, R., Ni, C., Noutsos, A., Nowak, M.A., Okino, H., Olivares, H., Ortiz-León, G.N., Oyama, T., Palumbo, D.C.M., Park, J., Patel, N., Pen, U.-L., Pesce, D.W., Piétu, V., Plambeck, R., PopStefanija, A., Porth, O., Pötzl, F.M., Preciado-López, J.A., Pu, H.-Y., Ramakrishnan, V., Rao, R., Rawlings, M.G., Raymond, A.W., Rezzolla, L., Ripperda, B., Roelofs, F., Rogers, A., Ros, E., Rose, M., Roshanineshat, A., Rottmann, H., Roy, A.L., Ruszczyk, C., Rygl, K.L.J., Sánchez, S., Sánchez-Arguelles, D., Sasada, M., Savolainen, T., Schloerb, F.P., Schuster, K.-F., Shao, L., Shen, Z., Small, D., Sohn, B.W., SooHoo, J., Sun, H., Tazaki, F., Tetarenko, A.J., Tiede, P., Tilanus, R.P.J., Titus, M., Toma, K., Torne, P., Traianou, E., Trent, T., Trippe, S., van Bemmel, I., van Langevelde, H.J., van Rossum, D.R., Wagner, J., Ward-Thompson, D., Wardle, J., Weintroub, J., Wex, N., Wharton, R., Wiik, K., Wu, Q., Yoon, D., Young, A., Young, K., Younsi, Z., Yuan, F., Yuan, Y.-F., Zensus, J.A., Zhao, G.-Y., and Zhao, S.-S.
ApJ 925, 13 (2022)
10.3847/1538-4357/ac332e

APEX and NOEMA observations of H_2S in nearby luminous galaxies and the ULIRG Mrk 231. A possible relation between dense gas properties and molecular outflows
Sato, M.T., Aalto, S., Kohno, K., König, S., Harada, N., Viti, S., Izumi, T., Nishimura, Y., and Gorski, M.
A&A 660, A82 (2022)
10.1051/0004-6361/202141260

The APEX Large CO Heterodyne Orion Legacy Survey (ALCOHOLS). I. Survey overview
Stanke, T., Arce, H.G., Bally, J., Bergman, P., Carpenter, J., Davis, C.J., Dent, W., Di Francesco, J., Eislöffel, J., Froebrich, D., Ginsburg, A., Heyer, M., Johnstone, D., Mardones, D., McCaughrean, M.J., Megeath, S.T., Nakamura, F., Smith, M.D., Stutz, A., Tatematsu, K., Walker, C., Williams, J.P., Zinnecker, H., Swift, B.J., Kulesa, C., Peters, B., Duffy, B., Kloosterman, J., Yıldız, U.A., Pineda, J.L., De Breuck, C., and Klein, T.
A&A 658, A178 (2022)
10.1051/0004-6361/201937034

Millimeter Light Curves of Sagittarius A Observed during the 2017 Event Horizon Telescope Campaign*
Wielgus, M., Marchili, N., Martí-Vidal, I., Keating, G.K., Ramakrishnan, V., Tiede, P., Fomalont, E., Issaoun, S., Neilsen, J., Nowak, M.A., Blackburn, L., Gammie, C.F., Goddi, C., Haggard, D., Lee, D., Moscibrodzka, M., Tetarenko, A.J., Bower, G.C., Chan, C.-kwan, Chatterjee, K., Chesler, P.M., Dexter, J., Doeleman, S.S., Georgiev, B., Gurwell, M., Johnson, M.D., Marrone, D.P., Mus, A., Psaltis, D., Ripperda, B., Witzel, G., Akiyama, K., Alberdi, A., Alef, W., Algaba, J.C., Anantua, R., Asada, K., Azulay, R., Bach, U., Baczko, A.-K., Ball, D., Baloković, M., Barrett, J., Bauböck, M., Benson, B.A., Bintley, D., Blundell, R., Boland, W., Bouman, K.L., Boyce, H., Bremer, M., Brinkerink, C.D., Brissenden, R., Britzen, S., Broderick, A.E., Broguiere, D., Bronzwaer, T., Bustamante, S., Byun, D.-Y., Carlstrom, J.E., Ceccobello, C., Chael, A., Chatterjee, S., Chen, M.-T., Chen, Y., Cho, I., Christian, P., Conroy, N.S., Conway, J.E., Cordes, J.M., Crawford, T.M., Crew, G.B., Cruz-Osorio, A., Cui, Y., Davelaar, J., De Laurentis, M., Deane, R., Dempsey, J., Desvignes, G., Dhruv, V., Dzib, S.A., Eatough, R.P., Emami, R., Falcke, H., Farah, J., Fish, V.L., Ford, H.A., Fraga-Encinas, R., Freeman, W.T., Friberg, P., Fromm, C.M., Fuentes, A., Galison, P., García, R., Gentaz, O., Gold, R., Gómez-Ruiz, A.I., Gómez, J.L., Gu, M., Hada, K., Haworth, K., Hecht, M.H., Hesper, R., Ho, L.C., Ho, P., Honma, M., Huang, C.-W.L., Huang, L., Hughes, D.H., Ikeda, S., Impellizzeri, C.M.V., Inoue, M., James, D.J., Jannuzi, B.T., Janssen, M., Jeter, B., Jiang, W., Jiménez-Rosales, A., Jorstad, S., Joshi, A.V., Jung, T., Karami, M., Karuppusamy, R., Kawashima, T., Kettenis, M., Kim, D.-J., Kim, J.-Y., Kim, J., Kim, J., Kino, M., Koay, J.Y., Kocherlakota, P., Kofuji, Y., Koch, P.M., Koyama, S., Kramer, C., Kramer, M., Krichbaum, T.P., Kuo, C.-Y., La Bella, N., Lauer, T.R., Lee, S.-S., Leung, P.K., Levis, A., Li, Z., Lico, R., Lindahl, G., Lindqvist, M., Lisakov, M., Liu, J., Liu, K., Liuzzo, E., Lo, W.-P., Lobanov, A.P., Loinard, L., Lonsdale, C., Lu, R.-S., Mao, J., Markoff, S., Marscher, A.P., Matsushita, S., Matthews, L.D., Medeiros, L., Menten, K.M., Michalik, D., Mizuno, I., Mizuno, Y., Moran, J.M., Moriyama, K., Müller, C., Musoke, G., Myserlis, I., Nadolski, A., Nagai, H., Nagar, N.M., Nakamura, M., Narayan, R., Narayanan, G., Natarajan, I., Nathanail, A., Navarro Fuentes, S., Neri, R., Ni, C., Noutsos, A., Oh, J., Okino, H., Olivares, H., Ortiz-León, G.N., Oyama, T., Özel, F., Palumbo, D.C.M., Paraschos, G.F., Park, J., Parsons, H., Patel, N., Pen, U.-L., Pesce, D.W., Piétu, V., Plambeck, R., PopStefanija, A., Porth, O., Pötzl, F.M., Prather, B., Preciado-López, J.A., Pu, H.-Y., Rao, R., Rawlings, M.G., Raymond, A.W., Rezzolla, L., Ricarte, A., Roelofs, F., Rogers, A., Ros, E., Romero-Canizales, C., Roshanineshat, A., Rottmann, H., Roy, A.L., Ruiz, I., Ruszczyk, C., Rygl, K.L.J., Sánchez, S., Sánchez-Argüelles, D., Sánchez-Portal, M., Sasada, M., Satapathy, K., Savolainen, T., Schloerb, F.P., Schuster, K.-F., Shao, L., Shen, Z., Small, D., Won Sohn, B., SooHoo, J., Souccar, K., Sun, H., Tazaki, F., Tilanus, R.P.J., Titus, M., Torne, P., Traianou, E., Trent, T., Trippe, S., van Bemmel, I., van Langevelde, H.J., van Rossum, D.R., Vos, J., Wagner, J., Ward-Thompson, D., Wardle, J., Weintroub, J., Wex, N., Wharton, R., Wiik, K., Wondrak, M.F., Wong, G.N., Wu, Q., Yamaguchi, P., Yoon, D., Young, A., Young, K., Younsi, Z., Yuan, F., Yuan, Y.-F., Zensus, J.A., Zhang, S., Zhao, G.-Y., and Zhao, S.-S.
ApJ 930, L19 (2022)
10.3847/2041-8213/ac6428

Dense Gas and Star Formation in Nearby Infrared-bright Galaxies: APEX Survey of HCN and HCO^+ $J = 2 \rightarrow 1$
Zhou, J., Zhang, Z.-Y., Gao, Y., Wang, J., Shi, Y., Gu, Q., Yang, C., Wang, T., and Tan, Q.-H.
ApJ 936, 58 (2022)
10.3847/1538-4357/ac82eb

International authors (APEX)

Which Galaxy Property is the Best Gauge of the Oxygen Abundance?
Alvarez-Hurtado, P., Barrera-Ballesteros, J.K., Sánchez, S.F., Colombo, D., López-Sánchez, A.R., Aquino-Ortíz, E.
ApJ 929, 47 (2022)
10.3847/1538-4357/ac58fb

A Multiwavelength Study of ELAN Environments ($AMUSE^2$). Mass Budget, Satellites Spin Alignment, and Gas Infall in a Massive $z \sim 3$ Quasar Host Halo
Arrigoni Battaia, F., Chen, C.-C., Liu, H.-Y.B., De Breuck, C., Galametz, M., Fumagalli, M., Yang, Y., Zanella, A., Man, A., Obreja, A., Prochaska, J.X., Bañados, E., Hennawi, J.F., Farina, E.P., Zwaan, M.A., Decarli, R., and Lusso, E.
ApJ 930, 72 (2022)
10.3847/1538-4357/ac5a4d

Velocity structure of the 50 pc long NGC 6334 filamentary cloud. Hints of multiple compressions and their impact on the cloud properties
Arzoumanian, D., Russeil, D., Zavagno, A., Chun-Yuan Chen, M., André, P., Inutsuka, S.-ichiro, Misugi, Y., Sánchez-Monge, Á., Schilke, P., Men'shchikov, A., and Kohno, M.
A&A 660, A56 (2022)
10.1051/0004-6361/202141699

A potential new phase of massive star formation. A luminous outflow cavity centred on an infrared quiet core
Bonne, L., Peretto, N., Duarte-Cabral, A., Schmiedeke, A., Schneider, N., Bontemps, S., and Whitworth, A.
A&A 665, A22 (2022)
10.1051/0004-6361/202142154

The SOFIA FEEDBACK Legacy Survey Dynamics and Mass Ejection in the Bipolar H II Region RCW 36
Bonne, L., Schneider, N., García, P., Bij, A., Broos, P., Fissel, L., Guesten, R., Jackson, J., Simon, R., Townsley, L., Zavagno, A., Aladro, R., Buchbender, C., Guevara, C., Higgins, R., Jacob, A.M., Kabanovic, S., Karim, R., Soam, A., Stutzki, J., Tiwari, M., Wyrowski, F., and Tielens, A.G.G.M.
ApJ 935, 171 (2022)
10.3847/1538-4357/ac8052

Sulphur-rich cold gas around the hot core precursor G328.2551-0.5321. An APEX unbiased spectral survey of the 2 mm, 1.2 mm, and 0.8 mm atmospheric windows
Bouscasse, L., Csengeri, T., Belloche, A., Wyrowski, F., Bontemps, S., Güsten, R., and Menten, K.M.
A&A 662, A32 (2022)
[10.1051/0004-6361/202140519](10.1051/0004-6361/202140519)

Sampling molecular gas in the Helix planetary nebula: Variation in HNC/HCN with UV flux
Bublitz, J., Kastner, J.H., Hily-Blant, P., Forveille, T., Santander-García, M., Alcolea, J., and Bujarrabal, V.
A&A 659, A197 (2022)
[10.1051/0004-6361/202141778](10.1051/0004-6361/202141778)

Living on the edge of the Milky Way's central molecular zone. G1.3 is the more likely candidate for gas accretion into the CMZ
Busch, L.A., Riquelme, D., Güsten, R., Menten, K.M., Pillai, T.G.S., and Kauffmann, J.
A&A 668, A183 (2022)
[10.1051/0004-6361/202244870](10.1051/0004-6361/202244870)

Stellar population in the vicinity of the H II region G331.03-00.15
Cárdenas, S. B., Blanco, A. B., Gamen, R., Cichowolski, S.
A&A 666, A96 (2022)
[10.1051/0004-6361/202244381](10.1051/0004-6361/202244381)

A multiwavelength study of the H II region G347.600 + 00.211 and its effects on the surrounding medium
Cárdenas, S. B., Cichowolski, S., Suad, L. A., Molina Lera, J. A., Gamen, R., Rizzo, L.
MNRAS 509, 3395 (2022)
10.1093/mnras/stab3084

RJ-plots: An improved method to classify structures objectively
Clarke, S.D., Jaffa, S.E., and Whitworth, A.P.
MNRAS 516, 2782 (2022)
10.1093/mnras/stac2318

The SEDIGISM survey: The influence of spiral arms on the molecular gas distribution of the inner Milky Way
Colombo, D., Duarte-Cabral, A., Pettitt, A.R., Urquhart, J.S., Wyrowski, F., Csengeri, T., Neralwar, K.R., Schuller, F., Menten, K.M., Anderson, L., Barnes, P., Beuther, H., Bronfman, L., Eden, D., Ginsburg, A., Henning, T., König, C., Lee, M.-Y., Mattern, M., Medina, S., Ragan, S.E., Rigby, A.J., Sánchez-Monge, Á., Traficante, A., Yang, A.Y., and Wienen, M.
A&A 658, A54 (2022)
[10.1051/0004-6361/202141287](10.1051/0004-6361/202141287)

Deuterium Fractionation as a Multiphase Component Tracer in the Galactic Center
Colzi, L., Martín-Pintado, J., Rivilla, V.M., Jiménez-Serra, I., Zeng, S., Rodríguez-Almeida, L.F., Rico-Villas, F., Martín, S., and Requena-Torres, M.A.
ApJ 926, L22 (2022)
[10.3847/2041-8213/ac52ac](10.3847/2041-8213/ac52ac)

SOFIA/GREAT observations of OD and OH rotational lines towards high-mass star forming regions
Csengeri, T., Wyrowski, F., Menten, K. M., Wiesemeyer, H., Güsten, R., Stutzki, J., Heyminck, S., Okada, Y.
A&A 658, A193 (2022)
10.1051/0004-6361/202140577
Feeding the spider with carbon. [CII] emission from the circumgalactic medium and active galactic nucleus
De Breuck, C., Lundgren, A., Emonts, B., Kolwa, S., Dannerbauer, H., and Lehnert, M.
A&A 658, L2 (2022)
10.1051/0004-6361/202141853

New evidences in IRDC G333.73 + 0.37: colliding filamentary clouds, hub-filament system, and embedded cores
Dewangan, L. K.
MNRAS 513, 2942 (2022)
10.1093/mnras/stac967

Ionized filaments and ongoing physical processes in massive-star-forming sites around $l = 345.°5$
Dewangan, L.K., Pirogov, L.E., Bhadari, N.K., and Maity, A.K.
MNRAS 516, 2988 (2022)
10.1093/mnras/stac2334

A Multiwavelength Study of the Sgr B Region: Contiguous Cloud-Cloud Collisions Triggering Widespread Star Formation Events?
Enokiya, R., Fukui, Y.
ApJ 931, 155 (2022)
10.3847/1538-4357/ac674f

High-resolution images of two wiggling stellar jets, MHO 1502 and MHO 2147, obtained with GSAOI+GeMS
Ferrero, L. V., Günthardt, G., García, L., Gómez, M., Kalari, V. M., Saldaño, H. P.
A&A 657, A110 (2022)
10.1051/0004-6361/202142421

High resolution spectral imaging of CO(7-6), [CI](2-1), and continuum of three high-z lensed dusty star-forming galaxies using ALMA
Gururajan, G., Béthermin, M., Theulé, P., Spilker, J.S., Aravena, M., Archipley, M.A., Chapman, S.C., De Breuck, C., Gonzalez, A., Hayward, C.C., Hezaveh, Y., Hill, R., Jarugula, S., Litke, K.C., Malkan, M., Marrone, D.P., Narayanan, D., Phadke, K.A., Reuter, C., Vieira, J.D., Vizgan, D., and Weiß, A.
A&A 663, A22 (2022)
10.1051/0004-6361/202142172

An APEX search for carbon emission from NGC 1977 proplyds
Haworth, T.J., Kim, J.S., Qiao, L., Winter, A.J., Williams, J.P., Clarke, C.J., Owen, J.E., Facchini, S., Ansdell, M., Kama, M., and Ballabio, G.
MNRAS 512, 2594 (2022)
10.1093/mnras/stac656

Resolving the Inner Parsec of the Blazar J1924-2914 with the Event Horizon Telescope
Issaoun, S., Wielgus, M., Jorstad, S., Krichbaum, T.P., Blackburn, L., Janssen, M., Chan, C.-kwan, Pesce, D.W., Gómez, J.L., Akiyama, K., Mościbrodzka, M., Martí-Vidal, I., Chael, A., Lico, R., Liu, J., Ramakrishnan, V., Lisakov, M., Fuentes, A., Zhao, G.-Y., Moriyama, K., Broderick, A.E., Tiede, P., MacDonald, N.R., Mizuno, Y., Traianou, E., Loinard, L., Davelaar, J., Gurwell, M., Lu, R.-S., Alberdi, A., Alef, W., Algaba, J.C., Anantua, R., Asada, K., Azulay, R., Bach, U., Baczko, A.-K., Ball, D., Baloković, M., Barrett, J., Bauböck, M., Benson, B.A., Bintley, D., Blundell, R., Boland, W., Bouman, K.L., Bower, G.C., Boyce, H., Bremer, M., Brinkerink, C.D., Brissenden, R., Britzen, S., Broguiere, D., Bronzwaer, T., Bustamante, S., Byun, D.-Y., Carlstrom, J.E., Ceccobello, C., Chatterjee, K., Chatterjee, S., Chen, M.-T., Chen, Y., Cho, I., Christian, P., Conroy, N.S., Conway, J.E., Cordes, J.M., Crawford, T.M., Crew, G.B., Cruz-Osorio, A., Cui, Y., De Laurentis, M., Deane, R., Dempsey, J., Desvignes, G., Dexter, J., Doeleman, S.S., Dhruv, V., Dzib Quijano, S.A., Eatough, R.P., Emami, R., Falcke, H., Farah, J., Fish, V.L., Fomalont, E., Ford, H.A., Fraga-Encinas, R., Freeman, W.T., Friberg, P., Fromm, C.M., Galison, P., Gammie, C.F., García, R., Gentaz, O., Georgiev, B., Goddi, C., Gold, R., Gómez-Ruiz, A.I., Gu, M., Hada, K., Haggard, D., Hecht, M.H., Hesper, R., Ho, L.C., Ho, P., Honma, M., Huang, C.-W.L., Huang, L., Hughes, D.H., Ikeda, S., Impellizzeri, C.M.V., Inoue, M., James, D.J., Jannuzi, B.T., Jeter, B., Jiang, W., Jimenez-Rosales, A., Johnson, M.D., Joshi, A.V., Jung, T., Karami, M., Karuppusamy, R., Kawashima, T., Keating, G.K., Kettenis, M., Kim, D.-J., Kim, J.-Y., Kim, J., Kim, J., Kino, M., Koay, J.Y., Kocherlakota, P., Kofuji, Y., Koch, P.M., Koyama, S., Kramer, C., Kramer, M., Kuo, C.-Y., La Bella, N., Lauer, T.R., Lee, D., Lee, S.-S., Leung, P.K., Levis, A., Li, Z., Lico, R., Lindahl, G., Lindqvist, M., Liu, K., Liuzzo, E., Lo, W.-P., Lobanov, A.P., Lonsdale, C., Mao, J., Marchili, N., Markoff, S., Marrone, D.P., Marscher, A.P., Matsushita, S., Matthews, L.D., Medeiros, L., Menten, K.M., Michalik, D., Mizuno, I., Mizuno, Y., Moran, J.M., Müller, C., Mus, A., Musoke, G., Myserlis, I., Nadolski, A., Nagai, H., Nagar, N.M., Nakamura, M., Narayan, R., Narayanan, G., Natarajan, I., Nathanail, A., Neilsen, J., Neri, R., Ni, C., Noutsos, A., Nowak, M.A., Oh, J., Okino, H., Olivares, H., Ortiz-León, G.N., Oyama, T., Özel, F., Palumbo, D.C.M., Paraschos, G.F., Park, J., Parsons, H., Patel, N., Pen, U.-L., Piétu, V., Plambeck, R., PopStefanija, A., Porth, O., Pötzl, F.M., Prather, B., Preciado-López, J.A., Psaltis, D., Pu, H.-Y., Rao, R., Rawlings, M.G., Raymond, A.W., Rezzolla, L., Ricarte, A., Ripperda, B., Roelofs, F., Rogers, A., Ros, E., Romero-Canizales, C., Roshanineshat, A., Rottmann, H., Roy, A.L., Ruiz, I., Ruszczyk, C., Rygl, K.L.J., Sánchez, S., Sánchez-Arguelles, D., Sanchez-Portal, M., Sasada, M., Satapathy, K., Savolainen, T., Schloerb, F.P., Schuster, K.-F., Shao, L., Shen, Z., Small, D., Sohn, B.W., SooHoo, J., Souccar, K., Sun, H., Tazaki, F., Tetarenko, A.J., Tiede, P., Tilanus, R.P.J., Titus, M., Torne, P., Trent, T., Trippe, S., van Bemmel, I., van Langevelde, H.J., van Rossum, D.R., Vos, J., Wagner, J., Ward-Thompson, D., Wardle, J., Weintroub, J., Wex, N., Wharton, R., Wiik, K., Witzel, G., Wondrak, M., Wong, G.N., Wu, Q., Yamaguchi, P., Yoon, D., Young, A., Young, K., Younsi, Z., Yuan, F., Yuan, Y.-F., Zensus, J.A., Zhang, S., and Zhao, S.-S.
ApJ 934, 145 (2022)
10.3847/1538-4357/ac7a40

ArH^+ and H_2O^+ absorption towards luminous galaxies
Jacob, A.M., Menten, K.M., Wyrowski, F., Winkel, B., Neufeld, D.A., and Koribalski, B.S.
A&A 659, A152 (2022)
10.1051/0004-6361/202142544

Vibrationally excited HCN transitions in circumstellar envelopes of carbon-rich AGB stars
Jeste, M., Gong, Y., Wong, K.T., Menten, K.M., Kamiński, T., and Wyrowski, F.
A&A 666, A69 (2022)
10.1051/0004-6361/202243365

Self-absorption in [C II], ^{12}CO, and H I in RCW120. Building up a geometrical and physical model of the region
Kabanovic, S., Schneider, N., Ossenkopf-Okada, V., Falasca, F., Güsten, R., Stutzki, J., Simon, R., Buchbender, C., Anderson, L., Bonne, L., Guevara, C., Higgins, R., Koribalski, B., Luisi, M., Mertens, M., Okada, Y., Röllig, M., Seifried, D., Tiwari, M., Wyrowski, F., Zavagno, A., Tielens, A. G. G. M.
A&A 659, A36 (2022)
10.1051/0004-6361/202142575

A search for cool molecular gas in GK Persei and other classical novae
Kamiński, T., Mazurek, H.J., Menten, K.M., and Tylenda, R.
A&A 659, A109 (2022)
10.1051/0004-6361/202142737

A multiwavelength study of the W33 Main ultracompact HII region
Khan, S., Pandian, J. D., Lal, D. V., Rugel, M. R., Brunthaler, A., Menten, K. M., Wyrowski, F., Medina, S. -N. X., Dzib, S. A., Nguyen, H.
A&A 664, A140 (2022)
10.1051/0004-6361/202140914

The Effect of Molecular Cloud Properties on the Kinematics of Stars Formed in the Trifid Region
Kuhn, M.A., Hillenbrand, L.A., Feigelson, E.D., Fowler, I., Getman, K.V., Broos, P.S., Povich, M.S., and Gromadzki, M.
ApJ 937, 46 (2022)
10.3847/1538-4357/ac6fe8

Water Masers as an Early Tracer of Star Formation
Ladeyschikov, D.A., Gong, Y., Sobolev, A.M., Menten, K.M., Urquhart, J.S., Breen, S.L., Shakhvorostova, N.N., Bayandina, O.S., and Tsivilev, A.P.
ApJSS 261, 14 (2022)
10.3847/1538-4365/ac6b43

ESO 137-002: a large spiral undergoing edge-on ram-pressure stripping with little star formation in the tail
Laudari, S., Jáchym, P., Sun, M., Waldron, W., Chatzikos, M., Kenney, J., Luo, R., Nulsen, P., Sarazin, C., Combes, F., Edge, T., Voit, M., Donahue, M., and Cortese, L.
MNRAS 509, 3938 (2022)
10.1093/mnras/stab3280

ATLASGAL-selected massive clumps in the inner Galaxy. X. Observations of atomic carbon at 492 GHz
Lee, M. -Y., Wyrowski, F., Menten, K., Tiwari, M., Güsten, R.
A&A 664, A80 (2022)
10.1051/0004-6361/202142404

Low-J CO Line Ratios from Single-dish CO Mapping Surveys and PHANGS-ALMA
Leroy, A.K., Rosolowsky, E., Usero, A., Sandstrom, K., Schinnerer, E., Schruba, A., Bolatto, A.D., Sun, J., Barnes, A.T., Belfiore, F., Bigiel, F., den Brok, J.S., Cao, Y., Chiang, I.-D., Chevance, M., Dale, D.A., Eibensteiner, C., Faesi, C.M., Glover, S.C.O., Hughes, A., Jiménez Donaire, M.J., Klessen, R.S., Koch, E.W., Kruijssen, J.M.D., Liu, D., Meidt, S.E., Pan, H.-A., Pety, J., Puschnig, J., Querejeta, M., Saito, T., Sardone, A., Watkins, E.J., Weiss, A., and Williams, T.G.
ApJ 927, 149 (2022)
10.3847/1538-4357/ac3490

The evolution of temperature and density structures of OB cluster-forming molecular clumps
Lin, Y., Wyrowski, F., Liu, H. B., Izquierdo, A. F., Csengeri, T., Leurini, S., Menten, K. M.
A&A 658, A128 (2022)
10.1051/0004-6361/202142023

Cloud-cloud collision and star formation in G323.18+0.15
Ma, Y., Zhou, J., Esimbek, J., Baan, W., Li, D., He, Y., Tang, X., Ji, W., Zhou, D., Wu, G., and Xu, Y.
A&A 663, A97 (2022)
10.1051/0004-6361/202243317

Unraveling the Observational Signatures of Cloud-Cloud Collision and Hub-filament Systems in W31
Maity, A.K., Dewangan, L.K., Sano, H., Tachihara, K., Fukui, Y., and Bhadari, N.K.
ApJ 934, 2 (2022)
10.3847/1538-4357/ac7872

Spitzer and Herschel studies of dust in supernova remnants in the Small Magellanic Cloud
Matsuura, M., Ayley, V., Chawner, H., Filipović, M.D., Reid, W., Priestley, F.D., Rigby, A., Barlow, M.J., and Gomez, H.E.
MNRAS 513, 1154 (2022)
10.1093/mnras/stac583

Submillimeter observations of molecular gas interacting with the supernova remnant W28
Mazumdar, P., Tram, L.N., Wyrowski, F., Menten, K.M., and Tang, X.
A&A 668, A180 (2022)
10.1051/0004-6361/202037564

Low Mass Stars as Tracers of Star and Cluster Formation
Megeath, S.T., Gutermuth, R.A., and Kounkel, M.A.
PASP 134, 42001 (2022)
10.1088/1538-3873/ac4c9c

ArTéMiS imaging of the filamentary infrared dark clouds G1.75-0.08 and G11.36+0.80: Dust-based physical properties of the clouds and their clumps
Miettinen, O., Mattern, M., and André, P.
A&A 667, A90 (2022)
10.1051/0004-6361/202243027

Star Formation Triggered by the Expanding Bubble S111
Mookerjea, B.
ApJ 926, 4 (2022)
10.3847/1538-4357/ac4258

APEX at the QSO MUSEUM: molecular gas reservoirs associated with z ~ 3 quasars and their link to the extended Ly α emission
Muñoz-Elgueta, N., Arrigoni Battaia, F., Kauffmann, G., De Breuck, C., García-Vergara, C., Zanella, A., Farina, E.P., and Decarli, R.
MNRAS 511, 1462 (2022)
10.1093/mnras/stac041

The SEDIGISM survey: Molecular cloud morphology. I. Classification and star formation
Neralwar, K.R., Colombo, D., Duarte-Cabral, A., Urquhart, J.S., Mattern, M., Wyrowski, F., Menten, K.M., Barnes, P., Sánchez-Monge, Á., Beuther, H., Rigby, A.J., Mazumdar, P., Eden, D., Csengeri, T., Dobbs, C.L., Veena, V.S., Neupane, S., Henning, T., Schuller, F., Leurini, S., Wienen, M., Yang, A.Y., Ragan, S.E., Medina, S., and Nguyen-Luong, Q.
A&A 663, A56 (2022)
10.1051/0004-6361/202142428

The SEDIGISM survey: Molecular cloud morphology. II. Integrated source properties
Neralwar, K.R., Colombo, D., Duarte-Cabral, A., Urquhart, J.S., Mattern, M., Wyrowski, F., Menten, K.M., Barnes, P., Sánchez-Monge, Á., Rigby, A.J., Mazumdar, P., Eden, D., Csengeri, T., Dobbs, C.L., Veena, V.S., Neupane, S., Henning, T., Schuller, F., Leurini, S., Wienen, M., Yang, A.Y., Ragan, S.E., Medina, S., and Nguyen-Luong, Q.
A&A 664, A84 (2022)
10.1051/0004-6361/202142513

Extremely high spectral resolution measurements of the 450 µm atmospheric window at Chajnantor with APEX
Pardo, J.R., De Breuck, C., Muders, D., González, J., Montenegro-Montes, F.M., Pérez-Beaupuits, J.P., Cernicharo, J., Prigent, C., Serabyn, E., Mroczkowski, T., and Phillips, N.
A&A 664, A153 (2022)
10.1051/0004-6361/202243409

Chemical environments of 6.7 GHz methanol maser sources
Paulson, S.T. and Pandian, J.D.
MNRAS 509, 3677 (2022)
10.1093/mnras/stab3227

Dust Temperature Profiles in Dense Cores Related to the High-Mass Star-Forming Regions
Pirogov, L.E.
Radiophys. Quantum El. 64, 857 (2022)
10.1007/s11141-022-10184-1

Solenoidal turbulent modes and star formation efficiency in Galactic plane molecular clouds
Rani, R., Moore, T.J.T., Eden, D.J., and Rigby, A.J.
MNRAS 515, 271 (2022)
10.1093/mnras/stac1812

Ground-based HCN submillimetre measurements in Titan's atmosphere: an intercomparison with Herschel observations
Rengel, M., Shulyak, D., Hartogh, P., Sagawa, H., Moreno, R., Jarchow, C., and Breitschwerdt, D.
A&A 658, A88 (2022)
10.1051/0004-6361/202141422

Interstellar Complex Organic Molecules in SiO-traced Massive Outflows
Rojas-García, O. S., Gómez-Ruiz, A. I., Palau, A., Orozco-Aguilera, M. T., Dagostino, M. Chavez, Kurtz, S. E.
ApJSS 262, 13 (2022)
10.3847/1538-4365/ac81cb

The molecular gas properties in local Seyfert 2 galaxies
Salvestrini, F., Gruppioni, C., Hatziminaoglou, E., Pozzi, F., Vignali, C., Casasola, V., Paladino, R., Aalto, S., Andreani, P., Marchesi, S., and Stanke, T.
A&A 663, A28 (2022)
10.1051/0004-6361/202142760

A Spectral Survey of CH_3CCH in the Hot Molecular Core G331.512-0.103
Santos, J.C., Bronfman, L., Mendoza, E., Lépine, J.R.D., Duronea, N.U., Merello, M., and Finger, R.
ApJ 925, 3 (2022)
10.3847/1538-4357/ac36cc

The Nearby Evolved Stars Survey II: Constructing a volume-limited sample and first results from the James Clerk Maxwell Telescope
Scicluna, P., Kemper, F., McDonald, I., Srinivasan, S., Trejo, A., Wallström, S. H. J., Wouterloot, J. G. A., Cami, J., Greaves, J., He, Jinhua, Hoai, D. T., Kim, Hyosun, Jones, O.C., Shinnaga, H., Clark, C. J. R., Dharmawardena, T., Holland, W., Imai, H., van Loon, J. Th, Menten, K. M., Wesson, R., Chawner, H., Feng, S., Goldman, S., Liu, F. C., MacIsaac, H., Tang, J., Zeegers, S., Amada, K., Antoniou, V., Bemis, A., Boyer, M. L., Chapman, S., Chen, X., Cho, S. -H., Cui, L., Dell'Agli, F., Friberg, P., Fukaya, S., Gomez, H., Gong, Y., Hadjara, M., Haswell, C., Hirano, N., Hony, S., Izumiura, H., Jeste, M., Jiang, X., Kaminski, T., Keaveney, N., Kim, J., Kraemer, K. E., Kuan, Y. -J., Lagadec, E., Lee, C. F., Li, D., Liu, S. -Y., Liu, T., de Looze, I., Lykou, F., Maraston, C., Marshall, J. P., Matsuura, M., Min, C., Otsuka, M., Oyadomari, M., Parsons, H., Patel, N. A., Peeters, E., Pham, T. A., Qiu, J., Randall, S., Rau, G., Redman, M. P., Richards, A. M. S., Serjeant, S., Shi, C., Sloan, G. C., Smith, M. W. L., Suh, K. -W., Toalá, J. A., Uttenthaler, S., Ventura, P., Wang, B., Yamamura, I., Yang, T., Yun, Y., Zhang, F., Zhang, Y., Zhao, G., Zhu, M., Zijlstra, A. A.
MNRAS 512, 1091 (2022)
10.1093/mnras/stab2860

SOFIA FEEDBACK Survey: PDR Diagnostics of Stellar Feedback in Different Regions of RCW 49
Tiwari, M., Wolfire, M., Pound, M. W., Tarantino, E., Karim, R., Bonne, L., Buchbender, C., Güsten, R., Guevara, C., Kabanovic, S., Kavak, Ü., Mertens, M., Schneider, N., Simon, R., Stutzki, J., Tielens, A. G. G. M.
AJ 164, 150 (2022)
10.3847/1538-3881/ac8a44

ATLASGAL - evolutionary trends in high-mass star formation
Urquhart, J. S., Wells, M. R. A., Pillai, T., Leurini, S., Giannetti, A., Moore, T. J. T., Thompson, M. A., Figura, C., Colombo, D., Yang, A. Y., König, C., Wyrowski, F., Menten, K. M., Rigby, A. J., Eden, D. J., Ragan, S. E.
MNRAS 510, 3389 (2022)
10.1093/mnras/stab3511

Formation of the SDC13 Hub-filament System: A Cloud-Cloud Collision Imprinted on the Multiscale Magnetic Field
Wang, J.-W., Koch, P.M., Tang, Y.-W., Fuller, G.A., Peretto, N., Williams, G.M., Yen, H.-W., Lee, H.-T., and Chen, W.-A.
ApJ 931, 115 (2022)
10.3847/1538-4357/ac6872

Spatially Resolved X-Ray Study of Supernova Remnant G306.3-0.9 with Unusually High Calcium Abundance
Weng, J., Zhou, P., Chen, Y., Leung, S.-C., Toonen, S., Perets, H.B., Nomoto, K., Zenati, Y., and Vink, J.
ApJ 924, 119 (2022)
10.3847/1538-4357/ac308d

The SEDIGISM survey: A search for molecular outflows
Yang, A.Y., Urquhart, J.S., Wyrowski, F., Thompson, M.A., König, C., Colombo, D., Menten, K.M., Duarte-Cabral, A., Schuller, F., Csengeri, T., Eden, D., Barnes, P., Traficante, A., Bronfman, L., Sanchez-Monge, A., Ginsburg, A., Cesaroni, R., Lee, M.-Y., Beuther, H., Medina, S.-N.X., Mazumdar, P., and Henning, T.
A&A 658, A160 (2022)
10.1051/0004-6361/202142039

Redshifted methanol absorption tracing infall motions of high-mass star formation regions
Yang, W.J., Menten, K.M., Yang, A.Y., Wyrowski, F., Gong, Y., Ellingsen, S.P., Henkel, C., Chen, X., and Xu, Y.
A&A 658, A192 (2022)
10.1051/0004-6361/202142811

Physical and Chemical Properties of the Molecular Gas Associated with the Mid-infrared Bubble S156
Yu, N.-P., Xu, J.-L., Zhang, C.-P., Jiang, P., Liu, X.-L., and Wang, J.-J.
ApJ 928, 83 (2022)
10.3847/1538-4357/ac49ee

Astronomical VLBI, publications in refereed journals 2022

Swedish authors (Astro VLBI)

Characterizing and Mitigating Intraday Variability: Reconstructing Source Structure in Accreting Black Holes with mm-VLBI
Broderick, A.E., Gold, R., Georgiev, B., Pesce, D.W., Tiede, P., Ni, C., Moriyama, K., Akiyama, K., Alberdi, A., Alef, W., Algaba, J.C., Anantua, R., Asada, K., Azulay, R., Bach, U., Baczko, A.-K., Ball, D., Baloković, M., Barrett, J., Bauböck, M., Benson, B.A., Bintley, D., Blackburn, L., Blundell, R., Bouman, K.L., Bower, G.C., Boyce, H., Bremer, M., Brinkerink, C.D., Brissenden, R., Britzen, S., Broguiere, D., Bronzwaer, T., Bustamante, S., Byun, D.-Y., Carlstrom, J.E., Ceccobello, C., Chael, A., Chan, C.-kwan, Chatterjee, K., Chatterjee, S., Chen, M.-T., Chen, Y., Cheng, X., Cho, I., Christian, P., Conroy, N.S., Conway, J.E., Cordes, J.M., Crawford, T.M., Crew, G.B., Cruz-Osorio, A., Cui, Y., Davelaar, J., De Laurentis, M., Deane, R., Dempsey, J., Desvignes, G., Dexter, J., Dhruv, V., Doeleman, S.S., Dougal, S., Dzib, S.A., Eatough, R.P., Emami, R., Falcke, H., Farah, J., Fish, V.L., Fomalont, E., Ford, H.A., Fraga-Encinas, R., Freeman, W.T., Friberg, P., Fromm, C.M., Fuentes, A., Galison, P., Gammie, C.F., García, R., Gentaz, O., Goddi, C., Gómez-Ruiz, A.I., Gómez, J.L., Gu, M., Gurwell, M., Hada, K., Haggard, D., Haworth, K., Hecht, M.H., Hesper, R., Heumann, D., Ho, L.C., Ho, P., Honma, M., Huang, C.-W.L., Huang, L., Hughes, D.H., Ikeda, S., Impellizzeri, C.M.V., Inoue, M., Issaoun, S., James, D.J., Jannuzi, B.T., Janssen, M., Jeter, B., Jiang, W., Jiménez-Rosales, A., Johnson, M.D., Jorstad, S., Joshi, A.V., Jung, T., Karami, M., Karuppusamy, R., Kawashima, T., Keating, G.K., Kettenis, M., Kim, D.-J., Kim, J.-Y., Kim, J., Kim, J., Kino, M., Koay, J.Y., Kocherlakota, P., Kofuji, Y., Koch, P.M., Koyama, S., Kramer, C., Kramer, M., Krichbaum, T.P., Kuo, C.-Y., La Bella, N., Lauer, T.R., Lee, D., Lee, S.-S., Leung, P.K., Levis, A., Li, Z., Lico, R., Lindahl, G., Lindqvist, M., Lisakov, M., Liu, J., Liu, K., Liuzzo, E., Lo, W.-P., Lobanov, A.P., Loinard, L., Lonsdale, C.J., Lu, R.-S., Mao, J., Marchili, N., Markoff, S., Marrone, D.P., Marscher, A.P., Martí-Vidal, I., Matsushita, S., Matthews, L.D., Menten, K.M., Michalik, D., Mizuno, I., Mizuno, Y., Moran, J.M., Moscibrodzka, M., Müller, C., Mus, A., Musoke, G., Myserlis, I., Nadolski, A., Nagai, H., Nagar, N.M., Nakamura, M., Narayan, R., Narayanan, G., Natarajan, I., Nathanail, A., Navarro Fuentes, S., Neilsen, J., Neri, R., Noutsos, A., Nowak, M.A., Oh, J., Okino, H., Olivares, H., Ortiz-León, G.N., Oyama, T., Palumbo, D.C.M., Paraschos, G.F., Park, J., Parsons, H., Patel, N., Pen, U.-L., Piétu, V., Plambeck, R., PopStefanija, A., Porth, O., Pötzl, F.M., Prather, B., Preciado-López, J.A., Pu, H.-Y., Ramakrishnan, V., Rao, R., Rawlings, M.G., Raymond, A.W., Rezzolla, L., Ricarte, A., Ripperda, B., Roelofs, F., Rogers, A., Ros, E., Romero-Cañizales, C., Roshanineshat, A., Rottmann, H., Roy, A.L., Ruiz, I., Ruszczyk, C., Rygl, K.L.J., Sánchez, S., Sánchez-Argüelles, D., Sánchez-Portal, M., Sasada, M., Satapathy, K., Savolainen, T., Schloerb, F.P., Schonfeld, J., Schuster, K.-F., Shao, L., Shen, Z., Small, D., Sohn, B.W., SooHoo, J., Souccar, K., Sun, H., Tazaki, F., Tetarenko, A.J., Tilanus, R.P.J., Titus, M., Torne, P., Traianou, E., Trent, T., Trippe, S., Turk, M., van Bemmel, I., van Langevelde, H.J., van Rossum, D.R., Vos, J., Wagner, J., Ward-Thompson, D., Wardle, J., Weintroub, J., Wex, N., Wharton, R., Wielgus, M., Wiik, K., Witzel, G., Wondrak, M.F., Wong, G.N., Wu, Q., Yamaguchi, P., Yoon, D., Young, A., Young, K., Younsi, Z., Yuan, F., Yuan, Y.-F., Zensus, J.A., Zhao, G.-Y., Zhang, S., and Zhao, S.-S.
ApJ 930, L21 (2022)
10.3847/2041-8213/ac6584

*The Photon Ring in M87**
Broderick, A.E., Pesce, D.W., Gold, R., Tiede, P., Pu, H.-Y., Anantua, R., Britzen, S., Ceccobello, C., Chatterjee, K., Chen, Y., Conroy, N.S., Crew, G.B., Cruz-Osorio, A., Cui, Y., Doeleman, S.S., Emami, R., Farah, J., Fromm, C.M., Galison, P., Georgiev, B., Ho, L.C., James, D.J., Jeter, B., Jimenez-Rosales, A., Koay, J.Y., Kramer, C., Krichbaum, T.P., Lee, S.-S., Lindqvist, M., Martí-Vidal, I., Menten, K.M., Mizuno, Y., Moran, J.M., Moscibrodzka, M., Nathanail, A., Neilsen, J., Ni, C., Park, J., Piétu, V., Rezzolla, L., Ricarte, A., Ripperda, B., Shao, L., Tazaki, F., Toma, K., Torne, P., Weintroub, J., Wielgus, M., Yuan, F., Zhao, S.-S., and Zhang, S.
ApJ 935, 61 (2022)
10.3847/1538-4357/ac7c1d

A long-lived compact jet in the black hole X-ray binary candidate AT2019wey
Cao, H.-M., Migliori, G., Giroletti, M., Frey, S., Yang, J., Gabányi, K.É., Cui, L., An, T., Hong, X.-Y., and Zhang, W.-D.
A&A 657, A104 (2022)
10.1051/0004-6361/202142241

First Sagittarius A Event Horizon Telescope Results. VI. Testing the Black Hole Metric*
Event Horizon Telescope Collaboration, Akiyama, K., Alberdi, A., Alef, W., Algaba, J.C., Anantua, R., Asada, K., Azulay, R., Bach, U., Baczko, A.-K., Ball, D., Baloković, M., Barrett, J., Bauböck, M., Benson, B.A., Bintley, D., Blackburn, L., Blundell, R., Bouman, K.L., Bower, G.C., Boyce, H., Bremer, M., Brinkerink, C.D., Brissenden, R., Britzen, S., Broderick, A.E., Broguiere, D., Bronzwaer, T., Bustamante, S., Byun, D.-Y., Carlstrom, J.E., Ceccobello, C., Chael, A., Chan, C.-kwan, Chatterjee, K., Chatterjee, S., Chen, M.-T., Chen, Y., Cheng, X., Cho, I., Christian, P., Conroy, N.S., Conway, J.E., Cordes, J.M., Crawford, T.M., Crew, G.B., Cruz-Osorio, A., Cui, Y., Davelaar, J., De Laurentis, M., Deane, R., Dempsey, J., Desvignes, G., Dexter, J., Dhruv, V., Doeleman, S.S., Dougal, S., Dzib, S.A., Eatough, R.P., Emami, R., Falcke, H., Farah, J., Fish, V.L., Fomalont, E., Ford, H.A., Fraga-Encinas, R., Freeman, W.T., Friberg, P., Fromm, C.M., Fuentes, A., Galison, P., Gammie, C.F., García, R., Gentaz, O., Georgiev, B., Goddi, C., Gold, R., Gómez-Ruiz, A.I., Gómez, J.L., Gu, M., Gurwell, M., Hada, K., Haggard, D., Haworth, K., Hecht, M.H., Hesper, R., Heumann, D., Ho, L.C., Ho, P., Honma, M., Huang, C.-W.L., Huang, L., Hughes, D.H., Ikeda, S., Impellizzeri, C.M.V., Inoue, M., Issaoun, S., James, D.J., Jannuzi, B.T., Janssen, M., Jeter, B., Jiang, W., Jiménez-Rosales, A., Johnson, M.D., Jorstad, S., Joshi, A.V., Jung, T., Karami, M., Karuppusamy, R., Kawashima, T., Keating, G.K., Kettenis, M., Kim, D.-J., Kim, J.-Y., Kim, J., Kim, J., Kino, M., Koay, J.Y., Kocherlakota, P., Kofuji, Y., Koch, P.M., Koyama, S., Kramer, C., Kramer, M., Krichbaum, T.P., Kuo, C.-Y., La Bella, N., Lauer, T.R., Lee, D., Lee, S.-S., Leung, P.K., Levis, A., Li, Z., Lico, R., Lindahl, G., Lindqvist, M., Lisakov, M., Liu, J., Liu, K., Liuzzo, E., Lo, W.-P., Lobanov, A.P., Loinard, L., Lonsdale, C.J., Lu, R.-S., Mao, J., Marchili, N., Markoff, S., Marrone, D.P., Marscher, A.P., Martí-Vidal, I., Matsushita, S., Matthews, L.D., Medeiros, L., Menten, K.M., Michalik, D., Mizuno, I., Mizuno, Y., Moran, J.M., Moriyama, K., Moscibrodzka, M., Müller, C., Mus, A., Musoke, G., Myserlis, I., Nadolski, A., Nagai, H., Nagar, N.M., Nakamura, M., Narayan, R., Narayanan, G., Natarajan, I., Nathanail, A., Fuentes, S.N., Neilsen, J., Neri, R., Ni, C., Noutsos, A., Nowak, M.A., Oh, J., Okino, H., Olivares, H., Ortiz-León, G.N., Oyama, T., Özel, F., Palumbo, D.C.M., Paraschos, G.F., Park, J., Parsons, H., Patel, N., Pen, U.-L., Pesce, D.W., Piétu, V., Plambeck, R., PopStefanija, A., Porth, O., Pötzl, F.M., Prather, B.,

Preciado-López, J.A., Psaltis, D., Pu, H.-Y., Ramakrishnan, V., Rao, R., Rawlings, M.G., Raymond, A.W., Rezzolla, L., Ricarte, A., Ripperda, B., Roelofs, F., Rogers, A., Ros, E., Romero-Cañizales, C., Roshanineshat, A., Rottmann, H., Roy, A.L., Ruiz, I., Ruszczyk, C., Rygl, K.L.J., Sánchez, S., Sánchez-Argüelles, D., Sánchez-Portal, M., Sasada, M., Satapathy, K., Savolainen, T., Schloerb, F.P., Schonfeld, J., Schuster, K.-F., Shao, L., Shen, Z., Small, D., Sohn, B.W., SooHoo, J., Souccar, K., Sun, H., Tazaki, F., Tetarenko, A.J., Tiede, P., Tilanus, R.P.J., Titus, M., Torne, P., Traianou, E., Trent, T., Trippe, S., Turk, M., van Bemmel, I., van Langevelde, H.J., van Rossum, D.R., Vos, J., Wagner, J., Ward-Thompson, D., Wardle, J., Weintroub, J., Wex, N., Wharton, R., Wielgus, M., Wiik, K., Witzel, G., Wondrak, M.F., Wong, G.N., Wu, Q., Yamaguchi, P., Yoon, D., Young, A., Young, K., Younsi, Z., Yuan, F., Yuan, Y.-F., Zensus, J.A., Zhang, S., Zhao, G.-Y., and Zhao, S.-S.
ApJ 930, L17 (2022)
10.3847/2041-8213/ac6756

First Sagittarius A Event Horizon Telescope Results. V. Testing Astrophysical Models of the Galactic Center Black Hole*
Event Horizon Telescope Collaboration, Akiyama, K., Alberdi, A., Alef, W., Algaba, J.C., Anantua, R., Asada, K., Azulay, R., Bach, U., Baczko, A.-K., Ball, D., Baloković, M., Barrett, J., Bauböck, M., Benson, B.A., Bintley, D., Blackburn, L., Blundell, R., Bouman, K.L., Bower, G.C., Boyce, H., Bremer, M., Brinkerink, C.D., Brissenden, R., Britzen, S., Broderick, A.E., Broguiere, D., Bronzwaer, T., Bustamante, S., Byun, D.-Y., Carlstrom, J.E., Ceccobello, C., Chael, A., Chan, C.-kwan, Chatterjee, K., Chatterjee, S., Chen, M.-T., Chen, Y., Cheng, X., Cho, I., Christian, P., Conroy, N.S., Conway, J.E., Cordes, J.M., Crawford, T.M., Crew, G.B., Cruz-Osorio, A., Cui, Y., Davelaar, J., De Laurentis, M., Deane, R., Dempsey, J., Desvignes, G., Dexter, J., Dhruv, V., Doeleman, S.S., Dougal, S., Dzib, S.A., Eatough, R.P., Emami, R., Falcke, H., Farah, J., Fish, V.L., Fomalont, E., Ford, H.A., Fraga-Encinas, R., Freeman, W.T., Friberg, P., Fromm, C.M., Fuentes, A., Galison, P., Gammie, C.F., García, R., Gentaz, O., Georgiev, B., Goddi, C., Gold, R., Gómez-Ruiz, A.I., Gómez, J.L., Gu, M., Gurwell, M., Hada, K., Haggard, D., Haworth, K., Hecht, M.H., Hesper, R., Heumann, D., Ho, L.C., Ho, P., Honma, M., Huang, C.-W.L., Huang, L., Hughes, D.H., Ikeda, S., Violette Impellizzeri, C.M., Inoue, M., Issaoun, S., James, D.J., Jannuzi, B.T., Janssen, M., Jeter, B., Jiang, W., Jiménez-Rosales, A., Johnson, M.D., Jorstad, S., Joshi, A.V., Jung, T., Karami, M., Karuppusamy, R., Kawashima, T., Keating, G.K., Kettenis, M., Kim, D.-J., Kim, J.-Y., Kim, J., Kim, J., Kino, M., Koay, J.Y., Kocherlakota, P., Kofuji, Y., Koch, P.M., Koyama, S., Kramer, C., Kramer, M., Krichbaum, T.P., Kuo, C.-Y., La Bella, N., Lauer, T.R., Lee, D., Lee, S.-S., Leung, P.K., Levis, A., Li, Z., Lico, R., Lindahl, G., Lindqvist, M., Lisakov, M., Liu, J., Liu, K., Liuzzo, E., Lo, W.-P., Lobanov, A.P., Loinard, L., Lonsdale, C.J., Lu, R.-S., Mao, J., Marchili, N., Markoff, S., Marrone, D.P., Marscher, A.P., Martí-Vidal, I., Matsushita, S., Matthews, L.D., Medeiros, L., Menten, K.M., Michalik, D., Mizuno, I., Mizuno, Y., Moran, J.M., Moriyama, K., Moscibrodzka, M., Müller, C., Mus, A., Musoke, G., Myserlis, I., Nadolski, A., Nagai, H., Nagar, N.M., Nakamura, M., Narayan, R., Narayanan, G., Natarajan, I., Nathanail, A., Navarro Fuentes, S., Neilsen, J., Neri, R., Ni, C., Noutsos, A., Nowak, M.A., Oh, J., Okino, H., Olivares, H., Ortiz-León, G.N., Oyama, T., Özel, F., Palumbo, D.C.M., Filippos Paraschos, G., Park, J., Parsons, H., Patel, N., Pen, U.-L., Pesce, D.W., Piétu, V., Plambeck, R., PopStefanija, A., Porth, O., Pötzl, F.M., Prather, B., Preciado-López, J.A., Psaltis, D., Pu, H.-Y., Ramakrishnan, V., Rao, R., Rawlings, M.G., Raymond, A.W., Rezzolla, L., Ricarte, A., Ripperda, B., Roelofs, F., Rogers, A., Ros, E., Romero-Cañizales, C., Roshanineshat, A., Rottmann, H., Roy, A.L., Ruiz, I., Ruszczyk, C.,

Rygl, K.L.J., Sánchez, S., Sánchez-Argüelles, D., Sánchez-Portal, M., Sasada, M., Satapathy, K., Savolainen, T., Schloerb, F.P., Schonfeld, J., Schuster, K.-F., Shao, L., Shen, Z., Small, D., Sohn, B.W., SooHoo, J., Souccar, K., Sun, H., Tazaki, F., Tetarenko, A.J., Tiede, P., Tilanus, R.P.J., Titus, M., Torne, P., Traianou, E., Trent, T., Trippe, S., Turk, M., van Bemmel, I., van Langevelde, H.J., van Rossum, D.R., Vos, J., Wagner, J., Ward-Thompson, D., Wardle, J., Weintroub, J., Wex, N., Wharton, R., Wielgus, M., Wiik, K., Witzel, G., Wondrak, M.F., Wong, G.N., Wu, Q., Yamaguchi, P., Yoon, D., Young, A., Young, K., Younsi, Z., Yuan, F., Yuan, Y.-F., Zensus, J.A., Zhang, S., Zhao, G.-Y., Zhao, S.-S., Chan, T.L., Qiu, R., Ressler, S., and White, C.
ApJ 930, L16 (2022)
10.3847/2041-8213/ac6672

First Sagittarius A Event Horizon Telescope Results. IV. Variability, Morphology, and Black Hole Mass*
Event Horizon Telescope Collaboration, Akiyama, K., Alberdi, A., Alef, W., Algaba, J.C., Anantua, R., Asada, K., Azulay, R., Bach, U., Baczko, A.-K., Ball, D., Baloković, M., Barrett, J., Bauböck, M., Benson, B.A., Bintley, D., Blackburn, L., Blundell, R., Bouman, K.L., Bower, G.C., Boyce, H., Bremer, M., Brinkerink, C.D., Brissenden, R., Britzen, S., Broderick, A.E., Broguiere, D., Bronzwaer, T., Bustamante, S., Byun, D.-Y., Carlstrom, J.E., Ceccobello, C., Chael, A., Chan, C.-kwan, Chatterjee, K., Chatterjee, S., Chen, M.-T., Chen, Y., Cheng, X., Cho, I., Christian, P., Conroy, N.S., Conway, J.E., Cordes, J.M., Crawford, T.M., Crew, G.B., Cruz-Osorio, A., Cui, Y., Davelaar, J., De Laurentis, M., Deane, R., Dempsey, J., Desvignes, G., Dexter, J., Dhruv, V., Doeleman, S.S., Dougal, S., Dzib, S.A., Eatough, R.P., Emami, R., Falcke, H., Farah, J., Fish, V.L., Fomalont, E., Ford, H.A., Fraga-Encinas, R., Freeman, W.T., Friberg, P., Fromm, C.M., Fuentes, A., Galison, P., Gammie, C.F., García, R., Gentaz, O., Georgiev, B., Goddi, C., Gold, R., Gómez-Ruiz, A.I., Gómez, J.L., Gu, M., Gurwell, M., Hada, K., Haggard, D., Haworth, K., Hecht, M.H., Hesper, R., Heumann, D., Ho, L.C., Ho, P., Honma, M., Huang, C.-W.L., Huang, L., Hughes, D.H., Ikeda, S., Impellizzeri, C.M.V., Inoue, M., Issaoun, S., James, D.J., Jannuzi, B.T., Janssen, M., Jeter, B., Jiang, W., Jiménez-Rosales, A., Johnson, M.D., Jorstad, S., Joshi, A.V., Jung, T., Karami, M., Karuppusamy, R., Kawashima, T., Keating, G.K., Kettenis, M., Kim, D.-J., Kim, J.-Y., Kim, J., Kim, J., Kino, M., Koay, J.Y., Kocherlakota, P., Kofuji, Y., Koch, P.M., Koyama, S., Kramer, C., Kramer, M., Krichbaum, T.P., Kuo, C.-Y., La Bella, N., Lauer, T.R., Lee, D., Lee, S.-S., Leung, P.K., Levis, A., Li, Z., Lico, R., Lindahl, G., Lindqvist, M., Lisakov, M., Liu, J., Liu, K., Liuzzo, E., Lo, W.-P., Lobanov, A.P., Loinard, L., Lonsdale, C.J., Lu, R.-S., Mao, J., Marchili, N., Markoff, S., Marrone, D.P., Marscher, A.P., Martí-Vidal, I., Matsushita, S., Matthews, L.D., Medeiros, L., Menten, K.M., Michalik, D., Mizuno, I., Mizuno, Y., Moran, J.M., Moriyama, K., Moscibrodzka, M., Müller, C., Mus, A., Musoke, G., Myserlis, I., Nadolski, A., Nagai, H., Nagar, N.M., Nakamura, M., Narayan, R., Narayanan, G., Natarajan, I., Nathanail, A., Fuentes, S.N., Neilsen, J., Neri, R., Ni, C., Noutsos, A., Nowak, M.A., Oh, J., Okino, H., Olivares, H., Ortiz-León, G.N., Oyama, T., Palumbo, D.C.M., Paraschos, G.F., Park, J., Parsons, H., Patel, N., Pen, U.-L., Pesce, D.W., Piétu, V., Plambeck, R., PopStefanija, A., Porth, O., Pötzl, F.M., Prather, B., Preciado-López, J.A., Pu, H.-Y., Ramakrishnan, V., Rao, R., Rawlings, M.G., Raymond, A.W., Rezzolla, L., Ricarte, A., Ripperda, B., Roelofs, F., Rogers, A., Ros, E., Romero-Cañizales, C., Roshanineshat, A., Rottmann, H., Roy, A.L., Ruiz, I., Ruszczyk, C., Rygl, K.L.J., Sánchez, S., Sánchez-Argüelles, D., Sánchez-Portal, M., Sasada, M., Satapathy, K., Savolainen, T., Schloerb, F.P., Schonfeld, J., Schuster, K.-F., Shao, L., Shen, Z., Small, D., Sohn, B.W., SooHoo, J., Souccar, K., Sun, H., Tazaki, F.,

Tetarenko, A.J., Tiede, P., Tilanus, R.P.J., Titus, M., Torne, P., Traianou, E., Trent, T., Trippe, S., Turk, M., van Bemmel, I., van Langevelde, H.J., van Rossum, D.R., Vos, J., Wagner, J., Ward-Thompson, D., Wardle, J., Weintroub, J., Wex, N., Wharton, R., Wielgus, M., Wiik, K., Witzel, G., Wondrak, M.F., Wong, G.N., Wu, Q., Yamaguchi, P., Yoon, D., Young, A., Young, K., Younsi, Z., Yuan, F., Yuan, Y.-F., Zensus, J.A., Zhang, S., Zhao, G.-Y., Zhao, S.-S., and Chang, D.O.
ApJ 930, L15 (2022)
10.3847/2041-8213/ac6736

First Sagittarius A Event Horizon Telescope Results. III. Imaging of the Galactic Center Supermassive Black Hole*
Event Horizon Telescope Collaboration, Akiyama, K., Alberdi, A., Alef, W., Algaba, J.C., Anantua, R., Asada, K., Azulay, R., Bach, U., Baczko, A.-K., Ball, D., Baloković, M., Barrett, J., Bauböck, M., Benson, B.A., Bintley, D., Blackburn, L., Blundell, R., Bouman, K.L., Bower, G.C., Boyce, H., Bremer, M., Brinkerink, C.D., Brissenden, R., Britzen, S., Broderick, A.E., Broguiere, D., Bronzwaer, T., Bustamante, S., Byun, D.-Y., Carlstrom, J.E., Ceccobello, C., Chael, A., Chan, C.-kwan, Chatterjee, K., Chatterjee, S., Chen, M.-T., Chen, Y., Cheng, X., Cho, I., Christian, P., Conroy, N.S., Conway, J.E., Cordes, J.M., Crawford, T.M., Crew, G.B., Cruz-Osorio, A., Cui, Y., Davelaar, J., De Laurentis, M., Deane, R., Dempsey, J., Desvignes, G., Dexter, J., Dhruv, V., Doeleman, S.S., Dougal, S., Dzib, S.A., Eatough, R.P., Emami, R., Falcke, H., Farah, J., Fish, V.L., Fomalont, E., Ford, H.A., Fraga-Encinas, R., Freeman, W.T., Friberg, P., Fromm, C.M., Fuentes, A., Galison, P., Gammie, C.F., García, R., Gentaz, O., Georgiev, B., Goddi, C., Gold, R., Gómez-Ruiz, A.I., Gómez, J.L., Gu, M., Gurwell, M., Hada, K., Haggard, D., Haworth, K., Hecht, M.H., Hesper, R., Heumann, D., Ho, L.C., Ho, P., Honma, M., Huang, C.-W.L., Huang, L., Hughes, D.H., Ikeda, S., Impellizzeri, C.M.V., Inoue, M., Issaoun, S., James, D.J., Jannuzi, B.T., Janssen, M., Jeter, B., Jiang, W., Jiménez-Rosales, A., Johnson, M.D., Jorstad, S., Joshi, A.V., Jung, T., Karami, M., Karuppusamy, R., Kawashima, T., Keating, G.K., Kettenis, M., Kim, D.-J., Kim, J.-Y., Kim, J., Kim, J., Kino, M., Koay, J.Y., Kocherlakota, P., Kofuji, Y., Koch, P.M., Koyama, S., Kramer, C., Kramer, M., Krichbaum, T.P., Kuo, C.-Y., La Bella, N., Lauer, T.R., Lee, D., Lee, S.-S., Leung, P.K., Levis, A., Li, Z., Lico, R., Lindahl, G., Lindqvist, M., Lisakov, M., Liu, J., Liu, K., Liuzzo, E., Lo, W.-P., Lobanov, A.P., Loinard, L., Lonsdale, C.J., Lu, R.-S., Mao, J., Marchili, N., Markoff, S., Marrone, D.P., Marscher, A.P., Martí-Vidal, I., Matsushita, S., Matthews, L.D., Medeiros, L., Menten, K.M., Michalik, D., Mizuno, I., Mizuno, Y., Moran, J.M., Moriyama, K., Moscibrodzka, M., Müller, C., Mus, A., Musoke, G., Myserlis, I., Nadolski, A., Nagai, H., Nagar, N.M., Nakamura, M., Narayan, R., Narayanan, G., Natarajan, I., Nathanail, A., Fuentes, S.N., Neilsen, J., Neri, R., Ni, C., Noutsos, A., Nowak, M.A., Oh, J., Okino, H., Olivares, H., Ortiz-León, G.N., Oyama, T., Özel, F., Palumbo, D.C.M., Paraschos, G.F., Park, J., Parsons, H., Patel, N., Pen, U.-L., Pesce, D.W., Piétu, V., Plambeck, R., PopStefanija, A., Porth, O., Pötzl, F.M., Prather, B., Preciado-López, J.A., Psaltis, D., Pu, H.-Y., Ramakrishnan, V., Rao, R., Rawlings, M.G., Raymond, A.W., Rezzolla, L., Ricarte, A., Ripperda, B., Roelofs, F., Rogers, A., Ros, E., Romero-Cañizales, C., Roshanineshat, A., Rottmann, H., Roy, A.L., Ruiz, I., Ruszczyk, C., Rygl, K.L.J., Sánchez, S., Sánchez-Argüelles, D., Sánchez-Portal, M., Sasada, M., Satapathy, K., Savolainen, T., Schloerb, F.P., Schonfeld, J., Schuster, K.-F., Shao, L., Shen, Z., Small, D., Sohn, B.W., SooHoo, J., Souccar, K., Sun, H., Tazaki, F., Tetarenko, A.J., Tiede, P., Tilanus, R.P.J., Titus, M., Torne, P., Traianou, E., Trent, T., Trippe, S., Turk, M., van Bemmel, I., van Langevelde, H.J., van Rossum, D.R., Vos, J., Wagner, J., Ward-Thompson, D., Wardle, J., Weintroub, J., Wex, N., Wharton, R.,

Wielgus, M., Wiik, K., Witzel, G., Wondrak, M.F., Wong, G.N., Wu, Q., Yamaguchi, P., Yoon, D., Young, A., Young, K., Younsi, Z., Yuan, F., Yuan, Y.-F., Zensus, J.A., Zhang, S., Zhao, G.-Y., and Zhao, S.-S.
ApJ 930, L14 (2022)
10.3847/2041-8213/ac6429

First Sagittarius A Event Horizon Telescope Results. II. EHT and Multiwavelength Observations, Data Processing, and Calibration*
Event Horizon Telescope Collaboration, Akiyama, K., Alberdi, A., Alef, W., Algaba, J.C., Anantua, R., Asada, K., Azulay, R., Bach, U., Baczko, A.-K., Ball, D., Baloković, M., Barrett, J., Bauböck, M., Benson, B.A., Bintley, D., Blackburn, L., Blundell, R., Bouman, K.L., Bower, G.C., Boyce, H., Bremer, M., Brinkerink, C.D., Brissenden, R., Britzen, S., Broderick, A.E., Broguiere, D., Bronzwaer, T., Bustamante, S., Byun, D.-Y., Carlstrom, J.E., Ceccobello, C., Chael, A., Chan, C.-kwan, Chatterjee, K., Chatterjee, S., Chen, M.-T., Chen, Y., Cheng, X., Cho, I., Christian, P., Conroy, N.S., Conway, J.E., Cordes, J.M., Crawford, T.M., Crew, G.B., Cruz-Osorio, A., Cui, Y., Davelaar, J., De Laurentis, M., Deane, R., Dempsey, J., Desvignes, G., Dexter, J., Dhruv, V., Doeleman, S.S., Dougal, S., Dzib, S.A., Eatough, R.P., Emami, R., Falcke, H., Farah, J., Fish, V.L., Fomalont, E., Ford, H.A., Fraga-Encinas, R., Freeman, W.T., Friberg, P., Fromm, C.M., Fuentes, A., Galison, P., Gammie, C.F., García, R., Gentaz, O., Georgiev, B., Goddi, C., Gold, R., Gómez-Ruiz, A.I., Gómez, J.L., Gu, M., Gurwell, M., Hada, K., Haggard, D., Haworth, K., Hecht, M.H., Hesper, R., Heumann, D., Ho, L.C., Ho, P., Honma, M., Huang, C.-W.L., Huang, L., Hughes, D.H., Ikeda, S., Impellizzeri, C.M.V., Inoue, M., Issaoun, S., James, D.J., Jannuzi, B.T., Janssen, M., Jeter, B., Jiang, W., Jiménez-Rosales, A., Johnson, M.D., Jorstad, S., Joshi, A.V., Jung, T., Karami, M., Karuppusamy, R., Kawashima, T., Keating, G.K., Kettenis, M., Kim, D.-J., Kim, J.-Y., Kim, J., Kim, J., Kino, M., Koay, J.Y., Kocherlakota, P., Kofuji, Y., Koch, P.M., Koyama, S., Kramer, C., Kramer, M., Krichbaum, T.P., Kuo, C.-Y., La Bella, N., Lauer, T.R., Lee, D., Lee, S.-S., Leung, P.K., Levis, A., Li, Z., Lico, R., Lindahl, G., Lindqvist, M., Lisakov, M., Liu, J., Liu, K., Liuzzo, E., Lo, W.-P., Lobanov, A.P., Loinard, L., Lonsdale, C.J., Lu, R.-S., Mao, J., Marchili, N., Markoff, S., Marrone, D.P., Marscher, A.P., Martí-Vidal, I., Matsushita, S., Matthews, L.D., Medeiros, L., Menten, K.M., Michalik, D., Mizuno, I., Mizuno, Y., Moran, J.M., Moriyama, K., Moscibrodzka, M., Müller, C., Mus, A., Musoke, G., Myserlis, I., Nadolski, A., Nagai, H., Nagar, N.M., Nakamura, M., Narayan, R., Narayanan, G., Natarajan, I., Nathanail, A., Fuentes, S.N., Neilsen, J., Neri, R., Ni, C., Noutsos, A., Nowak, M.A., Oh, J., Okino, H., Olivares, H., Ortiz-León, G.N., Oyama, T., Özel, F., Palumbo, D.C.M., Paraschos, G.F., Park, J., Parsons, H., Patel, N., Pen, U.-L., Pesce, D.W., Piétu, V., Plambeck, R., PopStefanija, A., Porth, O., Pötzl, F.M., Prather, B., Preciado-López, J.A., Psaltis, D., Pu, H.-Y., Ramakrishnan, V., Rao, R., Rawlings, M.G., Raymond, A.W., Rezzolla, L., Ricarte, A., Ripperda, B., Roelofs, F., Rogers, A., Ros, E., Romero-Cañizales, C., Roshanineshat, A., Rottmann, H., Roy, A.L., Ruiz, I., Ruszczyk, C., Rygl, K.L.J., Sánchez, S., Sánchez-Argüelles, D., Sánchez-Portal, M., Sasada, M., Satapathy, K., Savolainen, T., Schloerb, F.P., Schonfeld, J., Schuster, K.-F., Shao, L., Shen, Z., Small, D., Sohn, B.W., SooHoo, J., Souccar, K., Sun, H., Tazaki, F., Tetarenko, A.J., Tiede, P., Tilanus, R.P.J., Titus, M., Torne, P., Traianou, E., Trent, T., Trippe, S., Turk, M., van Bemmel, I., van Langevelde, H.J., van Rossum, D.R., Vos, J., Wagner, J., Ward-Thompson, D., Wardle, J., Weintroub, J., Wex, N., Wharton, R., Wielgus, M., Wiik, K., Witzel, G., Wondrak, M.F., Wong, G.N., Wu, Q., Yamaguchi, P., Yoon, D., Young, A., Young, K., Younsi, Z., Yuan, F., Yuan, Y.-F., Zensus, J.A., Zhang, S., Zhao, G.-Y., Zhao, S.-S., Agurto, C., Araneda, J.P., Arriagada, O., Bertarini, A., Berthold, R.,

Blanchard, J., Brown, K., Cárdenas, M., Cantzler, M., Caro, P., Chuter, T.C., Ciechanowicz, M., Coulson, I.M., Crowley, J., Degenaar, N., Dornbusch, S., Durán, C.A., Forster, K., Geertsema, G., González, E., Graham, D., Gueth, F., Han, C.-C., Herrera, C., Herrero-Illana, R., Heyminck, S., Hoge, J., Huang, Y.-D., Jiang, H., John, D., Klein, T., Kubo, D., Kuroda, J., Kwon, C., Laing, R., Liu, C.-T., Liu, K.-Y., Mac-Auliffe, F., Martin-Cocher, P., Matulonis, C., Messias, H., Meyer-Zhao, Z., Montenegro-Montes, F., Montgomerie, W., Muders, D., Nishioka, H., Norton, T.J., Olivares, R., Pérez-Beaupuits, J.P., Parra, R., Poirier, M., Pradel, N., Raffin, P.A., Ramírez, J., Reynolds, M., Saez-Madain, A.F., Santana, J., Silva, K.M., Sousa, D., Stahm, W., Torstensson, K., Venegas, P., Walther, C., Wieching, G., Wijnands, R., and Wouterloot, J.G.A.
ApJ 930, L13 (2022)
10.3847/2041-8213/ac6675

First Sagittarius A Event Horizon Telescope Results. I. The Shadow of the Supermassive Black Hole in the Center of the Milky Way*
Event Horizon Telescope Collaboration, Akiyama, K., Alberdi, A., Alef, W., Algaba, J.C., Anantua, R., Asada, K., Azulay, R., Bach, U., Baczko, A.-K., Ball, D., Baloković, M., Barrett, J., Bauböck, M., Benson, B.A., Bintley, D., Blackburn, L., Blundell, R., Bouman, K.L., Bower, G.C., Boyce, H., Bremer, M., Brinkerink, C.D., Brissenden, R., Britzen, S., Broderick, A.E., Broguiere, D., Bronzwaer, T., Bustamante, S., Byun, D.-Y., Carlstrom, J.E., Ceccobello, C., Chael, A., Chan, C.-kwan, Chatterjee, K., Chatterjee, S., Chen, M.-T., Chen, Y., Cheng, X., Cho, I., Christian, P., Conroy, N.S., Conway, J.E., Cordes, J.M., Crawford, T.M., Crew, G.B., Cruz-Osorio, A., Cui, Y., Davelaar, J., De Laurentis, M., Deane, R., Dempsey, J., Desvignes, G., Dexter, J., Dhruv, V., Doeleman, S.S., Dougal, S., Dzib, S.A., Eatough, R.P., Emami, R., Falcke, H., Farah, J., Fish, V.L., Fomalont, E., Ford, H.A., Fraga-Encinas, R., Freeman, W.T., Friberg, P., Fromm, C.M., Fuentes, A., Galison, P., Gammie, C.F., García, R., Gentaz, O., Georgiev, B., Goddi, C., Gold, R., Gómez-Ruiz, A.I., Gómez, J.L., Gu, M., Gurwell, M., Hada, K., Haggard, D., Haworth, K., Hecht, M.H., Hesper, R., Heumann, D., Ho, L.C., Ho, P., Honma, M., Huang, C.-W.L., Huang, L., Hughes, D.H., Ikeda, S., Impellizzeri, C.M.V., Inoue, M., Issaoun, S., James, D.J., Jannuzi, B.T., Janssen, M., Jeter, B., Jiang, W., Jiménez-Rosales, A., Johnson, M.D., Jorstad, S., Joshi, A.V., Jung, T., Karami, M., Karuppusamy, R., Kawashima, T., Keating, G.K., Kettenis, M., Kim, D.-J., Kim, J.-Y., Kim, J., Kim, J., Kino, M., Koay, J.Y., Kocherlakota, P., Kofuji, Y., Koch, P.M., Koyama, S., Kramer, C., Kramer, M., Krichbaum, T.P., Kuo, C.-Y., La Bella, N., Lauer, T.R., Lee, D., Lee, S.-S., Leung, P.K., Levis, A., Li, Z., Lico, R., Lindahl, G., Lindqvist, M., Lisakov, M., Liu, J., Liu, K., Liuzzo, E., Lo, W.-P., Lobanov, A.P., Loinard, L., Lonsdale, C.J., Lu, R.-S., Mao, J., Marchili, N., Markoff, S., Marrone, D.P., Marscher, A.P., Martí-Vidal, I., Matsushita, S., Matthews, L.D., Medeiros, L., Menten, K.M., Michalik, D., Mizuno, I., Mizuno, Y., Moran, J.M., Moriyama, K., Moscibrodzka, M., Müller, C., Mus, A., Musoke, G., Myserlis, I., Nadolski, A., Nagai, H., Nagar, N.M., Nakamura, M., Narayan, R., Narayanan, G., Natarajan, I., Nathanail, A., Fuentes, S.N., Neilsen, J., Neri, R., Ni, C., Noutsos, A., Nowak, M.A., Oh, J., Okino, H., Olivares, H., Ortiz-León, G.N., Oyama, T., Özel, F., Palumbo, D.C.M., Paraschos, G.F., Park, J., Parsons, H., Patel, N., Pen, U.-L., Pesce, D.W., Piétu, V., Plambeck, R., PopStefanija, A., Porth, O., Pötzl, F.M., Prather, B., Preciado-López, J.A., Psaltis, D., Pu, H.-Y., Ramakrishnan, V., Rao, R., Rawlings, M.G., Raymond, A.W., Rezzolla, L., Ricarte, A., Ripperda, B., Roelofs, F., Rogers, A., Ros, E., Romero-Cañizales, C., Roshanineshat, A., Rottmann, H., Roy, A.L., Ruiz, I., Ruszczyk, C., Rygl, K.L.J., Sánchez, S., Sánchez-Argüelles, D., Sánchez-Portal, M., Sasada, M., Satapathy, K., Savolainen, T., Schloerb, F.P., Schonfeld, J., Schuster, K.-F., Shao, L.,

Shen, Z., Small, D., Sohn, B.W., SooHoo, J., Souccar, K., Sun, H., Tazaki, F., Tetarenko, A.J., Tiede, P., Tilanus, R.P.J., Titus, M., Torne, P., Traianou, E., Trent, T., Trippe, S., Turk, M., van Bemmel, I., van Langevelde, H.J., van Rossum, D.R., Vos, J., Wagner, J., Ward-Thompson, D., Wardle, J., Weintroub, J., Wex, N., Wharton, R., Wielgus, M., Wiik, K., Witzel, G., Wondrak, M.F., Wong, G.N., Wu, Q., Yamaguchi, P., Yoon, D., Young, A., Young, K., Younsi, Z., Yuan, F., Yuan, Y.-F., Zensus, J.A., Zhang, S., Zhao, G.-Y., Zhao, S.-S., Agurto, C., Allardi, A., Amestica, R., Araneda, J.P., Arriagada, O., Berghuis, J.L., Bertarini, A., Berthold, R., Blanchard, J., Brown, K., Cárdenas, M., Cantzler, M., Caro, P., Castillo-Domínguez, E., Chan, T.L., Chang, C.-C., Chang, D.O., Chang, S.-H., Chang, S.-C., Chen, C.-C., Chilson, R., Chuter, T.C., Ciechanowicz, M., Colin-Beltran, E., Coulson, I.M., Crowley, J., Degenaar, N., Dornbusch, S., Durán, C.A., Everett, W.B., Faber, A., Forster, K., Fuchs, M.M., Gale, D.M., Geertsema, G., González, E., Graham, D., Gueth, F., Halverson, N.W., Han, C.-C., Han, K.-C., Hasegawa, Y., Hernández-Rebollar, J.L., Herrera, C., Herrero-Illana, R., Heyminck, S., Hirota, A., Hoge, J., Hostler Schimpf, S.R., Howie, R.E., Huang, Y.-D., Jiang, H., Jinchi, H., John, D., Kimura, K., Klein, T., Kubo, D., Kuroda, J., Kwon, C., Lacasse, R., Laing, R., Leitch, E.M., Li, C.-T., Liu, C.-T., Liu, K.-Y., Lin, L.C.-C., Lu, L.-M., Mac-Auliffe, F., Martin-Cocher, P., Matulonis, C., Maute, J.K., Messias, H., Meyer-Zhao, Z., Montaña, A., Montenegro-Montes, F., Montgomerie, W., Moreno Nolasco, M.E., Muders, D., Nishioka, H., Norton, T.J., Nystrom, G., Ogawa, H., Olivares, R., Oshiro, P., Pérez-Beaupuits, J.P., Parra, R., Phillips, N.M., Poirier, M., Pradel, N., Qiu, R., Raffin, P.A., Rahlin, A.S., Ramírez, J., Ressler, S., Reynolds, M., Rodríguez-Montoya, I., Saez-Madain, A.F., Santana, J., Shaw, P., Shirkey, L.E., Silva, K.M., Snow, W., Sousa, D., Sridharan, T.K., Stahm, W., Stark, A.A., Test, J., Torstensson, K., Venegas, P., Walther, C., Wei, T.-S., White, C., Wieching, G., Wijnands, R., Wouterloot, J.G.A., Yu, C.-Y., Yu (于威), W., and Zeballos, M.
ApJ 930, L12 (2022)
10.3847/2041-8213/ac6674

Selective Dynamical Imaging of Interferometric Data
Farah, J., Galison, P., Akiyama, K., Bouman, K.L., Bower, G.C., Chael, A., Fuentes, A., Gómez, J.L., Honma, M., Johnson, M.D., Kofuji, Y., Marrone, D.P., Moriyama, K., Narayan, R., Pesce, D.W., Tiede, P., Wielgus, M., Zhao, G.-Y., Alberdi, A., Alef, W., Algaba, J.C., Anantua, R., Asada, K., Azulay, R., Baczko, A.-K., Ball, D., Baloković, M., Barrett, J., Benson, B.A., Bintley, D., Blackburn, L., Blundell, R., Boland, W., Boyce, H., Bremer, M., Brinkerink, C.D., Brissenden, R., Britzen, S., Broderick, A.E., Broguiere, D., Bronzwaer, T., Bustamente, S., Byun, D.-Y., Carlstrom, J.E., Chan, C.-kwan, Chatterjee, K., Chatterjee, S., Chen, M.-T., Chen, Y., Cho, I., Christian, P., Conway, J.E., Cordes, J.M., Crawford, T.M., Crew, G.B., Cruz-Osorio, A., Cui, Y., Davelaar, J., De Laurentis, M., Deane, R., Dempsey, J., Desvignes, G., Doeleman, S.S., Eatough, R.P., Falcke, H., Fish, V.L., Fomalont, E., Ford, H.A., Fraga-Encinas, R., Friberg, P., Fromm, C.M., Gammie, C.F., Garc'a, R., Gentaz, O., Goddi, C., Gold, R., Gómez-Ruiz, A.I., Gu, M., Gurwell, M., Hada, K., Haggard, D., Hecht, M.H., Hesper, R., Ho, L.C., Ho, P., Huang, C.-W.L., Huang, L., Hughes, D.H., Ikeda, S., Inoue, M., Issaoun, S., James, D.J., Jannuzi, B.T., Janssen, M., Jeter, B., Jiang, W., Jimenez-Rosales, A., Jorstad, S., Jung, T., Karami, M., Karuppusamy, R., Kawashima, T., Keating, G.K., Kettenis, M., Kim, D.-J., Kim, J.-Y., Kim, J., Kim, J., Kino, M., Koay, J.Y., Koch, P.M., Koyama, S., Kramer, C., Kramer, M., Krichbaum, T.P., Kuo, C.-Y., Lauer, T.R., Lee, S.-S., Levis, A., Li, Y.-R., Li, Z., Lico, R., Lindahl, G., Lindqvist, M., Liu, J., Liu, K., Liuzzo, E., Lo, W.-P., Lobanov, A.P., Loinard, L., Lonsdale, C., Lu, R.-S., MacDonald, N.R., Mao, J., Marchili, N., Markoff, S., Marscher, A.P.,

Martí-Vidal, I., Matsushita, S., Matthews, L.D., Medeiros, L., Menten, K.M., Mizuno, I., Mizuno, Y., Moran, J.M., Moscibrodzka, M., Müller, C., Mejas, A.M., Musoke, G., Nagai, H., Nagar, N.M., Nakamura, M., Narayanan, G., Natarajan, I., Nathanail, A., Neilsen, J., Neri, R., Ni, C., Noutsos, A., Nowak, M.A., Okino, H., Olivares, H., Ortiz-León, G.N., Oyama, T., zel, F., Palumbo, D.C.M., Park, J., Patel, N., Pen, U.-L., Piétu, V., Plambeck, R., PopStefanija, A., Porth, O., Pötzl, F.M., Prather, B., Preciado-López, J.A., Psaltis, D., Pu, H.-Y., Ramakrishnan, V., Rao, R., Rawlings, M.G., Raymond, A.W., Rezzolla, L., Ripperda, B., Roelofs, F., Rogers, A., Ros, E., Rose, M., Roshanineshat, A., Rottmann, H., Roy, A.L., Ruszczyk, C., Rygl, K.L.J., Sánchez, S., Sánchez-Arguelles, D., Sasada, M., Savolainen, T., Schloerb, F.P., Schuster, K.-F., Shao, L., Shen, Z., Small, D., Sohn, B.W., SooHoo, J., Sun, H., Tazaki, F., Tetarenko, A.J., Tilanus, R.P.J., Titus, M., Toma, K., Torne, P., Traianou, E., Trent, T., Trippe, S., van Bemmel, I., van Langevelde, H.J., van Rossum, D.R., Wagner, J., Ward-Thompson, D., Wardle, J., Weintroub, J., Wex, N., Wharton, R., Wiik, K., Wong, G.N., Wu, Q., Yoon, D., Young, A., Young, K., Younsi, Z., Yuan, F., Yuan, Y.-F., Zensus, J.A., Zhao, S.-S., and Event Horizon Telescope Collaboration
ApJ 930, L18 (2022)
10.3847/2041-8213/ac6615

A Universal Power-law Prescription for Variability from Synthetic Images of Black Hole Accretion Flows
Georgiev, B., Pesce, D.W., Broderick, A.E., Wong, G.N., Dhruv, V., Wielgus, M., Gammie, C.F., Chan, C.-kwan, Chatterjee, K., Emami, R., Mizuno, Y., Gold, R., Fromm, C.M., Ricarte, A., Yoon, D., Joshi, A.V., Prather, B., Cruz-Osorio, A., Johnson, M.D., Porth, O., Olivares, H., Younsi, Z., Rezzolla, L., Vos, J., Qiu, R., Nathanail, A., Narayan, R., Chael, A., Anantua, R., Moscibrodzka, M., Akiyama, K., Alberdi, A., Alef, W., Algaba, J.C., Asada, K., Azulay, R., Bach, U., Baczko, A.-K., Ball, D., Baloković, M., Barrett, J., Bauböck, M., Benson, B.A., Bintley, D., Blackburn, L., Blundell, R., Bouman, K.L., Bower, G.C., Boyce, H., Bremer, M., Brinkerink, C.D., Brissenden, R., Britzen, S., Broguiere, D., Bronzwaer, T., Bustamante, S., Byun, D.-Y., Carlstrom, J.E., Ceccobello, C., Chatterjee, S., Chen, M.-T., Chen, Y., Cheng, X., Cho, I., Christian, P., Conroy, N.S., Conway, J.E., Cordes, J.M., Crawford, T.M., Crew, G.B., Cui, Y., Davelaar, J., De Laurentis, M., Deane, R., Dempsey, J., Desvignes, G., Dexter, J., Doeleman, S.S., Dougal, S., Dzib, S.A., Eatough, R.P., Falcke, H., Farah, J., Fish, V.L., Fomalont, E., Ford, H.A., Fraga-Encinas, R., Freeman, W.T., Friberg, P., Fuentes, A., Galison, P., García, R., Gentaz, O., Goddi, C., Gómez-Ruiz, A.I., Gómez, J.L., Gu, M., Gurwell, M., Hada, K., Haggard, D., Haworth, K., Hecht, M.H., Hesper, R., Heumann, D., Ho, L.C., Ho, P., Honma, M., Huang, C.-W.L., Huang, L., Hughes, D.H., Ikeda, S., Impellizzeri, C.M.V., Inoue, M., Issaoun, S., James, D.J., Jannuzi, B.T., Janssen, M., Jeter, B., Jiang, W., Jiménez-Rosales, A., Jorstad, S., Jung, T., Karami, M., Karuppusamy, R., Kawashima, T., Keating, G.K., Kettenis, M., Kim, D.-J., Kim, J.-Y., Kim, J., Kim, J., Kino, M., Koay, J.Y., Kocherlakota, P., Kofuji, Y., Koch, P.M., Koyama, S., Kramer, C., Kramer, M., Krichbaum, T.P., Kuo, C.-Y., La Bella, N., Lauer, T.R., Lee, D., Lee, S.-S., Lehner, L., Leung, P.K., Levis, A., Li, Z., Lico, R., Lindahl, G., Lindqvist, M., Lisakov, M., Liu, J., Liu, K., Liuzzo, E., Lo, W.-P., Lobanov, A.P., Loinard, L., Lonsdale, C.J., Lu, R.-S., Mao, J., Marchili, N., Markoff, S., Marrone, D.P., Marscher, A.P., Martí-Vidal, I., Matsushita, S., Matthews, L.D., Menten, K.M., Michalik, D., Mizuno, I., Moran, J.M., Moriyama, K., Müller, C., Mus, A., Musoke, G., Myserlis, I., Nadolski, A., Nagai, H., Nagar, N.M., Nakamura, M., Narayanan, G., Natarajan, I., Navarro Fuentes, S., Neilsen, J., Neri, R., Ni, C., Noutsos, A., Nowak, M.A., Oh, J., Okino, H., Ortiz-León, G.N., Oyama, T.,

Palumbo, D.C.M., Paraschos, G.F., Park, J., Parsons, H., Patel, N., Pen, U.-L., Piétu, V., Plambeck, R., PopStefanija, A., Pötzl, F.M., Preciado-López, J.A., Pu, H.-Y., Ramakrishnan, V., Rao, R., Rawlings, M.G., Raymond, A.W., Ripperda, B., Roelofs, F., Rogers, A., Ros, E., Romero-Cañizales, C., Roshanineshat, A., Rottmann, H., Roy, A.L., Ruiz, I., Ruszczyk, C., Rygl, K.L.J., Sánchez, S., Sánchez-Argüelles, D., Sánchez-Portal, M., Sasada, M., Satapathy, K., Savolainen, T., Schloerb, F.P., Schonfeld, J., Schuster, K.-F., Shao, L., Shen, Z., Small, D., Sohn, B.W., SooHoo, J., Souccar, K., Sun, H., Tazaki, F., Tetarenko, A.J., Tiede, P., Tilanus, R.P.J., Titus, M., Torne, P., Traianou, E., Trent, T., Trippe, S., Turk, M., van Bemmel, I., van Langevelde, H.J., van Rossum, D.R., Wagner, J., Ward-Thompson, D., Wardle, J., Weintroub, J., Wex, N., Wharton, R., Wiik, K., Witzel, G., Wondrak, M.F., Wu, Q., Yamaguchi, P., Young, A., Young, K., Yuan, F., Yuan, Y.-F., Zensus, J.A., Zhang, S., Zhao, G.-Y., and Zhao, S.-S.
ApJ 930, L20 (2022)
10.3847/2041-8213/ac65eb

A repeating fast radio burst source in a globular cluster
Kirsten, F., Marcote, B., Nimmo, K., Hessels, J.W.T., Bhardwaj, M., Tendulkar, S.P., Keimpema, A., Yang, J., Snelders, M.P., Scholz, P., Pearlman, A.B., Law, C.J., Peters, W.M., Giroletti, M., Paragi, Z., Bassa, C., Hewitt, D.M., Bach, U., Bezrukovs, V., Burgay, M., Buttaccio, S.T., Conway, J.E., Corongiu, A., Feiler, R., Forssén, O., Gawroński, M.P., Karuppusamy, R., Kharinov, M.A., Lindqvist, M., Maccaferri, G., Melnikov, A., Ould-Boukattine, O.S., Possenti, A., Surcis, G., Wang, N., Yuan, J., Aggarwal, K., Anna-Thomas, R., Bower, G.C., Blaauw, R., Burke-Spolaor, S., Cassanelli, T., Clarke, T.E., Fonseca, E., Gaensler, B.M., Gopinath, A., Kaspi, V.M., Kassim, N., Lazio, T.J.W., Leung, C., Li, D.Z., Lin, H.H., Masui, K.W., Mckinven, R., Michilli, D., Mikhailov, A.G., Ng, C., Orbidans, A., Pen, U.L., Petroff, E., Rahman, M., Ransom, S.M., Shin, K., Smith, K.M., Stairs, I.H., and Vlemmings, W.
Nature 602, 585 (2022)
10.1038/s41586-021-04354-w

High-resolution VLBI Observations of and Modeling the Radio Emission from the Tidal Disruption Event AT2019dsg
Mohan, P., An, T., Zhang, Y., Yang, J., Yang, X., and Wang, A.
ApJ 927, 74 (2022)
10.3847/1538-4357/ac4cb2

Radio interferometric imaging of RS Oph bipolar ejecta for the 2021 nova outburst
Munari, U., Giroletti, M., Marcote, B., O'Brien, T.J., Veres, P., Yang, J., Williams, D.R.A., and Woudt, P.
A&A 666, L6 (2022)
10.1051/0004-6361/202244821

Burst timescales and luminosities as links between young pulsars and fast radio bursts
Nimmo, K., Hessels, J.W.T., Kirsten, F., Keimpema, A., Cordes, J.M., Snelders, M.P., Hewitt, D.M., Karuppusamy, R., Archibald, A.M., Bezrukovs, V., Bhardwaj, M., Blaauw, R., Buttaccio, S.T., Cassanelli, T., Conway, J.E., Corongiu, A., Feiler, R., Fonseca, E., Forssén, O., Gawroński, M., Giroletti, M., Kharinov, M.A., Leung, C., Lindqvist, M., Maccaferri, G., Marcote, B., Masui, K.W., Mckinven, R., Melnikov, A., Michilli, D., Mikhailov, A.G., Ng, C., Orbidans, A., Ould-Boukattine, O.S., Paragi, Z., Pearlman, A.B.,

Petroff, E., Rahman, M., Scholz, P., Shin, K., Smith, K.M., Stairs, I.H., Surcis, G., Tendulkar, S.P., Vlemmings, W., Wang, N., Yang, J., and Yuan, J.P.
NatAs 6, 393 (2022)
10.1038/s41550-021-01569-9

Milliarcsecond Localization of the Repeating FRB 20201124A
Nimmo, K., Hewitt, D.M., Hessels, J.W.T., Kirsten, F., Marcote, B., Bach, U., Blaauw, R., Burgay, M., Corongiu, A., Feiler, R., Gawroński, M.P., Giroletti, M., Karuppusamy, R., Keimpema, A., Kharinov, M.A., Lindqvist, M., Maccaferri, G., Melnikov, A., Mikhailov, A., Ould-Boukattine, O.S., Paragi, Z., Pilia, M., Possenti, A., Snelders, M.P., Surcis, G., Trudu, M., Venturi, T., Vlemmings, W., Wang, N., Yang, J., and Yuan, J.
ApJ 927, L3 (2022)
10.3847/2041-8213/ac540f

The Variability of the Black Hole Image in M87 at the Dynamical Timescale
Satapathy, K., Psaltis, D., Özel, F., Medeiros, L., Dougall, S.T., Chan, C.-K., Wielgus, M., Prather, B.S., Wong, G.N., Gammie, C.F., Akiyama, K., Alberdi, A., Alef, W., Algaba, J.C., Anantua, R., Asada, K., Azulay, R., Baczko, A.-K., Ball, D., Baloković, M., Barrett, J., Benson, B.A., Bintley, D., Blackburn, L., Blundell, R., Boland, W., Bouman, K.L., Bower, G.C., Boyce, H., Bremer, M., Brinkerink, C.D., Brissenden, R., Britzen, S., Broderick, A.E., Broguiere, D., Bronzwaer, T., Bustamente, S., Byun, D.-Y., Carlstrom, J.E., Chael, A., Chatterjee, K., Chatterjee, S., Chen, M.-T., Chen, Y., Cho, I., Christian, P., Conway, J.E., Cordes, J.M., Crawford, T.M., Crew, G.B., Cruz-Osorio, A., Cui, Y., Davelaar, J., De Laurentis, M., Deane, R., Dempsey, J., Desvignes, G., Dexter, J., Doeleman, S.S., Eatough, R.P., Falcke, H., Farah, J., Fish, V.L., Fomalont, E., Ford, H.A., Fraga-Encinas, R., Friberg, P., Fromm, C.M., Fuentes, A., Galison, P., García, R., Gentaz, O., Georgiev, B., Goddi, C., Gold, R., Gómez-Ruiz, A.I., Gómez, J.L., Gu, M., Gurwell, M., Hada, K., Haggard, D., Hecht, M.H., Hesper, R., Ho, L.C., Ho, P., Honma, M., Huang, C.-W.L., Huang, L., Hughes, D.H., Ikeda, S., Inoue, M., Issaoun, S., James, D.J., Jannuzi, B.T., Janssen, M., Jeter, B., Jiang, W., Jimenez-Rosales, A., Johnson, M.D., Jorstad, S., Jung, T., Karami, M., Karuppusamy, R., Kawashima, T., Keating, G.K., Kettenis, M., Kim, D.-J., Kim, J.-Y., Kim, J., Kim, J., Kino, M., Koay, J.Y., Kofuji, Y., Koch, P.M., Koyama, S., Kramer, C., Kramer, M., Krichbaum, T.P., Kuo, C.-Y., Lauer, T.R., Lee, S.-S., Levis, A., Li, Y.-R., Li, Z., Lindqvist, M., Lico, R., Lindahl, G., Liu, J., Liu, K., Liuzzo, E., Lo, W.-P., Lobanov, A.P., Loinard, L., Lonsdale, C., Lu, R.-S., MacDonald, N.R., Mao, J., Marchili, N., Markoff, S., Marrone, D.P., Marscher, A.P., Martí-Vidal, I., Matsushita, S., Matthews, L.D., Menten, K.M., Mizuno, I., Mizuno, Y., Moran, J.M., Moriyama, K., Moscibrodzka, M., Müller, C., Mejías, A.M., Musoke, G., Nagai, H., Nagar, N.M., Nakamura, M., Narayan, R., Narayanan, G., Natarajan, I., Nathanail, A., Neilsen, J., Neri, R., Ni, C., Noutsos, A., Nowak, M.A., Okino, H., Olivares, H., Ortiz-León, G.N., Oyama, T., Palumbo, D.C.M., Park, J., Patel, N., Pen, U.-L., Pesce, D.W., Piétu, V., Plambeck, R., PopStefanija, A., Porth, O., Pötzl, F.M., Preciado-López, J.A., Pu, H.-Y., Ramakrishnan, V., Rao, R., Rawlings, M.G., Raymond, A.W., Rezzolla, L., Ripperda, B., Roelofs, F., Rogers, A., Ros, E., Rose, M., Roshanineshat, A., Rottmann, H., Roy, A.L., Ruszczyk, C., Rygl, K.L.J., Sánchez, S., Sánchez-Arguelles, D., Sasada, M., Savolainen, T., Schloerb, F.P., Schuster, K.-F., Shao, L., Shen, Z., Small, D., Sohn, B.W., SooHoo, J., Sun, H., Tazaki, F., Tetarenko, A.J., Tiede, P., Tilanus, R.P.J., Titus, M., Toma, K., Torne, P., Traianou, E., Trent, T., Trippe, S., van Bemmel, I., van Langevelde, H.J., van Rossum, D.R., Wagner, J., Ward-Thompson, D., Wardle, J., Weintroub, J., Wex, N., Wharton, R., Wiik, K., Wu, Q., Yoon, D., Young, A., Young, K.,

Younsi, Z., Yuan, F., Yuan, Y.-F., Zensus, J.A., Zhao, G.-Y., and Zhao, S.-S.
ApJ 925, 13 (2022)
10.3847/1538-4357/ac332e

EVN observations of 6.7 GHz methanol maser polarization in massive star-forming regions. V. Completion of the flux-limited sample
Surcis, G., Vlemmings, W.H.T., van Langevelde, H.J., Hutawarakorn Kramer, B., and Bartkiewicz, A.
A&A 658, A78 (2022)
10.1051/0004-6361/202142125

Broad band flux-density monitoring of radio sources with the Onsala twin telescopes
Varenius, E., Maio, F., Le Bail, K., and Haas, R.
Exp. Astron. 54, 137 (2022)
10.1007/s10686-022-09867-4

Millimeter Light Curves of Sagittarius A Observed during the 2017 Event Horizon Telescope Campaign*
Wielgus, M., Marchili, N., Martí-Vidal, I., Keating, G.K., Ramakrishnan, V., Tiede, P., Fomalont, E., Issaoun, S., Neilsen, J., Nowak, M.A., Blackburn, L., Gammie, C.F., Goddi, C., Haggard, D., Lee, D., Moscibrodzka, M., Tetarenko, A.J., Bower, G.C., Chan, C.-kwan, Chatterjee, K., Chesler, P.M., Dexter, J., Doeleman, S.S., Georgiev, B., Gurwell, M., Johnson, M.D., Marrone, D.P., Mus, A., Psaltis, D., Ripperda, B., Witzel, G., Akiyama, K., Alberdi, A., Alef, W., Algaba, J.C., Anantua, R., Asada, K., Azulay, R., Bach, U., Baczko, A.-K., Ball, D., Baloković, M., Barrett, J., Bauböck, M., Benson, B.A., Bintley, D., Blundell, R., Boland, W., Bouman, K.L., Boyce, H., Bremer, M., Brinkerink, C.D., Brissenden, R., Britzen, S., Broderick, A.E., Broguiere, D., Bronzwaer, T., Bustamante, S., Byun, D.-Y., Carlstrom, J.E., Ceccobello, C., Chael, A., Chatterjee, S., Chen, M.-T., Chen, Y., Cho, I., Christian, P., Conroy, N.S., Conway, J.E., Cordes, J.M., Crawford, T.M., Crew, G.B., Cruz-Osorio, A., Cui, Y., Davelaar, J., De Laurentis, M., Deane, R., Dempsey, J., Desvignes, G., Dhruv, V., Dzib, S.A., Eatough, R.P., Emami, R., Falcke, H., Farah, J., Fish, V.L., Ford, H.A., Fraga-Encinas, R., Freeman, W.T., Friberg, P., Fromm, C.M., Fuentes, A., Galison, P., García, R., Gentaz, O., Gold, R., Gómez-Ruiz, A.I., Gómez, J.L., Gu, M., Hada, K., Haworth, K., Hecht, M.H., Hesper, R., Ho, L.C., Ho, P., Honma, M., Huang, C.-W.L., Huang, L., Hughes, D.H., Ikeda, S., Impellizzeri, C.M.V., Inoue, M., James, D.J., Jannuzi, B.T., Janssen, M., Jeter, B., Jiang, W., Jiménez-Rosales, A., Jorstad, S., Joshi, A.V., Jung, T., Karami, M., Karuppusamy, R., Kawashima, T., Kettenis, M., Kim, D.-J., Kim, J.-Y., Kim, J., Kim, J., Kino, M., Koay, J.Y., Kocherlakota, P., Kofuji, Y., Koch, P.M., Koyama, S., Kramer, C., Kramer, M., Krichbaum, T.P., Kuo, C.-Y., La Bella, N., Lauer, T.R., Lee, S.-S., Leung, P.K., Levis, A., Li, Z., Lico, R., Lindahl, G., Lindqvist, M., Lisakov, M., Liu, J., Liu, K., Liuzzo, E., Lo, W.-P., Lobanov, A.P., Loinard, L., Lonsdale, C., Lu, R.-S., Mao, J., Markoff, S., Marscher, A.P., Matsushita, S., Matthews, L.D., Medeiros, L., Menten, K.M., Michalik, D., Mizuno, I., Mizuno, Y., Moran, J.M., Moriyama, K., Müller, C., Musoke, G., Myserlis, I., Nadolski, A., Nagai, H., Nagar, N.M., Nakamura, M., Narayan, R., Narayanan, G., Natarajan, I., Nathanail, A., Navarro Fuentes, S., Neri, R., Ni, C., Noutsos, A., Oh, J., Okino, H., Olivares, H., Ortiz-León, G.N., Oyama, T., Özel, F., Palumbo, D.C.M., Paraschos, G.F., Park, J., Parsons, H., Patel, N., Pen, U.-L., Pesce, D.W., Piétu, V., Plambeck, R., PopStefanija, A., Porth, O., Pötzl, F.M., Prather, B., Preciado-López, J.A., Pu, H.-Y., Rao, R., Rawlings, M.G., Raymond, A.W., Rezzolla, L., Ricarte, A., Roelofs, F., Rogers, A., Ros, E., Romero-Canizales, C., Roshanineshat, A., Rottmann, H., Roy, A.L.,

Ruiz, I., Ruszczyk, C., Rygl, K.L.J., Sánchez, S., Sánchez-Argüelles, D., Sánchez-Portal, M., Sasada, M., Satapathy, K., Savolainen, T., Schloerb, F.P., Schuster, K.-F., Shao, L., Shen, Z., Small, D., Won Sohn, B., SooHoo, J., Souccar, K., Sun, H., Tazaki, F., Tilanus, R.P.J., Titus, M., Torne, P., Traianou, E., Trent, T., Trippe, S., van Bemmel, I., van Langevelde, H.J., van Rossum, D.R., Vos, J., Wagner, J., Ward-Thompson, D., Wardle, J., Weintroub, J., Wex, N., Wharton, R., Wiik, K., Wondrak, M.F., Wong, G.N., Wu, Q., Yamaguchi, P., Yoon, D., Young, A., Young, K., Younsi, Z., Yuan, F., Yuan, Y.-F., Zensus, J.A., Zhang, S., Zhao, G.-Y., and Zhao, S.-S.
ApJ 930, L19 (2022)
10.3847/2041-8213/ac6428

Structural and spectral properties of Galactic plane variable radio sources
Yang, J., Chen, Y., Gurvits, L.I., Paragi, Z., Yang, A., Yang, X., and Shen, Z.
MNRAS 511, 280 (2022)
10.1093/mnras/stab3804

Is there a sub-parsec-scale jet base in the nearby dwarf galaxy NGC 4395?
Yang, J., Yang, X., Wrobel, J.M., Paragi, Z., Gurvits, L.I., Ho, L.C., Nyland, K., Fan, L., and Tafoya, D.
MNRAS 514, 6215 (2022)
10.1093/mnras/stac1753

The X-shaped Radio Galaxy J0725+5835 is Associated with an AGN Pair
Yang, X., Ji, J., Joshi, R., Yang, J., An, T., Wang, R., Ho, L.C., Roberts, D.H., and Saripalli, L.
ApJ 933, 98 (2022)
10.3847/1538-4357/ac71aa

X-Ray Burst and Persistent Emission Properties of the Magnetar SGR 1830-0645 in Outburst
Younes, G., Hu, C.-P., Bansal, K., Ray, P.S., Pearlman, A.B., Kirsten, F., Wadiasingh, Z., Göğüş, E., Baring, M.G., Enoto, T., Arzoumanian, Z., Gendreau, K.C., Kouveliotou, C., Güver, T., Harding, A.K., Majid, W.A., Blumer, H., Hessels, J.W.T., Gawroński, M.P., Bezrukovs, V., and Orbidans, A.
ApJ 924, 136 (2022)
10.3847/1538-4357/ac3756

International authors (Astro VLBI)

VLBI imaging of the pre-coalescence SMBHB candidate SDSS J143016.05+230344.4
An, T., Zhang, Y., Wang, A., Shu, X., Yang, H., Jiang, N., Dou, L., Pan, Z., Wang, T., and Zheng, Z.
A&A 663, A139 (2022)
10.1051/0004-6361/202243821

Astrometry of variable compact radio sources: a search for Galactic black hole X-ray binaries
Atri, P., Miller-Jones, J.C.A., Bahramian, A., Plotkin, R.M., Maccarone, T.J., Marcote, B., Heinke, C.O., Sivakoff, G.R., Ginsburg, A., Strader, J., and Chomiuk, L.
MNRAS 517, 5810 (2022)
10.1093/mnras/stac2795

Ambilateral collimation study of the twin-jets in NGC 1052
Baczko, A.-K., Ros, E., Kadler, M., Fromm, C.M., Boccardi, B., Perucho, M., Krichbaum, T.P., Burd, P.R., and Zensus, J.A.
A&A 658, A119 (2022)
10.1051/0004-6361/202141897

Deep Very Long Baseline Interferometry Observations Challenge Previous Evidence of a Binary Supermassive Black Hole Residing in Seyfert Galaxy NGC 7674
Breiding, P., Burke-Spolaor, S., An, T., Bansal, K., Mohan, P., Taylor, G.B., and Zhang, Y.
ApJ 933, 143 (2022)
10.3847/1538-4357/ac7466

Radio emission in a nearby, ultra-cool dwarf binary: A multifrequency study
Climent, J.B., Guirado, J.C., Zapatero Osorio, M.R., Zakhozhay, O.V., Pérez-Torres, M., Azulay, R., Gauza, B., Rebolo, R., Béjar, V.J.S., Martín-Pintado, J., and Lefèvre, C.
A&A 660, A65 (2022)
10.1051/0004-6361/202142260

Discovery of recurrent flares of 6.7 GHz methanol maser emission in Cepheus A HW2
Durjasz, M., Szymczak, M., Olech, M., and Bartkiewicz, A.
A&A 663, A123 (2022)
10.1051/0004-6361/202243552

VLBI observations of GRB 201015A, a relatively faint GRB with a hint of very high-energy gamma-ray emission
Giarratana, S., Rhodes, L., Marcote, B., Fender, R., Ghirlanda, G., Giroletti, M., Nava, L., Paredes, J.M., Ravasio, M.E., Ribó, M., Patel, M., Rastinejad, J., Schroeder, G., Fong, W., Gompertz, B.P., Levan, A.J., and O'Brien, P.
A&A 664, A36 (2022)
10.1051/0004-6361/202142919

Probing the Innermost Regions of AGN Jets and Their Magnetic Fields with RadioAstron. V. Space and Ground Millimeter-VLBI Imaging of OJ 287
Gómez, J.L., Traianou, E., Krichbaum, T.P., Lobanov, A.P., Fuentes, A., Lico, R., Zhao, G.-Y., Bruni, G., Kovalev, Y.Y., Lähteenmäki, A., Voitsik, P.A., Lisakov, M.M., Angelakis, E., Bach, U., Casadio, C., Cho, I., Dey, L., Gopakumar, A., Gurvits, L.I., Jorstad, S., Kovalev, Y.A., Lister, M.L., Marscher, A.P., Myserlis, I., Pushkarev, A.B., Ros, E., Savolainen, T., Tornikoski, M., Valtonen, M.J., and Zensus, A.
ApJ 924, 122 (2022)
10.3847/1538-4357/ac3bcc

Investigating the Nature of the Luminous Ambiguous Nuclear Transient ASASSN-17jz
Holoien, T.W.-S., Neustadt, J.M.M., Vallely, P.J., Auchettl, K., Hinkle, J.T., Romero-Cañizales, C., Shappee, B.J., Kochanek, C.S., Stanek, K.Z., Chen, P., Dong, S., Prieto, J.L., Thompson, T.A., Brink, T.G., Filippenko, A.V., Zheng, W., Bersier, D., Bose, S., Burgasser, A.J., Channa, S., de Jaeger, T., Hestenes, J., Im, M., Jeffers, B., Jun, H.D., Lansbury, G., Post, R.S., Ross, T.W., Stern, D., Tang, K., Tucker, M.A., Valenti, S., Yunus, S., and Zhang, K.D.
ApJ 933, 196 (2022)
10.3847/1538-4357/ac74b9

Resolving the Inner Parsec of the Blazar J1924-2914 with the Event Horizon Telescope
Issaoun, S., Wielgus, M., Jorstad, S., Krichbaum, T.P., Blackburn, L., Janssen, M., Chan, C.- kwan, Pesce, D.W., Gómez, J.L., Akiyama, K., Mościbrodzka, M., Martí-Vidal, I., Chael, A., Lico, R., Liu, J., Ramakrishnan, V., Lisakov, M., Fuentes, A., Zhao, G.-Y., Moriyama, K., Broderick, A.E., Tiede, P., MacDonald, N.R., Mizuno, Y., Traianou, E., Loinard, L., Davelaar, J., Gurwell, M., Lu, R.-S., Alberdi, A., Alef, W., Algaba, J.C., Anantua, R., Asada, K., Azulay, R., Bach, U., Baczko, A.-K., Ball, D., Baloković, M., Barrett, J., Bauböck, M., Benson, B.A., Bintley, D., Blundell, R., Boland, W., Bouman, K.L., Bower, G.C., Boyce, H., Bremer, M., Brinkerink, C.D., Brissenden, R., Britzen, S., Broguiere, D., Bronzwaer, T., Bustamante, S., Byun, D.-Y., Carlstrom, J.E., Ceccobello, C., Chatterjee, K., Chatterjee, S., Chen, M.-T., Chen, Y., Cho, I., Christian, P., Conroy, N.S., Conway, J.E., Cordes, J.M., Crawford, T.M., Crew, G.B., Cruz-Osorio, A., Cui, Y., De Laurentis, M., Deane, R., Dempsey, J., Desvignes, G., Dexter, J., Doeleman, S.S., Dhruv, V., Dzib Quijano, S.A., Eatough, R.P., Emami, R., Falcke, H., Farah, J., Fish, V.L., Fomalont, E., Ford, H.A., Fraga-Encinas, R., Freeman, W.T., Friberg, P., Fromm, C.M., Galison, P., Gammie, C.F., García, R., Gentaz, O., Georgiev, B., Goddi, C., Gold, R., Gómez-Ruiz, A.I., Gu, M., Hada, K., Haggard, D., Hecht, M.H., Hesper, R., Ho, L.C., Ho, P., Honma, M., Huang, C.-W.L., Huang, L., Hughes, D.H., Ikeda, S., Impellizzeri, C.M.V., Inoue, M., James, D.J., Jannuzi, B.T., Jeter, B., Jiang, W., Jimenez-Rosales, A., Johnson, M.D., Joshi, A.V., Jung, T., Karami, M., Karuppusamy, R., Kawashima, T., Keating, G.K., Kettenis, M., Kim, D.-J., Kim, J.-Y., Kim, J., Kim, J., Kino, M., Koay, J.Y., Kocherlakota, P., Kofuji, Y., Koch, P.M., Koyama, S., Kramer, C., Kramer, M., Kuo, C.-Y., La Bella, N., Lauer, T.R., Lee, D., Lee, S.-S., Leung, P.K., Levis, A., Li, Z., Lico, R., Lindahl, G., Lindqvist, M., Liu, K., Liuzzo, E., Lo, W.-P., Lobanov, A.P., Lonsdale, C., Mao, J., Marchili, N., Markoff, S., Marrone, D.P., Marscher, A.P., Matsushita, S., Matthews, L.D., Medeiros, L., Menten, K.M., Michalik, D., Mizuno, I., Mizuno, Y., Moran, J.M., Müller, C., Mus, A., Musoke, G., Myserlis, I., Nadolski, A., Nagai, H., Nagar, N.M., Nakamura, M., Narayan, R., Narayanan, G., Natarajan, I., Nathanail, A., Neilsen, J., Neri, R., Ni, C., Noutsos, A., Nowak, M.A., Oh, J., Okino, H., Olivares, H., Ortiz-León, G.N., Oyama, T., Özel, F., Palumbo, D.C.M., Paraschos, G.F., Park, J., Parsons, H., Patel, N., Pen, U.-L., Piétu, V., Plambeck, R., PopStefanija, A., Porth, O., Pötzl, F.M., Prather, B., Preciado-López, J.A., Psaltis, D., Pu, H.-Y., Rao, R., Rawlings, M.G., Raymond, A.W., Rezzolla, L., Ricarte, A., Ripperda, B., Roelofs, F., Rogers, A., Ros, E., Romero-Canizales, C., Roshanineshat, A., Rottmann, H., Roy, A.L., Ruiz, I., Ruszczyk, C., Rygl, K.L.J., Sánchez, S., Sánchez-Arguelles, D., Sanchez-Portal, M., Sasada, M., Satapathy, K., Savolainen, T., Schloerb, F.P., Schuster, K.-F., Shao, L., Shen, Z., Small, D., Sohn, B.W., SooHoo, J., Souccar, K., Sun, H., Tazaki, F., Tetarenko, A.J., Tiede, P., Tilanus, R.P.J., Titus, M., Torne, P., Trent, T., Trippe, S., van Bemmel, I., van Langevelde, H.J., van Rossum, D.R., Vos, J., Wagner, J., Ward-Thompson, D., Wardle, J., Weintroub, J., Wex, N., Wharton, R., Wiik, K., Witzel, G., Wondrak, M., Wong, G.N., Wu, Q., Yamaguchi, P., Yoon, D., Young, A., Young, K., Younsi, Z., Yuan, F., Yuan, Y.-F., Zensus, J.A., Zhang, S., and Zhao, S.-S.
ApJ 934, 145 (2022)
10.3847/1538-4357/ac7a40

Tracing Milky Way scattering by compact extragalactic radio sources
Koryukova, T.A., Pushkarev, A.B., Plavin, A.V., and Kovalev, Y.Y.
MNRAS 515, 1736 (2022)
10.1093/mnras/stac1898

Radio-loud Quasars above Redshift 4: Very Long Baseline Interferometry (VLBI) Imaging of an Extended Sample
Krezinger, M., Perger, K., Gabányi, K.É., Frey, S., Gurvits, L.I., Paragi, Z., An, T., Zhang, Y., Cao, H., and Sbarrato, T.
ApJSS 260, 49 (2022)
10.3847/1538-4365/ac63b8

A Radio, Optical, UV, and X-Ray View of the Enigmatic Changing-look Active Galactic Nucleus 1ES 1927+654 from Its Pre- to Postflare States
Laha, S., Meyer, E., Roychowdhury, A., Becerra Gonzalez, J., Acosta-Pulido, J.A., Thapa, A., Ghosh, R., Behar, E., Gallo, L.C., Kriss, G.A., Panessa, F., Bianchi, S., La Franca, F., Scepi, N., Begelman, M.C., Longinotti, A.L., Lusso, E., Oates, S., Nicholl, M., and Cenko, S.B.
ApJ 931, 5 (2022)
10.3847/1538-4357/ac63aa

New jet feature in the parsec-scale jet of the blazar OJ 287 connected to the 2017 teraelectronvolt flaring activity
Lico, R., Casadio, C., Jorstad, S.G., Gómez, J.L., Marscher, A.P., Traianou, E., Kim, J.-Y., Zhao, G.-Y., Fuentes, A., Cho, I., Krichbaum, T.P., Hervet, O., O'Brien, S., Boccardi, B., Myserlis, I., Agudo, I., Alberdi, A., Weaver, Z.R., and Zensus, J.A.
A&A 658, L10 (2022)
10.1051/0004-6361/202142948

Late-time Evolution and Modeling of the Off-axis Gamma-Ray Burst Candidate FIRST J141918.9+394036
Mooley, K.P., Margalit, B., Law, C.J., Perley, D.A., Deller, A.T., Lazio, T.J.W., Bietenholz, M.F., Shimwell, T., Intema, H.T., Gaensler, B.M., Metzger, B.D., Dong, D.Z., Hallinan, G., Ofek, E.O., and Sironi, L.
ApJ 924, 16 (2022)
10.3847/1538-4357/ac3330

Snapshot of a magnetohydrodynamic disk wind traced by water maser observations
Moscadelli, L., Sanna, A., Beuther, H., Oliva, A., and Kuiper, R.
NatAs 6, 1068 (2022)
10.1038/s41550-022-01754-4

Observing the inner parsec-scale region of candidate neutrino-emitting blazars
Nanci, C., Giroletti, M., Orienti, M., Migliori, G., Moldón, J., Garrappa, S., Kadler, M., Ros, E., Buson, S., An, T., Pérez-Torres, M.A., D'Ammando, F., Mohan, P., Agudo, I., Sohn, B.W., Castro-Tirado, A.J., and Zhang, Y.
A&A 663, A129 (2022)
10.1051/0004-6361/202142665

A persistent double nuclear structure in 3C 84
Oh, J., Hodgson, J.A., Trippe, S., Krichbaum, T.P., Kam, M., Paraschos, G.F., Kim, J.-Y., Rani, B., Sohn, B.W., Lee, S.-S., Lico, R., Liuzzo, E., Bremer, M., and Zensus, A.
MNRAS 509, 1024 (2022)
10.1093/mnras/stab3056

Collimation of the Relativistic Jet in the Quasar 3C 273
Okino, H., Akiyama, K., Asada, K., Gómez, J.L., Hada, K., Honma, M., Krichbaum, T.P., Kino, M., Nagai, H., Bach, U., Blackburn, L., Bouman, K.L., Chael, A., Crew, G.B., Doeleman, S.S., Fish, V.L., Goddi, C., Issaoun, S., Johnson, M.D., Jorstad, S., Koyama, S., Lonsdale, C.J., Lu, R.-S., Martí-Vidal, I., Matthews, L.D., Mizuno, Y., Moriyama, K., Nakamura, M., Pu, H.-Y., Ros, E., Savolainen, T., Tazaki, F., Wagner, J., Wielgus, M., and Zensus, A.
ApJ 940, 65 (2022)
10.3847/1538-4357/ac97e5

Jet kinematics in the transversely stratified jet of 3C 84. A two-decade overview
Paraschos, G.F., Krichbaum, T.P., Kim, J.-Y., Hodgson, J.A., Oh, J., Ros, E., Zensus, J.A., Marscher, A.P., Jorstad, S.G., Gurwell, M.A., Lähteenmäki, A., Tornikoski, M., Kiehlmann, S., and Readhead, A.C.S.
A&A 665, A1 (2022)
10.1051/0004-6361/202243343

FRB 121102: Drastic changes in the burst polarization contrasts with the stability of the persistent emission
Plavin, A., Paragi, Z., Marcote, B., Keimpema, A., Hessels, J.W.T., Nimmo, K., Vedantham, H.K., and Spitler, L.G.
MNRAS 511, 6033 (2022)
10.1093/mnras/stac500

Exploring the disk-jet connection in NGC 315
Ricci, L., Boccardi, B., Nokhrina, E., Perucho, M., MacDonald, N., Mattia, G., Grandi, P., Madika, E., Krichbaum, T.P., and Zensus, J.A.
A&A 664, A166 (2022)
10.1051/0004-6361/202243958

Multiwavelength View of the Close-by GRB 190829A Sheds Light on Gamma-Ray Burst Physics
Salafia, O.S., Ravasio, M.E., Yang, J., An, T., Orienti, M., Ghirlanda, G., Nava, L., Giroletti, M., Mohan, P., Spinelli, R., Zhang, Y., Marcote, B., Cimò, G., Wu, X., and Li, Z.
ApJ 931, L19 (2022)
10.3847/2041-8213/ac6c28

Radio properties of the OH megamaser galaxy IIZw 096
Wu, H., Wu, Z., Sotnikova, Y., Chen, Y., Zhang, B., Mufakharov, T., Shen, Z., Chen, X., Mikhailov, A., Mingaliev, M., Han, X.L., and Misra, P.
A&A 661, A125 (2022)
10.1051/0004-6361/202142854

Role of the companion lensing galaxy in the CLASS gravitational lens B1152+199
Zhang, M., Yuan, Q., Liu, J.-Y., and Zhang, L.
MNRAS 511, 1085 (2022)
10.1093/mnras/stac087

Unraveling the Innermost Jet Structure of OJ 287 with the First GMVA + ALMA Observations
Zhao, G.-Y., Gómez, J.L., Fuentes, A., Krichbaum, T.P., Traianou, E., Lico, R., Cho, I., Ros, E., Komossa, S., Akiyama, K., Asada, K., Blackburn, L., Britzen, S., Bruni, G., Crew, G.B., Dahale, R., Dey, L., Gold, R., Gopakumar, A., Issaoun, S., Janssen, M., Jorstad, S., Kim, J.-Y., Koay, J.Y., Kovalev, Y.Y., Koyama, S., Lobanov, A.P., Loinard, L., Lu, R.-S., Markoff, S., Marscher, A.P., Martí-Vidal, I., Mizuno, Y., Park, J., Savolainen, T., and Toscano, T.
ApJ 932, 72 (2022)
10.3847/1538-4357/ac6b9c

LOFAR, publications in refereed journals 2022

Swedish authors (LOFAR)

High-resolution imaging with the International LOFAR Telescope: Observations of the gravitational lenses MG 0751+2716 and CLASS B1600+434
Badole, S., Venkattu, D., Jackson, N., Wallace, S., Dhandha, J., Hartley, P., Riddell-Rovira, C., Townsend, A., Morabito, L.K., and McKean, J.P.
A&A 658, A7 (2022)
10.1051/0004-6361/202141227

Magnetic field strength in cosmic web filaments
Carretti, E., Vacca, V., O'Sullivan, S.P., Heald, G.H., Horellou, C., Röttgering, H.J.A., Scaife, A.M.M., Shimwell, T.W., Shulevski, A., Stuardi, C., and Vernstrom, T.
MNRAS 512, 945 (2022)
10.1093/mnras/stac384

Statistical analysis of the causes of excess variance in the 21 cm signal power spectra obtained with the Low-Frequency Array
Gan, H., Koopmans, L.V.E., Mertens, F.G., Mevius, M., Offringa, A.R., Ciardi, B., Gehlot, B.K., Ghara, R., Ghosh, A., Giri, S.K., Iliev, I.T., Mellema, G., Pandey, V.N., and Zaroubi, S.
A&A 663, A9 (2022)
10.1051/0004-6361/202142945

Degree-scale galactic radio emission at 122 MHz around the North Celestial Pole with LOFAR-AARTFAAC
Gehlot, B.K., Koopmans, L.V.E., Offringa, A.R., Gan, H., Ghara, R., Giri, S.K., Kuiack, M., Mertens, F.G., Mevius, M., Mondal, R., Pandey, V.N., Shulevski, A., Wijers, R.A.M.J., and Yatawatta, S.
A&A 662, A97 (2022)
10.1051/0004-6361/202142939

Nearby galaxies in the LOFAR Two-metre Sky Survey. I. Insights into the non-linearity of the radio-SFR relation
Heesen, V., Staffehl, M., Basu, A., Beck, R., Stein, M., Tabatabaei, F.S., Hardcastle, M.J., Chyży, K.T., Shimwell, T.W., Adebahr, B., Beswick, R., Bomans, D.J., Botteon, A.,

Brinks, E., Brüggen, M., Dettmar, R.-J., Drabent, A., de Gasperin, F., Gürkan, G., Heald, G.H., Horellou, C., Nikiel-Wroczynski, B., Paladino, R., Piotrowska, J., Röttgering, H.J.A., Smith, D.J.B., and Tasse, C.
A&A 664, A83 (2022)
10.1051/0004-6361/202142878

Seeing the forest and the trees: A radio investigation of the ULIRG Mrk 273
Kukreti, P., Morganti, R., Bondi, M., Oosterloo, T., Tadhunter, C., Morabito, L.K., Adams, E.A.K., Adebahr, B., de Blok, W.J.G., de Gasperin, F., Drabent, A., Hess, K.M., Ivashina, M.V., Kutkin, A., Mika, Á.M., Oostrum, L.C., Shimwell, T.W., van der Hulst, J.M., van Leeuwen, J., van Weeren, R.J., Vohl, D., and Ziemke, J.
A&A 664, A25 (2022)
10.1051/0004-6361/202243174

A numerical study of 21-cm signal suppression and noise increase in direction-dependent calibration of LOFAR data
Mevius, M., Mertens, F., Koopmans, L.V.E., Offringa, A.R., Yatawatta, S., Brentjens, M.A., Chapman, E., Ciardi, B., Gan, H., Gehlot, B.K., Ghara, R., Ghosh, A., Giri, S.K., Iliev, I.T., Mellema, G., Pandey, V.N., and Zaroubi, S.
MNRAS 509, 3693 (2022)
10.1093/mnras/stab3233

Sub-arcsecond imaging with the International LOFAR Telescope. I. Foundational calibration strategy and pipeline
Morabito, L.K., Jackson, N.J., Mooney, S., Sweijen, F., Badole, S., Kukreti, P., Venkattu, D., Groeneveld, C., Kappes, A., Bonnassieux, E., Drabent, A., Iacobelli, M., Croston, J.H., Best, P.N., Bondi, M., Callingham, J.R., Conway, J.E., Deller, A.T., Hardcastle, M.J., McKean, J.P., Miley, G.K., Moldon, J., Röttgering, H.J.A., Tasse, C., Shimwell, T.W., van Weeren, R.J., Anderson, J.M., Asgekar, A., Avruch, I.M., van Bemmel, I.M., Bentum, M.J., Bonafede, A., Brouw, W.N., Butcher, H.R., Ciardi, B., Corstanje, A., Coolen, A., Damstra, S., de Gasperin, F., Duscha, S., Eislöffel, J., Engels, D., Falcke, H., Garrett, M.A., Griessmeier, J., Gunst, A.W., van Haarlem, M.P., Hoeft, M., van der Horst, A.J., Jütte, E., Kadler, M., Koopmans, L.V.E., Krankowski, A., Mann, G., Nelles, A., Oonk, J.B.R., Orru, E., Paas, H., Pandey, V.N., Pizzo, R.F., Pandey-Pommier, M., Reich, W., Rothkaehl, H., Ruiter, M., Schwarz, D.J., Shulevski, A., Soida, M., Tagger, M., Vocks, C., Wijers, R.A.M.J., Wijnholds, S.J., Wucknitz, O., Zarka, P., and Zucca, P.
A&A 658, A1 (2022)
10.1051/0004-6361/202140649

Identifying active galactic nuclei via brightness temperature with sub-arcsecond international LOFAR telescope observations
Morabito, L.K., Sweijen, F., Radcliffe, J.F., Best, P.N., Kondapally, R., Bondi, M., Bonato, M., Duncan, K.J., Prandoni, I., Shimwell, T.W., Williams, W.L., van Weeren, R.J., Conway, J.E., and Calistro Rivera, G.
MNRAS 515, 5758 (2022)
10.1093/mnras/stac2129

The redshift evolution of extragalactic magnetic fields
Pomakov, V.P., O'Sullivan, S.P., Brüggen, M., Vazza, F., Carretti, E., Heald, G.H., Horellou, C., Shimwell, T., Shulevski, A., and Vernstrom, T.
MNRAS 515, 256 (2022)
10.1093/mnras/stac1805

Sub-arcsecond LOFAR imaging of Arp 299 at 150 MHz. Tracing the nuclear and diffuse extended emission of a bright LIRG
Ramírez-Olivencia, N., Varenius, E., Pérez-Torres, M., Alberdi, A., Conway, J.E., Alonso-Herrero, A., Pereira-Santaella, M., and Herrero-Illana, R.
A&A 658, A4 (2022)
10.1051/0004-6361/202140822

The LOFAR Two-metre Sky Survey. V. Second data release
Shimwell, T.W., Hardcastle, M.J., Tasse, C., Best, P.N., Röttgering, H.J.A., Williams, W.L., Botteon, A., Drabent, A., Mechev, A., Shulevski, A., van Weeren, R.J., Bester, L., Brüggen, M., Brunetti, G., Callingham, J.R., Chyży, K.T., Conway, J.E., Dijkema, T.J., Duncan, K., de Gasperin, F., Hale, C.L., Haverkorn, M., Hugo, B., Jackson, N., Mevius, M., Miley, G.K., Morabito, L.K., Morganti, R., Offringa, A., Oonk, J.B.R., Rafferty, D., Sabater, J., Smith, D.J.B., Schwarz, D.J., Smirnov, O., O'Sullivan, S.P., Vedantham, H., White, G.J., Albert, J.G., Alegre, L., Asabere, B., Bacon, D.J., Bonafede, A., Bonnassieux, E., Brienza, M., Bilicki, M., Bonato, M., Calistro Rivera, G., Cassano, R., Cochrane, R., Croston, J.H., Cuciti, V., Dallacasa, D., Danezi, A., Dettmar, R.J., Di Gennaro, G., Edler, H.W., Enßlin, T.A., Emig, K.L., Franzen, T.M.O., García-Vergara, C., Grange, Y.G., Gürkan, G., Hajduk, M., Heald, G., Heesen, V., Hoang, D.N., Hoeft, M., Horellou, C., Iacobelli, M., Jamrozy, M., Jelić, V., Kondapally, R., Kukreti, P., Kunert-Bajraszewska, M., Magliocchetti, M., Mahatma, V., Małek, K., Mandal, S., Massaro, F., Meyer-Zhao, Z., Mingo, B., Mostert, R.I.J., Nair, D.G., Nakoneczny, S.J., Nikiel-Wroczyński, B., Orrú, E., Pajdosz-Śmierciak, U., Pasini, T., Prandoni, I., van Piggelen, H.E., Rajpurohit, K., Retana-Montenegro, E., Riseley, C.J., Rowlinson, A., Saxena, A., Schrijvers, C., Sweijen, F., Siewert, T.M., Timmerman, R., Vaccari, M., Vink, J., West, J.L., Wołowska, A., Zhang, X., and Zheng, J.
A&A 659, A1 (2022)
10.1051/0004-6361/202142484

International authors (LOFAR)

A machine-learning classifier for LOFAR radio galaxy cross-matching techniques
Alegre, L., Sabater, J., Best, P., Mostert, R.I.J., Williams, W.L., Gürkan, G., Hardcastle, M.J., Kondapally, R., Shimwell, T.W., and Smith, D.J.B.
MNRAS 516, 4716 (2022)
10.1093/mnras/stac1888

Possible discovery of Calvera's supernova remnant
Arias, M., Botteon, A., Bassa, C.G., van der Jagt, S., van Weeren, R.J., O'Sullivan, S.P., Bosschaart, Q., Dullaart, R.S., Hardcastle, M.J., Hessels, J.W.T., Shimwell, T., Slob, M.M., Sturm, J.A., Tasse, C., Theijssen, N.C.M.A., and Vink, J.
A&A 667, A71 (2022)
10.1051/0004-6361/202244369

Physical Parameters of the Hot Spot A of the Radio Galaxy Cygnus A
Artyukh, V.S.
Astronomy Reports 66, 306 (2022)
10.1134/S1063772922050018

Tracking a Beam of Electrons from the Low Solar Corona into Interplanetary Space with the Low Frequency Array, Parker Solar Probe, and 1 au Spacecraft
Badman, S.T., Carley, E., Cañizares, L.A., Dresing, N., Jian, L.K., Lario, D., Gallagher, P.T., Martínez Oliveros, J.C., Pulupa, M., and Bale, S.D.
ApJ 938, 95 (2022)
10.3847/1538-4357/ac90c2

The application of ridgelines in extended radio source cross-identification
Barkus, B., Croston, J.H., Piotrowska, J., Mingo, B., Best, P.N., Hardcastle, M.J., Mostert, R.I.J., Röttgering, H.J.A., Sabater, J., Webster, B., and Williams, W.L.
MNRAS 509, 1 (2022)
10.1093/mnras/stab2952

SKA-low intensity mapping pathfinder updates: deeper 21 cm power spectrum limits from improved analysis frameworks
Barry, N., Bernardi, G., Greig, B., Kern, N., and Mertens, F.
JATIS 8, 11007 (2022)
10.1117/1.JATIS.8.1.011007

"Winged" Radio Sources from the LOFAR Two-meter Sky Survey First Data Release (LoTSS DR1)
Bera, S., Sasmal, T.K., Patra, D., and Mondal, S.
ApJSS 260, 7 (2022)
10.3847/1538-4365/ac5cc4

The Coma Cluster at LOFAR Frequencies. II. The Halo, Relic, and a New Accretion Relic
Bonafede, A., Brunetti, G., Rudnick, L., Vazza, F., Bourdin, H., Giovannini, G., Shimwell, T.W., Zhang, X., Mazzotta, P., Simionescu, A., Biava, N., Bonnassieux, E., Brienza, M., Brüggen, M., Rajpurohit, K., Riseley, C.J., Stuardi, C., Feretti, L., Tasse, C., Botteon, A., Carretti, E., Cassano, R., Cuciti, V., de Gasperin, F., Gastaldello, F., Rossetti, M., Rottgering, H.J.A., Venturi, T., and van Weeren, R.J.
ApJ 933, 218 (2022)
10.3847/1538-4357/ac721d

Spectral analysis of spatially resolved 3C295 (sub-arcsecond resolution) with the International LOFAR Telescope
Bonnassieux, E., Sweijen, F., Brienza, M., Rajpurohit, K., John Riseley, C., Bonafede, A., Jackson, N., Morabito, L.K., Brunetti, G., Harwood, J., Kappes, A., Rottgering, H.J., Tasse, C., and van Weeren, R.
A&A 658, A10 (2022)
10.1051/0004-6361/202141731

The Planck clusters in the LOFAR sky. I. LoTSS-DR2: New detections and sample overview
Botteon, A., Shimwell, T.W., Cassano, R., Cuciti, V., Zhang, X., Bruno, L., Camillini, L., Natale, R., Jones, A., Gastaldello, F., Simionescu, A., Rossetti, M., Akamatsu, H., van

Weeren, R.J., Brunetti, G., Brüggen, M., Groeneveld, C., Hoang, D.N., Hardcastle, M.J., Ignesti, A., Di Gennaro, G., Bonafede, A., Drabent, A., Röttgering, H.J.A., Hoeft, M., and de Gasperin, F.
A&A 660, A78 (2022)
10.1051/0004-6361/202143020

Magnetic fields and relativistic electrons fill entire galaxy cluster
Botteon, A., van Weeren, R.J., Brunetti, G., Vazza, F., Shimwell, T.W., Brüggen, M., Röttgering, H.J.A., de Gasperin, F., Akamatsu, H., Bonafede, A., Cassano, R., Cuciti, V., Dallacasa, D., Di Gennaro, G., and Gastaldello, F.
ScienceA 8, eabq7623 (2022)
10.1126/sciadv.abq7623

The galaxy group NGC 507: Newly detected AGN remnant plasma transported by sloshing
Brienza, M., Lovisari, L., Rajpurohit, K., Bonafede, A., Gastaldello, F., Murgia, M., Vazza, F., Bonnassieux, E., Botteon, A., Brunetti, G., Drabent, A., Hardcastle, M.J., Pasini, T., Riseley, C.J., Röttgering, H.J.A., Shimwell, T., Simionescu, A., and van Weeren, R.J.
A&A 661, A92 (2022)
10.1051/0004-6361/202142579

IGR J18249-3243: a new GeV-emitting FR II and the emerging population of high-energy radio galaxies
Bruni, G., Bassani, L., Persic, M., Rephaeli, Y., Malizia, A., Molina, M., Fiocchi, M., Ricci, R., Wieringa, M.H., Giroletti, M., Panessa, F., Bazzano, A., and Ubertini, P.
MNRAS 513, 886 (2022)
10.1093/mnras/stac865

The eROSITA Final Equatorial-Depth Survey (eFEDS). Galaxy clusters and groups in disguise
Bulbul, E., Liu, A., Pasini, T., Comparat, J., Hoang, D.N., Klein, M., Ghirardini, V., Salvato, M., Merloni, A., Seppi, R., Wolf, J., Anderson, S.F., Bahar, Y.E., Brusa, M., Brüggen, M., Buchner, J., Dwelly, T., Ibarra-Medel, H., Ider Chitham, J., Liu, T., Nandra, K., Ramos-Ceja, M.E., Sanders, J.S., and Shen, Y.
A&A 661, A10 (2022)
10.1051/0004-6361/202142460

The LOFAR view of giant, early-type galaxies: Radio emission from active nuclei and star formation
Capetti, A., Brienza, M., Balmaverde, B., Best, P.N., Baldi, R.D., Drabent, A., Gürkan, G., Rottgering, H.J.A., Tasse, C., and Webster, B.
A&A 660, A93 (2022)
10.1051/0004-6361/202142911

Multiwavelength Analysis of A1240, the Double Radio-relic Merging Galaxy Cluster Embedded in an 80 Mpc-long Cosmic Filament
Cho, H., James Jee, M., Smith, R., Finner, K., and Lee, W.
ApJ 925, 68 (2022)
10.3847/1538-4357/ac36c8

LOFAR detection of faint radio emission from the supernova remnant SRGe J0023+3625 = G116.6-26.1: probing the Milky Way synchrotron halo
Churazov, E.M., Khabibullin, I.I., Bykov, A.M., Chugai, N.N., Sunyaev, R.A., and Zinchenko, I.I.
MNRAS 513, L83 (2022)
10.1093/mnrasl/slac039

Testing afterglow models of FRB 200428 with early post-burst observations of SGR 1935 + 2154
Cooper, A.J., Rowlinson, A., Wijers, R.A.M.J., Bassa, C., Gourdji, K., Hessels, J., van der Horst, A.J., Kondratiev, V., Michilli, D., Pleunis, Z., Shimwell, T., and ter Veen, S.
MNRAS 517, 5483 (2022)
10.1093/mnras/stac2951

Galaxy clusters enveloped by vast volumes of relativistic electrons
Cuciti, V., de Gasperin, F., Brüggen, M., Vazza, F., Brunetti, G., Shimwell, T.W., Edler, H.W., van Weeren, R.J., Botteon, A., Cassano, R., Di Gennaro, G., Gastaldello, F., Drabent, A., Röttgering, H.J.A., and Tasse, C.
Nature 609, 911 (2022)
10.1038/s41586-022-05149-3

Barbell-shaped giant radio galaxy with ~100 kpc kink in the jet
Dabhade, P., Shimwell, T.W., Bagchi, J., Saikia, D.J., Combes, F., Gaikwad, M., Röttgering, H.J.A., Mohapatra, A., Ishwara-Chandra, C.H., Intema, H.T., and Raychaudhury, S.
A&A 668, A64 (2022)
10.1051/0004-6361/202243182

Radio AGN in nearby dwarf galaxies: the important role of AGN in dwarf galaxy evolution
Davis, F., Kaviraj, S., Hardcastle, M.J., Martin, G., Jackson, R.A., Kraljic, K., Malek, K., Peirani, S., Smith, D.J.B., Volonteri, M., and Wang, L.
MNRAS 511, 4109 (2022)
10.1093/mnras/stac068

Deep study of A399-401: Application of a wide-field facet calibration
de Jong, J.M.G.H.J., van Weeren, R.J., Botteon, A., Oonk, J.B.R., Brunetti, G., Shimwell, T.W., Cassano, R., Röttgering, H.J.A., and Tasse, C.
A&A 668, A107 (2022)
10.1051/0004-6361/202244346

Characteristics of remnant radio galaxies detected in deep radio continuum observations from SKA pathfinders
Dutta, S., Singh, V., Chandra, C.H.I., Wadadekar, Y., and Kayal, A.
J. Astrophys. Astron. 43, 96 (2022)
10.1007/s12036-022-09883-y

Abell 1033: Radio halo and gently reenergized tail at 54 MHz
Edler, H.W., de Gasperin, F., Brunetti, G., Botteon, A., Cuciti, V., van Weeren, R.J., Cassano, R., Shimwell, T.W., Brüggen, M., and Drabent, A.
A&A 666, A3 (2022)
10.1051/0004-6361/202243737

Updated constraints on WIMP dark matter annihilation by radio observations of M31
Egorov, A.E.
Phys. Rev. D 106, 23023 (2022)
10.1103/PhysRevD.106.023023

Filamentary structures of ionized gas in Cygnus X
Emig, K.L., White, G.J., Salas, P., Karim, R.L., van Weeren, R.J., Teuben, P.J., Zavagno, A., Chiu, P., Haverkorn, M., Oonk, J.B.R., Orrú, E., Polderman, I.M., Reich, W., Röttgering, H.J.A., and Tielens, A.G.G.M.
A&A 664, A88 (2022)
10.1051/0004-6361/202142596

Radio and far-IR emission associated with a massive star-forming galaxy candidate at $z \simeq 6.8$: a radio-loud AGN in the reionization era?
Endsley, R., Stark, D.P., Fan, X., Smit, R., Wang, F., Yang, J., Hainline, K., Lyu, J., Bouwens, R., and Schouws, S.
MNRAS 512, 4248 (2022)
10.1093/mnras/stac737

Faraday tomography of LoTSS-DR2 data. I. Faraday moments in the high-latitude outer Galaxy and revealing Loop III in polarisation
Erceg, A., Jelić, V., Haverkorn, M., Bracco, A., Shimwell, T.W., Tasse, C., Dickey, J.M., Ceraj, L., Drabent, A., Hardcastle, M.J., and Turić, L.
A&A 663, A7 (2022)
10.1051/0004-6361/202142244

The scintillating tail of comet C/2020 F3 (Neowise)
Fallows, R.A., Forte, B., Mevius, M., Brentjens, M.A., Bassa, C.G., Bisi, M.M., Offringa, A., Shaifullah, G., Tiburzi, C., Vedantham, H., and Zucca, P.
A&A 667, A57 (2022)
10.1051/0004-6361/202244377

Interpretation of Radio Wave Scintillation Observed through LOFAR Radio Telescopes
Forte, B., Fallows, R.A., Bisi, M.M., Zhang, J., Krankowski, A., Dabrowski, B., Rothkaehl, H., and Vocks, C.
ApJSS 263, 36 (2022)
10.3847/1538-4365/ac6deb

Probing the megaparsec-scale environment of hyperluminous infrared galaxies at $2 < z < 4$
Gao, F., Wang, L., Ramos Padilla, A.F., Clements, D., Farrah, D., and Huang, T.
A&A 668, A54 (2022)
10.1051/0004-6361/202244072

Is Jet Re-orientation the Elusive Trigger for Star Formation Suppression in Radio Galaxies?
Garofalo, D., Moravec, E., Macconi, D., and Singh, C.B.
PASP 134, 114101 (2022)
10.1088/1538-3873/ac9714

Discovery of 24 radio-bright quasars at 4.9 ≤ z ≤ 6.6 using low-frequency radio observations
Gloudemans, A.J., Duncan, K.J., Saxena, A., Harikane, Y., Hill, G.J., Zeimann, G.R., Röttgering, H.J.A., Yang, D., Best, P.N., Bañados, E., Drabent, A., Hardcastle, M.J., Hennawi, J.F., Lansbury, G., Magliocchetti, M., Miley, G.K., Nanni, R., Shimwell, T.W., Smith, D.J.B., Venemans, B.P., and Wagenveld, J.D.
A&A 668, A27 (2022)
10.1051/0004-6361/202244763

X-shaped radio galaxy 3C 223.1: A `double boomerang' with an anomalous spectral gradient
Gopal Krishna and Dabhade, P.
A&A 663, L8 (2022)
10.1051/0004-6361/202244113

Sizes and Shapes of Sources in Solar Metric Radio Bursts
Gordovskyy, M., Kontar, E.P., Clarkson, D.L., Chrysaphi, N., and Browning, P.K.
ApJ 925, 140 (2022)
10.3847/1538-4357/ac3bb7

Searching for low radio-frequency gravitational wave counterparts in wide-field LOFAR data
Gourdji, K., Rowlinson, A., Wijers, R.A.M.J., Broderick, J.W., Shulevski, A., and Jonker, P.G.
MNRAS 509, 5018 (2022)
10.1093/mnras/stab3197

Pushing sub-arcsecond resolution imaging down to 30 MHz with the trans-European International LOFAR Telescope
Groeneveld, C., van Weeren, R.J., Miley, G.K., Morabito, L.K., de Gasperin, F., Callingham, J.R., Sweijen, F., Brüggen, M., Botteon, A., Offringa, A., Brunetti, G., Moldon, J., Bondi, M., Kappes, A., and Röttgering, H.J.A.
A&A 658, A9 (2022)
10.1051/0004-6361/202141352

Radio detection of chemically peculiar stars with LOFAR
Hajduk, M., Leto, P., Vedantham, H., Trigilio, C., Haverkorn, M., Shimwell, T., Callingham, J.R., and White, G.J.
A&A 665, A152 (2022)
10.1051/0004-6361/202243784

The resolved jet of 3C 273 at 150 MHz. Sub-arcsecond imaging with the LOFAR international baselines
Harwood, J.J., Mooney, S., Morabito, L.K., Quinn, J., Sweijen, F., Groeneveld, C., Bonnassieux, E., Kappes, A., and Moldon, J.
A&A 658, A8 (2022)
10.1051/0004-6361/202141579

CHANG-ES XXIII: influence of a galactic wind in NGC 5775
Heald, G.H., Heesen, V., Sridhar, S.S., Beck, R., Bomans, D.J., Brüggen, M., Chyży, K.T., Damas-Segovia, A., Dettmar, R.-J., English, J., Henriksen, R., Ideguchi, S., Irwin, J., Krause, M., Li, J.-T., Murphy, E.J., Nikiel-Wroczyński, B., Piotrowska, J., Rand, R.J., Shimwell, T., Stein, Y., Vargas, C.J., Wang, Q.D., van Weeren, R.J., and Wiegert, T.
MNRAS 509, 658 (2022)
10.1093/mnras/stab2804

Diffuse radio emission from non-Planck galaxy clusters in the LoTSS-DR2 fields
Hoang, D.N., Brüggen, M., Botteon, A., Shimwell, T.W., Zhang, X., Bonafede, A., Bruno, L., Bonnassieux, E., Cassano, R., Cuciti, V., Drabent, A., de Gasperin, F., Gastaldello, F., Di Gennaro, G., Hoeft, M., Jones, A., Pignataro, G.V., Röttgering, H.J.A., Simionescu, A., and van Weeren, R.J.
A&A 665, A60 (2022)
10.1051/0004-6361/202243105

The Galactic Faraday rotation sky 2020
Hutschenreuter, S., Anderson, C.S., Betti, S., Bower, G.C., Brown, J.-A., Brüggen, M., Carretti, E., Clarke, T., Clegg, A., Costa, A., Croft, S., Van Eck, C., Gaensler, B.M., de Gasperin, F., Haverkorn, M., Heald, G., Hull, C.L.H., Inoue, M., Johnston-Hollitt, M., Kaczmarek, J., Law, C., Ma, Y.K., MacMahon, D., Mao, S.A., Riseley, C., Roy, S., Shanahan, R., Shimwell, T., Stil, J., Sobey, C., O'Sullivan, S.P., Tasse, C., Vacca, V., Vernstrom, T., Williams, P.K.G., Wright, M., and Enßlin, T.A.
A&A 657, A43 (2022)
10.1051/0004-6361/202140486

A LOFAR view into the stormy environment of the galaxy cluster 2A0335+096
Ignesti, A., Brunetti, G., Shimwell, T., Gitti, M., Birzan, L., Botteon, A., Brüggen, M., de Gasperin, F., Di Gennaro, G., Edge, A.C., Riseley, C.J., Röttgering, H.J.A., and van Weeren, R.J.
A&A 659, A20 (2022)
10.1051/0004-6361/202142549

Walk on the Low Side: LOFAR Explores the Low-frequency Radio Emission of GASP Jellyfish Galaxies
Ignesti, A., Vulcani, B., Poggianti, B.M., Moretti, A., Shimwell, T., Botteon, A., van Weeren, R.J., Roberts, I.D., Fritz, J., Tomičić, N., Peluso, G., Paladino, R., Gitti, M., Müller, A., McGee, S., and Gullieuszik, M.
ApJ 937, 58 (2022)
10.3847/1538-4357/ac8cf6

GASP XXXVIII: The LOFAR-MeerKAT-VLA View on the Nonthermal Side of a Jellyfish Galaxy
Ignesti, A., Vulcani, B., Poggianti, B.M., Paladino, R., Shimwell, T., Healy, J., Gitti, M., Bacchini, C., Moretti, A., Radovich, M., van Weeren, R.J., Roberts, I.D., Botteon, A., Müller, A., McGee, S., Fritz, J., Tomičić, N., Werle, A., Mingozzi, M., Gullieuszik, M., and Verheijen, M.
ApJ 924, 64 (2022)
10.3847/1538-4357/ac32ce

Sub-arcsecond imaging with the International LOFAR Telescope. II. Completion of the LOFAR Long-Baseline Calibrator Survey
Jackson, N., Badole, S., Morgan, J., Chhetri, R., Prūsis, K., Nikolajevs, A., Morabito, L., Brentjens, M., Sweijen, F., Iacobelli, M., Orrù, E., Sluman, J., Blaauw, R., Mulder, H., van Dijk, P., Mooney, S., Deller, A., Moldon, J., Callingham, J.R., Harwood, J., Hardcastle, M., Heald, G., Drabent, A., McKean, J.P., Asgekar, A., Avruch, I.M., Bentum, M.J., Bonafede, A., Brouw, W.N., Brüggen, M., Butcher, H.R., Ciardi, B., Coolen, A., Corstanje, A., Damstra, S., Duscha, S., Eislöffel, J., Falcke, H., Garrett, M., de Gasperin, F., Griessmeier, J.-M., Gunst, A.W., van Haarlem, M.P., Hoeft, M., van der Horst, A.J., Jütte, E., Koopmans, L.V.E., Krankowski, A., Maat, P., Mann, G., Miley, G.K., Nelles, A., Norden, M., Paas, M., Pandey, V.N., Pandey-Pommier, M., Pizzo, R.F., Reich, W., Rothkaehl, H., Rowlinson, A., Ruiter, M., Shulevski, A., Schwarz, D.J., Smirnov, O., Tagger, M., Vocks, C., van Weeren, R.J., Wijers, R., Wucknitz, O., Zarka, P., Zensus, J.A., and Zucca, P.
A&A 658, A2 (2022)
10.1051/0004-6361/202140756

Subarcsecond view on the high-redshift blazar GB 1508+5714 by the International LOFAR Telescope
Kappes, A., Burd, P.R., Kadler, M., Ghisellini, G., Bonnassieux, E., Perucho, M., Brüggen, M., Cheung, C.C., Ciardi, B., Gallo, E., Haardt, F., Morabito, L.K., Sbarrato, T., Drabent, A., Harwood, J., Jackson, N., and Moldon, J.
A&A 663, A44 (2022)
10.1051/0004-6361/202141720

Detection of radio-AGN in dust-obscured galaxies using deep uGMRT radio continuum observations
Kayal, A., Singh, V., Chandra, C.H.I., Wadadekar, Y., and Dutta, S.
J. Astrophys. Astron. 43, 84 (2022)
10.1007/s12036-022-09873-0

Cosmic evolution of low-excitation radio galaxies in the LOFAR two-metre sky survey deep fields
Kondapally, R., Best, P.N., Cochrane, R.K., Sabater, J., Duncan, K.J., Hardcastle, M.J., Haskell, P., Mingo, B., Röttgering, H.J.A., Smith, D.J.B., Williams, W.L., Bonato, M., Calistro Rivera, G., Gao, F., Hale, C.L., Małek, K., Miley, G.K., Prandoni, I., and Wang, L.
MNRAS 513, 3742 (2022)
10.1093/mnras/stac1128

Unmasking the history of 3C 293 with LOFAR sub-arcsecond imaging
Kukreti, P., Morganti, R., Shimwell, T.W., Morabito, L.K., Beswick, R.J., Brienza, M., Hardcastle, M.J., Sweijen, F., Jackson, N., Miley, G.K., Moldon, J., Oosterloo, T., and de Gasperin, F.
A&A 658, A6 (2022)
10.1051/0004-6361/202140814

Continuum source catalog for the first APERTIF data release
Kutkin, A.M., Oosterloo, T.A., Morganti, R., Adams, E.A.K., Mancini, M., Adebahr, B., de Blok, W.J.G., Dénes, H., Hess, K.M., van der Hulst, J.M., Lucero, D.M., Moss, V.A., Berger, A., van den Brink, R., van Cappellen, W.A., Connor, L., Damstra, S., Loose, G.M., van Leeuwen, J., Maan, Y., Mika, Á., Norden, M.J., Offringa, A.R., Oostrum, L.C.,

van der Schuur, D., Vohl, D., Wijnholds, S.J., and Ziemke, J.
A&A 667, A39 (2022)
10.1051/0004-6361/202244008

Interferometric Imaging, and Beam-Formed Study of a Moving Type-IV Radio Burst with LOFAR
Liu, H., Zucca, P., Cho, K.-S., Kumari, A., Zhang, P., Magdalenić, J., Kim, R.-S., Kim, S., and Kang, J.
Solar Physics 297, 115 (2022)
10.1007/s11207-022-02042-0

LOFAR Observations of Lightning Initial Breakdown Pulses
Liu, N.Y., Scholten, O., Hare, B.M., Dwyer, J.R., Sterpka, C.F., Kolmašová, I., and Santolík, O.
Geopohys. Res. L. 49, e98073 (2022)
10.1029/2022GL098073

Exploring the Radio Spectral Energy Distribution of the Ultraluminous Radio-quiet Quasar SDSS J0100+2802 at Redshift 6.3
Liu, Y., Wang, R., Momjian, E., Wagg, J., Yang, X., An, T., Shao, Y., Carilli, C.L., Wu, X.-B., Fan, X., Walter, F., Jiang, L., Li, Q., Li, J., Fei, Q., and Xu, F.
ApJ 929, 69 (2022)
10.3847/1538-4357/ac5c50

The Relationship of Lightning Radio Pulse Amplitudes and Source Altitudes as Observed by LOFAR
Machado, J.G.O., Hare, B.M., Scholten, O., Buitink, S., Corstanje, A., Falcke, H., Hörandel, J.R., Huege, T., Krampah, G.K., Mitra, P., Mulrey, K., Nelles, A., Pandya, H., Rachen, J.P., Thoudam, S., Trinh, T.N.G., ter Veen, S., and Winchen, T.
E&SS 9, e01958 (2022)
10.1029/2021EA001958

Search and analysis of giant radio galaxies with associated nuclei (SAGAN). III. New insights into giant radio quasars
Mahato, M., Dabhade, P., Saikia, D.J., Combes, F., Bagchi, J., Ho, L.C., and Raychaudhury, S.
A&A 660, A59 (2022)
10.1051/0004-6361/202141928

Central star formation in double-peak, gas-rich radio galaxies
Maschmann, D., Melchior, A.-L., Combes, F., Mazzilli Ciraulo, B., Freundlich, J., Halle, A., and Drabent, A.
A&A 664, A125 (2022)
10.1051/0004-6361/202142218

The LOFAR Two-metre Sky Survey Deep fields. The mass dependence of the far-infrared radio correlation at 150 MHz using deblended Herschel fluxes
McCheyne, I., Oliver, S., Sargent, M., Kondapally, R., Smith, D., Haskell, P., Duncan, K., Best, P.N., Sabater, J., Bonato, M., Calistro Rivera, G., Cochrane, R.K., Campos Varillas, M.C., Hurley, P., Leslie, S.K., Małek, K., Magliocchetti, M., Prandoni, I., Read, S.,

Rottgering, H.J.A., Tasse, C., Vaccari, M., and Wang, L.
A&A 662, A100 (2022)
10.1051/0004-6361/202141307

Learning to detect radio frequency interference in radio astronomy without seeing it
Mesarcik, M., Boonstra, A.-J., Ranguelova, E., and van Nieuwpoort, R.V.
MNRAS 516, 5367 (2022)
10.1093/mnras/stac2503

Accretion mode versus radio morphology in the LOFAR Deep Fields
Mingo, B., Croston, J.H., Best, P.N., Duncan, K.J., Hardcastle, M.J., Kondapally, R., Prandoni, I., Sabater, J., Shimwell, T.W., Williams, W.L., Baldi, R.D., Bonato, M., Bondi, M., Dabhade, P., Gürkan, G., Ineson, J., Magliocchetti, M., Miley, G., Pierce, J.C.S., and Röttgering, H.J.A.
MNRAS 511, 3250 (2022)
10.1093/mnras/stac140

Late-time Evolution and Modeling of the Off-axis Gamma-Ray Burst Candidate FIRST J141918.9+394036
Mooley, K.P., Margalit, B., Law, C.J., Perley, D.A., Deller, A.T., Lazio, T.J.W., Bietenholz, M.F., Shimwell, T., Intema, H.T., Gaensler, B.M., Metzger, B.D., Dong, D.Z., Hallinan, G., Ofek, E.O., and Sironi, L.
ApJ 924, 16 (2022)
10.3847/1538-4357/ac3330

Exploring the Circular Polarisation of Low-Frequency Solar Radio Bursts with LOFAR
Morosan, D.E., Räsänen, J.E., Kumari, A., Kilpua, E.K.J., Bisi, M.M., Dabrowski, B., Krankowski, A., Magdalenić, J., Mann, G., Rothkaehl, H., Vocks, C., and Zucca, P.
Solar Physics 297, 47 (2022)
10.1007/s11207-022-01976-9

Radio source-component association for the LOFAR Two-metre Sky Survey with region-based convolutional neural networks
Mostert, R.I.J., Duncan, K.J., Alegre, L., Röttgering, H.J.A., Williams, W.L., Best, P.N., Hardcastle, M.J., and Morganti, R.
A&A 668, A28 (2022)
10.1051/0004-6361/202243478

Star formation and AGN feedback in the local Universe: Combining LOFAR and MaNGA
Mulcahey, C.R., Leslie, S.K., Jackson, T.M., Young, J.E., Prandoni, I., Hardcastle, M.J., Roy, N., Małek, K., Magliocchetti, M., Bonato, M., Röttgering, H.J.A., and Drabent, A.
A&A 665, A144 (2022)
10.1051/0004-6361/202142215

The discovery of a radio galaxy of at least 5 Mpc
Oei, M.S.S.L., van Weeren, R.J., Hardcastle, M.J., Botteon, A., Shimwell, T.W., Dabhade, P., Gast, A.R.D.J.G.I.B., Röttgering, H.J.A., Brüggen, M., Tasse, C., Williams, W.L., and Shulevski, A.
A&A 660, A2 (2022)
10.1051/0004-6361/202142778

Measurement of the anisotropy power spectrum of the radio synchrotron background
Offringa, A.R., Singal, J., Heston, S., Horiuchi, S., and Lucero, D.M.
MNRAS 509, 114 (2022)
10.1093/mnras/stab2865

Pulsar emission beam geometry of radio broad-band Arecibo sources
Olszanski, T., Rankin, J., Venkataraman, A., and Wahl, H.
MNRAS 517, 1189 (2022)
10.1093/mnras/stac2397

LOFAR discovery of rare large FR I jets in the low-luminosity radio galaxy NGC 5322
Omar, A.
MNRAS 517, L81 (2022)
10.1093/mnrasl/slac114

Possible jet reorientation in low-frequency radio structures of blazars
Pajdosz-Śmierciak, U., Śmierciak, B., and Jamrozy, M.
MNRAS 514, 2122 (2022)
10.1093/mnras/stac1372

First optical identification of the SRG/eROSITA-detected supernova remnant G 116.6 - 26.1. I. Preliminary results
Palaiologou, E.V., Leonidaki, I., and Kopsacheili, M.
MNRAS 515, 339 (2022)
10.1093/mnras/stac1599

Possible Ongoing Merger Discovered by Photometry and Spectroscopy in the Field of the Galaxy Cluster PLCK G165.7+67.0
Pascale, M., Frye, B.L., Dai, L., Foo, N., Qin, Y., Leimbach, R., Bauer, A.M., Merlin, E., Coe, D., Diego, J., Yan, H., Zitrin, A., Cohen, S.H., Conselice, C.J., Dole, H., Harrington, K., Jansen, R.A., Kamieneski, P., Windhorst, R.A., and Yun, M.S.
ApJ 932, 85 (2022)
10.3847/1538-4357/ac6ce9

The eROSITA Final Equatorial-Depth Survey (eFEDS). LOFAR view of brightest cluster galaxies and AGN feedback
Pasini, T., Brüggen, M., Hoang, D.N., Ghirardini, V., Bulbul, E., Klein, M., Liu, A., Shimwell, T.W., Hardcastle, M.J., Williams, W.L., Botteon, A., Gastaldello, F., van Weeren, R.J., Merloni, A., de Gasperin, F., Bahar, Y.E., Pacaud, F., and Ramos-Ceja, M.
A&A 661, A13 (2022)
10.1051/0004-6361/202141211

Particle re-acceleration and diffuse radio sources in the galaxy cluster Abell 1550
Pasini, T., Edler, H.W., Brüggen, M., de Gasperin, F., Botteon, A., Rajpurohit, K., van Weeren, R.J., Gastaldello, F., Gaspari, M., Brunetti, G., Cuciti, V., Nanci, C., di Gennaro, G., Rossetti, M., Dallacasa, D., Hoang, D.N., and Riseley, C.J.
A&A 663, A105 (2022)
10.1051/0004-6361/202243833

Radio Spectra of Luminous, Heavily Obscured WISE-NVSS Selected Quasars
Patil, P., Whittle, M., Nyland, K., Lonsdale, C., Lacy, M., Kimball, A.E., Lonsdale, C., Peters, W., Clarke, T.E., Efstathiou, A., Giacintucci, S., Kim, M., Lanz, L., Mukherjee, D., and Polisensky, E.
ApJ 934, 26 (2022)
10.3847/1538-4357/ac71b0

Connecting radio emission to AGN wind properties with broad absorption line quasars
Petley, J.W., Morabito, L.K., Alexander, D.M., Rankine, A.L., Fawcett, V.A., Rosario, D.J., Matthews, J.H., Shimwell, T.M., and Drabent, A.
MNRAS 515, 5159 (2022)
10.1093/mnras/stac2067

Dust destruction and survival in the Cassiopeia A reverse shock
Priestley, F.D., Arias, M., Barlow, M.J., and De Looze, I.
MNRAS 509, 3163 (2022)
10.1093/mnras/stab3195

The Energetics of the Central Engine in the Powerful Quasar 3C 298
Punsly, B., Groeneveld, C., Hill, G.J., Marziani, P., Zeimann, G.R., and Schneider, D.P.
AJ 163, 194 (2022)
10.3847/1538-3881/ac5a4e

The thermal and non-thermal components within and between galaxy clusters Abell 399 and Abell 401
Radiconi, F., Vacca, V., Battistelli, E., Bonafede, A., Capalbo, V., Devlin, M.J., Di Mascolo, L., Feretti, L., Gallardo, P.A., Gill, A., Giovannini, G., Govoni, F., Guan, Y., Hilton, M., Hincks, A.D., Hughes, J.P., Iacobelli, M., Isopi, G., Loi, F., Moodley, K., Mroczkowski, T., Murgia, M., Orrú, E., Paladino, R., Partridge, B., Sarazin, C.L., Orlowski Scherer, J., Sifón, C., Vargas, C., Vazza, F., and Wollack, E.J.
MNRAS 517, 5232 (2022)
10.1093/mnras/stac3015

Deep Low-frequency Radio Observations of A2256. I. The Filamentary Radio Relic
Rajpurohit, K., van Weeren, R.J., Hoeft, M., Vazza, F., Brienza, M., Forman, W., Wittor, D., Domínguez-Fernández, P., Rajpurohit, S., Riseley, C.J., Botteon, A., Osinga, E., Brunetti, G., Bonnassieux, E., Bonafede, A., Rajpurohit, A.S., Stuardi, C., Drabent, A., Brüggen, M., Dallacasa, D., Shimwell, T.W., Röttgering, H.J.A., de Gasperin, F., Miley, G.K., and Rossetti, M.
ApJ 927, 80 (2022)
10.3847/1538-4357/ac4708

What is the origin of the stacked radio emission in radio-undetected quasars?. Insights from a radio-infrared image stacking analysis
Retana-Montenegro, E.
A&A 663, A153 (2022)
10.1051/0004-6361/202039750

A MeerKAT-meets-LOFAR study of MS 1455.0 + 2232: a 590 kiloparsec 'mini'-halo in a sloshing cool-core cluster
Riseley, C.J., Rajpurohit, K., Loi, F., Botteon, A., Timmerman, R., Biava, N., Bonafede, A., Bonnassieux, E., Brunetti, G., Enßlin, T., Di Gennaro, G., Ignesti, A., Shimwell, T., Stuardi, C., Vernstrom, T., and van Weeren, R.J.
MNRAS 512, 4210 (2022)
10.1093/mnras/stac672

LoTSS Jellyfish Galaxies. IV. Enhanced Star Formation on the Leading Half of Cluster Galaxies and Gas Compression in IC3949
Roberts, I.D., Lang, M., Trotsenko, D., Bemis, A.R., Ellison, S.L., Lin, L., Pan, H.-A., Ignesti, A., Leslie, S., and van Weeren, R.J.
ApJ 941, 77 (2022)
10.3847/1538-4357/ac9e9f

Arecibo-Green Bank-LOFAR Carbon Radio Recombination Line Observations toward Cold H I Clouds
Roshi, D.A., Peters, W.M., Emig, K.L., Salas, P., Oonk, J.B.R., Lebrón, M.E., and Dickey, J.M.
ApJ 925, 7 (2022)
10.3847/1538-4357/ac35d8

Intracluster Magnetic Filaments and an Encounter with a Radio Jet
Rudnick, L., Brüggen, M., Brunetti, G., Cotton, W.D., Forman, W., Jones, T.W., Nolting, C., Schellenberger, G., and van Weeren, R.
ApJ 935, 168 (2022)
10.3847/1538-4357/ac7c76

Miscellaneous radio galaxies from LOFAR survey
Sasmal, T.K., Bera, S., and Mondal, S.
Astron. Nachr. 343, e20210083 (2022)
10.1002/asna.20210083

Interferometric imaging of intensely radiating negative leaders
Scholten, O., Hare, B.M., Dwyer, J., Liu, N., Sterpka, C., Kolmašová, I., Santolík, O., Lán, R., Uhlíř, L., Buitink, S., Huege, T., Nelles, A., and ter Veen, S.
Phys. Rev. D 105, 62007 (2022)
10.1103/PhysRevD.105.062007

Characterization of the AARTFAAC-12 aperture array: radio source counts at 42 and 61 MHz
Shulevski, A., Franzen, T.M.O., Williams, W.L., Vernstrom, T., Gehlot, B.K., Kuiack, M., and Wijers, R.A.M.J.
MNRAS 513, 1036 (2022)
10.1093/mnras/stac881

Giant radio galaxies in the LOw-Frequency ARray Two-metre Sky Survey Boötes deep field
Simonte, M., Andernach, H., Brüggen, M., Schwarz, D.J., Prandoni, I., and Willis, A.G.
MNRAS 515, 2032 (2022)
10.1093/mnras/stac1911

Deep uGMRT observations of the ELAIS-North 1 field: statistical properties of radio-infrared relations up to z ~ 2
Sinha, A., Basu, A., Datta, A., and Chakraborty, A.
MNRAS 514, 4343 (2022)
10.1093/mnras/stac1504

Extragalactic peaked-spectrum radio sources at low frequencies are young radio galaxies
Slob, M.M., Callingham, J.R., Röttgering, H.J.A., Williams, W.L., Duncan, K.J., de Gasperin, F., Hardcastle, M.J., and Miley, G.K.
A&A 668, A186 (2022)
10.1051/0004-6361/202244651

Relic jet activity in 'Hanny's Voorwerp' revealed by the LOFAR two metre sky survey
Smith, D.J.B., Krause, M.G., Hardcastle, M.J., and Drake, A.B.
MNRAS 514, 3879 (2022)
10.1093/mnras/stac1568

A New Method to Constrain the Appearance and Disappearance of Observed Jellyfish Galaxy Tails
Smith, R., Shinn, J.-H., Tonnesen, S., Calderón-Castillo, P., Crossett, J., Jaffe, Y.L., Roberts, I., McGee, S., George, K., Vulcani, B., Gullieuszik, M., Moretti, A., Poggianti, B.M., and Shin, J.
ApJ 934, 86 (2022)
10.3847/1538-4357/ac7ab5

Searching for pulsars associated with polarised point sources using LOFAR: Initial discoveries from the TULIPP project
Sobey, C., Bassa, C.G., O'Sullivan, S.P., Callingham, J.R., Tan, C.M., Hessels, J.W.T., Kondratiev, V.I., Stappers, B.W., Tiburzi, C., Heald, G., Shimwell, T., Breton, R.P., Kirwan, M., Vedantham, H.K., Carretti, E., Grießmeier, J.-M., Haverkorn, M., and Karastergiou, A.
A&A 661, A87 (2022)
10.1051/0004-6361/202142636

Ultra-Slow Discharges That Precede Lightning Initiation
Sterpka, C., Dwyer, J., Liu, N., Demers, N., Hare, B.M., Scholten, O., and ter Veen, S.
Geopohys. Res. L. 49, e2022GL101597 (2022)
10.1029/2022GL101597

A robust RFI identification for radio interferometry based on a convolutional neural network
Sun, H., Deng, H., Wang, F., Mei, Y., Xu, T., Smirnov, O., Deng, L., and Wei, S.
MNRAS 512, 2025 (2022)
10.1093/mnras/stac570

High-resolution international LOFAR observations of 4C 43.15. Spectral ages and injection indices in a high-z radio galaxy
Sweijen, F., Morabito, L.K., Harwood, J., van Weeren, R.J., Röttgering, H.J.A., Callingham, J.R., Jackson, N., Miley, G., and Moldon, J.
A&A 658, A3 (2022)
10.1051/0004-6361/202039871

Deep sub-arcsecond wide-field imaging of the Lockman Hole field at 144 MHz
Sweijen, F., van Weeren, R.J., Röttgering, H.J.A., Morabito, L.K., Jackson, N., Offringa, A.R., van der Tol, S., Veenboer, B., Oonk, J.B.R., Best, P.N., Bondi, M., Shimwell, T.W., Tasse, C., and Thomson, A.P.
NatAs, 6 350 (2022)
10.1038/s41550-021-01573-z

Measuring cavity powers of active galactic nuclei in clusters using a hybrid X-ray-radio method. A new window on feedback opened by subarcsecond LOFAR-VLBI observations
Timmerman, R., van Weeren, R.J., Botteon, A., Röttgering, H.J.A., McNamara, B.R., Sweijen, F., Bîrzan, L., and Morabito, L.K.
A&A 668, A65 (2022)
10.1051/0004-6361/202243936

Origin of the ring structures in Hercules A. Sub-arcsecond 144 MHz to 7 GHz observations
Timmerman, R., van Weeren, R.J., Callingham, J.R., Cotton, W.D., Perley, R., Morabito, L.K., Gizani, N.A.B., Bridle, A.H., O'Dea, C.P., Baum, S.A., Tremblay, G.R., Kharb, P., Kassim, N.E., Röttgering, H.J.A., Botteon, A., Sweijen, F., Tasse, C., Brüggen, M., Moldon, J., Shimwell, T., and Brunetti, G.
A&A 658, A5 (2022)
10.1051/0004-6361/202140880

Galaxy Power Spectrum and Biasing Results from the LOFAR Two-meter Sky Survey (First Data Release)
Tiwari, P., Zhao, R., Zheng, J., Zhao, G.-B., Bacon, D., and Schwarz, D.J.
ApJ 928, 38 (2022)
10.3847/1538-4357/ac5748

Determining atmospheric electric fields using MGMR3D
Trinh, T.N.G., Scholten, O., Buitink, S., de Vries, K.D., Mitra, P., Phong Nguyen, T., and Si, D.T.
Phys. Rev. D 105, 63027 (2022)
10.1103/PhysRevD.105.063027

Puzzling large-scale polarization in the galaxy cluster Abell 523
Vacca, V., Govoni, F., Murgia, M., Perley, R.A., Feretti, L., Giovannini, G., Carretti, E., Gastaldello, F., Cova, F., Marchegiani, P., Battistelli, E., Boschin, W., Enßlin, T.A., Girardi, M., Loi, F., and Radiconi, F.
MNRAS 514, 4969 (2022)
10.1093/mnras/stac1421

Spectral study of the diffuse synchrotron source in the galaxy cluster Abell 523
Vacca, V., Shimwell, T., Perley, R.A., Govoni, F., Murgia, M., Feretti, L., Giovannini, G., Loi, F., Carretti, E., Cova, F., Gastaldello, F., Girardi, M., Enßlin, T., Akamatsu, H., Bonafede, A., Bonnassieux, E., Boschin, W., Botteon, A., Brunetti, G., Brüggen, M., Finoguenov, A., Hoang, D., Iacobelli, M., Orrú, E., Paladino, R., Röttgering, H., van Weeren, R., Vitello, F., and Wittor, D.
MNRAS 511, 3389 (2022)
10.1093/mnras/stac287

Peculiar Radio-X-Ray Relationship in Active Stars
Vedantham, H.K., Callingham, J.R., Shimwell, T.W., Benz, A.O., Hajduk, M., Ray, T.P., Tasse, C., and Drabent, A.
ApJ 926, L30 (2022)
10.3847/2041-8213/ac5115

Revealing new high-redshift quasar populations through Gaussian mixture model selection
Wagenveld, J.D., Saxena, A., Duncan, K.J., Röttgering, H.J.A., and Zhang, M.
A&A 660, A22 (2022)
10.1051/0004-6361/202142445

Pulsar scintillation studies with LOFAR. I. The census
Wu, Z., Verbiest, J.P.W., Main, R.A., Grießmeier, J.-M., Liu, Y., Osłowski, S., Moochickal Ambalappat, K., Nielsen, A.-S.B., Künsemöller, J., Donner, J.Y., Tiburzi, C., Porayko, N., Serylak, M., Künkel, L., Brüggen, M., and Vocks, C.
A&A 663, A116 (2022)
10.1051/0004-6361/202142980

Imaging of the Quiet Sun in the Frequency Range of 20-80 MHz
Zhang, P., Zucca, P., Kozarev, K., Carley, E., Wang, C., Franzen, T., Dabrowski, B., Krankowski, A., Magdalenic, J., and Vocks, C.
ApJ 932, 17 (2022)
10.3847/1538-4357/ac6b37

Geoscience, Publications in refereed journals 2022, using the infrastructure at the Onsala site

Swedish authors (Geoscience)

Combining VGOS, legacy S/X and GNSS for the determination of UT1
Diamantidis, K-P, Haas R, Varenius E, Schartner M, Matsumoto S
J. Geod. 96, 55 (2022)
10.1007/s00190-022-01648-3

The impact of estimating common tropospheric parameters for co-located VLBI radio telescopes on geodetic parameters during CONT17
Kitpracha, C, Nilsson T, Heinkelmann R, Balidakis K, Modiri S, Schuh H
Adv. Space Res. 69(9), 3227 (2022)
10.1016/j.asr.2022.02.013

Polarimetric GNSS-R Sea Level Monitoring using I/Q Interference Patterns at Different Antenna Configurations and Carrier Frequencies
Rajabi M, Hoseini M, Nahavandchi H, Semmling M, Ramatschi M, Goli M, Haas R, Wickert J
IEEE Trans. GRS 60, 1 (2022)
10.1109/TGRS.2021.3062492

Modeling gravimetric signatures of third-degree ocean tides and their detection in superconducting gravimeter records
Sulzbach R, Wziontek H, Hart-Davis M, Dobslaw H, Scherneck H-G, Van Camp M, Dahl Omang O C, Antokoletz E D, Voigt C, Dettmering D, Thomas M
J. Geod. 96, 35 (2022)
10.1007/s00190-022-01609-w

Broad band flux-density monitoring of radio sources with the Onsala twin telescopes
Varenius E, Maio F, Le Bail K, Haas R
Exp. Astron. 54, 137 (2022)
10.1007/s10686-022-09867-4

International authors (Geoscience)

Plate boundary deformation and volcano unrest at the Azores triple junction determined from continuous GPS measurements, 2002–2017
D'Araújo J, Sigmundsson F, Ferreira T, Okada J, Lorenzo M, Silva R
J. Geo. Res. (Solid Earth) 127, e2021JB023007 (2022)
10.1029/2021JB023007

Interseismic deformation in the Gulf of Aqaba from GPS measurements
Castro-Perdomo N, Viltres R, Masson F, Klinger Y, Liu S, Dhahry M, Ulrich P, Bernard J-D, Matrau R, Alothman A, Zahran H, Reilinger R, Mai P M, Jónsson S
Geophys. J. Int. 228(1), 477 (2022)
10.1093/gji/ggab353

Overview and Status of the International Celestial Reference Frame as Realized by VLBI
De Witt A, Charlot P, Gordon D, Jacobs C S
Universe 8(7), 374 (2022)
10.3390/universe8070374

The influence of groundwater levels on land subsidence in Karaman (Turkey) using the PS-InSAR technique
Gezgin C
Adv. Space Res. 70(11), 3568 (2022)
10.1016/j.asr.2022.08.003

Comparison of non-tidal loading data for application in a secular terrestrial reference frame.
Glomsda M, Bloßfeld M, Seitz M, Angermann D, Seitz F
Earth Planets Space 74, 87 (2022)
10.1186/s40623-022-01634-1

Effect of Geocenter Motion Induced by Ocean Tide Loading on Periodic Signals of GPS Position Time Series
Guo S, Shi C, Wei N et al.
J. Geod. and Geodynamics 42(8), 790 (2022)
10.14075/j.jgg.2022.08.004

Combined IVS Contribution to the ITRF2020
Hellmers H, Modiri S, Bachmann S, Thaller D, Bloßfeld M, Seitz M, Gipson J
In: International Association of Geodesy Symposia. Springer, Berlin, Heidelberg (2022)
10.1007/1345_2022_170

Prediction of IGS RTS Orbit Correction Using LSTM Network at the Time of IOD Change
Kim B, Kim J
Sensors 22(23), 9421 (2022)
10.3390/s22239421

Comparison and integration of CONT17 networks
Kwak Y, Glomsda M, Angermann D, Gerstl M
J. Geod. 96, 33 (2022)
10.1007/s00190-022-01610-3

Improvement of Coastal Sea-Level Altimetry Derived From GNSS SNR Measurements Using the SNR Forward Network and T-LSTM Anomaly Detection
Limsupavanich N, B. Guo G, Fu X
IEEE Trans. GRS 60, 1 (2022)
10.1109/TGRS.2022.3186239

Comparison of EOP and scale parameters estimated from the three simultaneous CONT17 VLBI observing networks
MacMillan D S
J. Geod. 96, 25 (2022)
10.1007/s00190-022-01611-2

Detection of a New Large Free Core Nutation Phase Jump
Malkin Z, Belda S, Modiri S
Sensors 22(16), 5960 (2022)
10.3390/s22165960

Adaptive neuro fuzzy inference system for predicting sub-daily Zenith Wet Delay
Mohammed J
Geodesy and Geodynamics 13(4), 352 (2022)
10.1016/j.geog.2021.10.005

Bestimmung flächenhafter vertikaler Landbewegungen entlang der deutschen Nord- und Ostseeküste.
Niemeier W, Riedel Anika, Tengen Dieter, Riedel Björn, Gerke Markus
In: Die Küste 91. Karlsruhe: Bundesanstalt für Wasserbau, P. 139 (2022)
10.18171/1.091102

Evaluation of the GSRM2.1 and the NUVEL1-A values in Europe using SLR and VLBI based geodetic velocity fields
Rahmani M, Nafisi V, Böhm S, Asgari J
Survey Review 54:385, 349 (2022)
10.1080/00396265.2021.1943633

Inter-Comparison of UT1-UTC from 24-Hour, Intensives, and VGOS Sessions during CONT17
Raut S, Heinkelmann R, Sadegh M, Belda S, Balikadis K, Schuh H
Sensors 22(7), 2740 (2022)
10.3390/s22072740

Variation Characteristics of Multi-Channel Differential Code Biases from New BDS-3 Signal Observations
Shi Q, Jin S
Remote Sensing 14(3), 594 (2022)
10.3390/rs14030594

Improving VLBI analysis by tropospheric ties in GNSS and VLBI integrated processing
Wang J, Ge M, Glaser S, Balidakis K, Heinkelmann R, Schuh H
J. Geod. 96, 32 (2022)
10.1007/s00190-022-01615-y

Towards operational multi-GNSS tropospheric products at GFZ Potsdam
Wilgan K, Dick G, Zus F, Wickert J
Atmos. Meas. Tech. 15, 21 (2022)
10.5194/amt-15-21-2022

Investigation of Precise Single-Frequency Time and Frequency Transfer with Galileo E1/E5a/E5b/E5/E6 Observations
Xu W, Yan C, Chen J
Remote Sensing 14(21), 5371 (2022)
10.3390/rs14215371

Galileo Time Transfer with Five-Frequency Uncombined PPP: A Posteriori Weighting, Inter-Frequency Bias, Precise Products and Multi-Frequency Contribution
Zhang Z, Pan L
Remote Sensing 14(11), 2538 (2022)
10.3390/rs14112538

Preliminary Analysis of Intersystem Biases in BDS-2/BDS-3 Precise Time and Frequency Transfer
Zhang P, Tu R, Tao K, Wang B, Gao Y, Lu X
Remote Sensing 14(18), 4594 (2022)
10.3390/rs14184594

Onsala 20 m telescope, single-dish observations, publications in refereed journals 2022

Swedish authors (OSO 20 m)

Multiple components in the molecular outflow of the red supergiant NML CygAndrews, H.,
De Beck, E., and Hirvonen, P.
MNRAS 510, 383 (2022)
10.1093/mnras/stab3244

Emission from HCN and CH_3OH in comets. Onsala 20-m observations and radiative transfer modelling
Bergman, P., Lerner, M.S., Olofsson, A.O.H., Wirström, E., Black, J.H., Bjerkeli, P., Parra, R., and Torstensson, K.
A&A 660, A118 (2022)
10.1051/0004-6361/202142583

Expanding shells around young clusters - S 171/Be 59
Gahm, G.F., Wilhelm, M.J.C., Persson, C.M., Djupvik, A.A., and Portegies Zwart, S.F.
A&A 663, A111 (2022)
10.1051/0004-6361/202142927

Spectral-line Survey of the Region of Massive Star Formation W51e1/e2 in the 4 mm Wavelength Range
Kalenskii, S.V., Kaiser, R.I., Bergman, P., Olofsson, A.O.H., Degtyarev, K.D., and Golysheva, P.
ApJ 932, 5 (2022)
10.3847/1538-4357/ac63ce

International authors (OSO 20 m)

Virgo filaments. I. Processing of gas in cosmological filaments around the Virgo cluster
Castignani, G., Combes, F., Jablonka, P., Finn, R.A., Rudnick, G., Vulcani, B., Desai, V., Zaritsky, D., and Salomé, P.
A&A 657, A9 (2022)
10.1051/0004-6361/202040141

2021 Census of Interstellar, Circumstellar, Extragalactic, Protoplanetary Disk, and Exoplanetary Molecules
McGuire, B.A.
ApJSS 259, 30 (2022)
10.3847/1538-4365/ac2a48

Fragmented atomic shell around S187 H II region and its interaction with molecular and ionized gas
Zemlyanukha, P., Zinchenko, I.I., Dombek, E., Pirogov, L.E., Topchieva, A., Joncas, G., Dewangan, L.K., Ojha, D.K., and Ghosh, S.K.
MNRAS 515, 2445 (2022)
10.1093/mnras/stac1989

Technical publications in refereed journals and conference proceeding 2022, about, e.g., receiver development, by OSO staff

Journals

Wideband Slotline-to-Microstrip Transition for 210–375 GHz Based on Marchand Baluns
López, C. D., Mebarki, M. A., Desmaris, V., Meledin, D., Pavolotskiy, A., & Belitsky, V.
IEEE Trans. THz Sci. Technol. 12(3), 307 (2022)
10.1109/TTHZ.2022.3149413

Ultra-Wideband 90º Waveguide Twist for THz applications
López, C.D., Montofré, D., Desmaris, V., Henkel, A., Belitsky, V.
IEEE Trans. THz Sci. Technol. 13(1), 67 (2022)
10.1109/TTHZ.2022.3213468

Noise Characterization and Modeling of GaN HEMTs at Cryogenic Temperatures
Mebarki, M. A., Ferrand-Drake Del Castillo, R., Meledin, D., Sundin, E., Thorsell, M., Rorsman, N., Belitsky, V., & Desmaris, V.
IEEE Trans. Microw. Theory Techn. (2022)
10.1109/TMTT.2022.3226480

GaN HEMT with superconducting Nb gates for low noise cryogenic applications
Mebarki, M. A., Ferrand-Drake Del Castillo, R., Pavolotskiy, A., Meledin, D., Sundin, E., Thorsell, M., Rorsman, N., Belitsky, V., & Desmaris, V.
Phys. Status Solidi A 2200468., 1 (2022)
10.1002/pssa.202200468

SEPIA345: A 345 GHz dual polarization heterodyne receiver channel for SEPIA at the APEX telescope
Meledin, D., Lapkin, I., Fredrixon, M., Sundin, E., Ferm, S.-E., Pavolotsky, A., Strandberg, M., Desmaris, V., López, C., Bergman, P., Olberg, M., Conway, J., Torstensson, K., Durán, C., Montenegro-Montes, F.M., De Breuck, C., and Belitsky, V.
A&A 668, A2 (2022)
10.1051/0004-6361/202244211

Conference proceedings

ALMA Band 2 Receiver Automated Test System
Barkhof, J., Hesper, R., Realini, S., Bekema, M., Koops, A., de Haan, R., Adema, J., Baryshev, A., Rodenhuis, M., Belitsky, V., Fredrixon, M., Lapkin, I., Pavolotsky, A., Strandberg, M., Ferm, S., Lopes, C., Cuttaia, F., Ricciardi, S., Terenzi, L., Villa, F., Nesti, R., Phillips, N., Yagoubov, P.
32nd IEEE International Symposium on Space Terahertz Technology, ISSTT 2022, Baeza, Spain (2022)

ALMA Band 2 Cold Cartridge Assembly Design
Belitsky, V. et al.
32nd IEEE International Symposium on Space Terahertz Technology, ISSTT 2022, Baeza, Spain (2022)

Design and Fabrication of All-Metal Micromachined Finline Structures for Millimeter and Sub-millimeter Applications
Lopez, C., Desmaris, V., Meledin, D., Pavolotsky, A., Belitsky, V.
32nd IEEE International Symposium on Space Terahertz Technology, ISSTT 2022, Baeza, Spain (2022)

GaN HEMT with superconducting Nb gates for low noise cryogenic applications
Mebarki, M. A., Ferrand-Drake Del Castillo, R., Pavolotskiy, A., Meledin, D., Sundin, E., Thorsell, M., Rorsman, N., Belitsky, V., & Desmaris, V.
2022 Compound Semiconductor Week (CSW) p. 1 (2022)
10.1109/CSW55288.2022.9930458

A cryogenic Scalable Small-Signal & Noise Model of GaN HEMTs
Mebarki, M.A., Ferrand-Drake Del Castillo, R., Pavolotskiy, A., Meledin, D., Sundin, E., M. Thorsell, N. Rorsman, Belitsky, V., Desmaris, V.
32nd IEEE International Symposium on Space Terahertz Technology, ISSTT 2022, Baeza, Spain (2022)

SEPIA345: a dual polarization 2SB cartridge receiver for APEX Telescope: Design and Performance
Meledin, D., Lapkin, I., Desmaris, V., S-E. Ferm, Sundin, E., Pavolotsky, A., Fredrixon, M., Strandberg, M., and Belitsky, V.
32nd IEEE International Symposium on Space Terahertz Technology, ISSTT 2022, Baeza, Spain (2022)

A broad-band and dual-polarization single-layer dichroic filter for applications in Sub-THz Range
Montofré, D., Lapkin, I., Belitsky, V., Helldner, L., Fredrixon, M., Lopez, C. and Desmaris, V.
32nd IEEE International Symposium on Space Terahertz Technology, ISSTT 2022, Baeza, Spain (2022)

SIS technology development to serve Next Generation receivers for ALMA
Pavolotsky, A., Kojima, T., Belitsky, V. and Masui, S.
32nd IEEE International Symposium on Space Terahertz Technology, ISSTT 2022, Baeza, Spain (2022)

Key numbers (nyckeltal)

Please see the following pages. An excel file with the same information is provided separately.

Infrastrukturens namn: OSO
Diarienummer: 2019-00208 (VR), LM 2021/018157 (Lantmäteriet)
Respondent (namn): John Conway
Respondent (epost): john.conway@chalmers.se
Respondent (telefon): 031-772 5503
Avser år: 2022

Katergorier av nyckelta

1 Anställda (enskilda individer eller FT
2 Projekt (representerade av en PI
3 Användare (enskilda individer
4 Kvantitet av användning
5 Output

1	Anställda vid infrastrukture	
1.1	*Enskilda individe*	
	Totalt	47
	Astro user support / ARCnode (Modul	6
	APEX svensk tid (Modul 3	3
	Astronomisk VLBI (Modul 4	4
	LOFAR (Modul 5)	2
	Geovetenskap (Modul 6)	11
	Utveckling av mm-mottagare (Modul 8)	9
	Utveckling av cm-mottagare (Modul 9)	5
	Ledning (Modul 1)	3
	Övriga tjänster (Modul 10	4
1.2	*FTE*	
	Totalt	29,1
	Astro user support / ARCnode (Modul	4,2
	APEX svensk tid (Modul 3	2,4
	Astronomisk VLBI (Modul 4	2,6
	LOFAR (Modul 5)	0,8
	Geovetenskap (Modul 6)	4,9
	Utveckling av mm-mottagare (Modul 8)	6,8
	Utveckling av cm-mottagare (Modul 9)	3,3
	Ledning (Modul 1)	1,7
	Övriga tjänster (Modul 10	2,4

Förklaringar till tabell 2, 3 och

ALMA: Tabell 2: Projekt med en nordisk PI. Cycle 8 and 9 (observationer oktober 2021 - september 2022). Genomförda = projekt med minst ett levererat dat
Tabell 3: Nordiska användare på alla projekt (även projekt med icke-nordisk PI). Cycle 8 and
Tabell 4: OSO har inte tillgång till information om observerade timmar, i stället rapporteras här antal pro

APEX: Alla projekt på svensk tid. Sökta projekt för perioden P11

Astronomisk VLBI: Alla proposaler inskickade 2022. Alla observationer utförda 20

LOFAR: Sökta projekt i Cycle 18 (Cycle 19 hade ingen "call for proposals"). Genomförda observationer november 2021 - november 20

Alla projekt observerade under aktuell period rapporteras. I undantagsfall är projekten inte avslutade (vilket OSO saknar information

För geoverksamheten kan nyckeltal av detta slag inte rapporteras (se aktivitetsrapporten för detaljer). Dock rapporterar vi observationstid med geodetisk VLBI i tab

Gråmarkerade fält är inte aktuella för OSO

		a. Alla projek			b. Typ av hemvist för alla P						c. Typ av akademisk hemvist för PI (endast akademiska hemvister		
					Akademisk			Kommersiel	Offentlig	Övriga			
2	Projekt	Totalt	Män	Kvinnor	Totalt	Män	Kvinnor	Totalt	Totalt	Totalt	Chalmers	Annat svenskt lärosäte	Internationel
2.1	*Sökta projekt*												
	Totalt	257	175	82	257	175	82				78	8	171
	ALMA (projekt med nordisk PI	123	75	48	123	75	48				61	8	54
	APEX svensk tid	22	16	6	22	16	6				10	0	12
	Astronomisk VLB	85	68	17	85	68	17				7	0	78
	LOFAR	27	16	11	27	16	11				0	0	27
2.2	*Genomförda projekt*												
	Totalt	107	80	27	107	80	27				15	1	91
	ALMA (projekt med nordisk PI	15	12	3	15	12	3				5	1	9
	APEX svensk tid	23	15	8	23	15	8				9	0	14
	Astronomisk VLB	46	35	11	46	35	11				1	0	45
	LOFAR	23	18	5	23	18	5				0	0	23

3	Användare	d. Alla användare			e. Typ av hemvist för alla användare						f. Typ av akademisk hemvist för användare (endast akad. hemvister		
					Akademisk			Kommersiel	Offentlig	Övriga			
		Totalt	Män	Kvinnor	Totalt	Män	Kvinnor	Totalt	Totalt	Totalt	Chalmers	Annat svenskt lärosäte	Internationel
3.1	*Sökta projekt*												
	Totalt	834	604	230	834	604	230				76	33	593
	ALMA (nordiska användare, alla projekt	146	97	49	146	97	49				44	31	71
	APEX svensk tid	91	57	34	91	57	34				19	2	70
	Astronomisk VLB	463	355	108	463	355	108				11	0	0
	LOFAR	134	95	39	134	95	39				2	0	452
3.2	*Genomförda projekt*												
	Totalt	708	522	186	708	522	186				56	16	636
	ALMA (nordiska användare, alla projekt	73	52	21	73	52	21				28	14	31
	APEX svensk tid	112	68	44	112	68	44				23	2	87
	Astronomisk VLB	325	253	72	325	253	72				3	0	322
	LOFAR	198	149	49	198	149	49				2	0	196

4	Typ och kvantitet av tillgång	g. Total kvantitet per typ av tillgång till infrastrukturen			h. Kvantitet av tillgång för akademiska projekt		
		Alla användare			Fysisk tillgång till infrastruktur		
		Fysisk	Data	Prover	Totalt	Män	Kvinnor
4.1	*Användning under året*						
	Totalt	n/a			n/a	n/a	n/a
	ALMA (antal projekt med nordisk P	15	3974 Gb		15	12	3
	APEX svensk tid (h	367	9888 records		367	255	112
	Astronomisk VLBI (h	1030	860/29.1 Tb		1030	709	321
	LOFAR (h)	5878	4.4/1.5 Pb		5878	5508	370
	Geodetisk VLBI (h)	2280				n/a	n/a

5	Output	
5.1	Publikationer	Se bifogad lista
5.2	Patent	n/a