

## Interacting galaxies with LOFAR: tidal tails at low frequencies

Projektet kan utföras på svenska

### Bakgrund

We are involved in the LOFAR Surveys Key Science Project, an international collaboration centered on observations with the Low Frequency Array (LOFAR), a new-generation, largely digital radio telescope centered in the Netherlands with stations distributed across Europe, including Onsala. LOFAR will survey the entire northern sky at a frequency of 150 MHz (wavelength of 2 meters). 10% of the sky has been covered (2000 square degrees), and new images of stunning quality are available for immediate analysis. Most of the sources are star-forming galaxies and radio galaxies powered by accretion onto a central supermassive black hole.

### Problembeskrivning

The goal of this project is to analyze LOFAR images of a small sample of well-selected galaxies with extended tidal tails. Optical images of such sources (see figure) show star formation all along the arms/tails that has been triggered in the gravitational interaction with a nearby galaxy companion. For the first time, the LOFAR data reveal low-frequency radio emission associated with those extended features. By analyzing these images, in conjunction with other data and possibly numerical simulations of colliding galaxies, it will be possible to relate the dynamical history with the star-formation history in the most outer regions of galaxies.

### Arbetsätt

The work will involve 1) selection of a few interacting galaxies with tidal tails in field covered by LOFAR so far; 2) characterization of the radio emission in relation to other star-formation tracers; 3) modeling the evolution of the radio-emitting electrons. The study will not be limited to the radio data but include comparison with other observations and dynamical simulations to constrain the physical processes.

### Gruppstorlek

3–4 studenter

### Målgrupp

E, F, GU-Fysik

Ability to code and automate calculations. Curiosity about the Universe!

### Litteraturtips

<https://lofar-surveys.org>

Example of a galaxy pair to be studied: <https://apod.nasa.gov/apod/ap130803.html>

### Handledare

Cathy Horellou, [cathy.horellou@chalmers.se](mailto:cathy.horellou@chalmers.se), 031-772 5504 (Rymd-, geo- och miljövetenskap)

### Examinator

Magnus Thomasson