Dr Hannah Calcutt

Curriculum Vitae

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Professional Experience

- **2018 – present:** Cosmic Origins fellow,
  Department of Space, Earth and Environment, Chalmers University of Technology
- **2015 – 2018:** Postdoctoral researcher,
  Niels Bohr Institute, University of Copenhagen, supervisor: Dr Jes Jørgensen
- **May 2015 – Nov 2015:** Test & Verification Engineer, Space Imaging, e2v technologies

Education

- **2010 – 2015:** PhD Astrophysics, University College London
  Advisor: Prof Serena Viti
- **2009 – 2010:** Research year abroad at the Harvard-Smithsonian Center for Astrophysics
  Supervisors: Prof Charles Alcock and Dr Stephen Murray
- **2006 – 2010:** MPhys Physics with Astrophysics with a year abroad (at the Harvard-Smithsonian Center for Astrophysics), University of Southampton
  Grade: First Class with Honours

Key achievements

- Authoring 5 papers, including 4 first author papers, leading to an h-index of 13, and a total number of citations (excluding self-citation) of 202 as of 25/10/19.
- Pioneered a new technique to eliminate contamination in emission maps. This led to the discovery of chemical differences in a prominent low-mass protostellar binary (Calcutt et al. 2018a,b).
- Detected doubly-deuterated methyl cyanide for the first time in the ISM (Calcutt et al. 2018b), showing how the D/H ratio is linked to the formation time of molecules.
- Key member of the Protostellar Interferometric Line Survey (PILS), which has resulted in the detection of 17 new species in the ISM, and 28 new species in a low-mass protostellar source.
- 5th author of Nature astronomy paper, Fayolle et al. 2017, detecting a biomarker around a protostar.
- Kuffmeier, Calcutt & Kristensen 2019, revealed that bridge-like structures between forming protostars can be used as an indicator of age differences between protostars.

Scientific responsibilities held

- IAU junior member, 2019 – present
- Astronomy for Equity and Inclusion working group, 2019 – present
- Member of two SKA working groups, Our Galaxy and Cradle of Life, 2019 – present
- Referee for A&A, 2019 – present
- Referee for ApJ, 2018 – present

- Involved in the Whipple spacecraft mission, 2010

Awards and Funding

- 2017: Marie Skłodowska-Curie Actions Seal of Excellence - score of 85% or above.
- 2011 – present: Awarded 36 hrs of PI telescope time, including 2 A ranked ALMA proposals, 305 hrs as Co-I.
- 2013: STFC PATT travel grant, 1400.

Conference and invited talks

Have attended 15 international conference and 5 national meetings, giving 8 contributed talks, and 4 invited talks, and 5 seminars. The following are some recent highlights:

- 11/06/19: A chemical census of star-forming regions Seminar at the University of Manchester
- 20/09/18: Exploring complex nitrogen chemistry in low-mass protostars Fractionation, Astrochemistry and Star/Planet formation invited talk
- 04/05/18: The chemical evolution of solar-type protostars ADAM, contributed talk
- 04/04/18: The Protostellar Interferometric Line Survey: Complex organic molecules on Solar System scales EWASS 2018, contributed talk
- 12/01/18: The Protostellar Interferometric Line Survey: Probing star formation with complex organic molecules Seminar at Chalmers University of Technology

Leadership experience

- Training and mentoring PhD students (Charl van der Walt and Naomi Asabre Frimpong), 2018 – present.
- Training a PhD student (Naomi Asabre Frimpong), 2018 – present.
- Co-supervising a PhD student (Sébastien Manigand), 2017 – present
- Supervised a PhD student (Niels Ligterink) on a project to detect small amines in low-mass star-forming regions, which is now a submitted paper (paper #16 on my publication list), 2018.
- Supervised an undergraduate project , summer 2017
- Trained a PhD student (George Kelly), 2014.

Organisational Roles

- Organisational committee, PhD day StarPlan, 2018
- LOC member, Nitrogen fractionation in space, University of Copenhagen, 2017
- StarPlan seminar organiser
- PILS collaboration organiser
- LOC member, Star formation and feedback in galaxies as revealed by far infrared and submillimetre wavelengths

Teaching experience

- Teacher of Certificate in Astronomy course at UCL, 2012–2014
- Summer school physics teacher, summer 2005, 2006, 2007

Outreach activities

- Founder of ACT (Astronomy Communication through Technology)
- Founding member of Astronomy on Tap, Gothenburg, 2019
- Speaker at Your Universe, astronomy and science festival, 2010–2015
- Speaker to schools and the public, 2006–2010

Languages

- English — Native speaker
- Danish — Passed Danish language programme 3
- Swedish — Basic oral and written skills

Publications - peer-reviewed

h-index: 13. **Total number of citations (excluding self-citation):** 202.

First author

1. *The ALMA-PILS survey: propyne (CH_3CCH) in IRAS 16293–2422*
   H. Calcutt, E. Willis, J. K. Jørgensen, P. Bjerkeli, N. F. W. Ligterink, A. Coutens, H. S. P. Müller, R. T. Garrod, S. F. Wampfler, M. N. Drozdovskaya, A&A, in press.
2. *The ALMA-PILS survey: The first detection of methyl isocyanide in a solar-type protostar.*
   H. Calcutt, M. R. Fiechter, E. Willis, H. S. P. Müller, R. T. Garrod, J. K. Jørgensen, and S. F. Wampfler et al. A&A, 617, A95, 2018
3. *The ALMA-PILS survey: Complex nitriles towards IRAS16293–2422.*
   H. Calcutt, J. K. Jørgensen, H. S. P. Müller, L. E. Kristensen, A. Coutens, T. L. Bourke, R. T. Garrod, M. V. Persson, M. H. D. van der Wiel, E. F. van Dishoeck, and S. F. Wampfler. A&A, 616, A90, 2018
4. *A high-resolution study of complex organic molecules in hot cores.*
   H. Calcutt, S. Viti, C. Codella, M. T. Beltrán, F. Fontani, and P. M. Woods. MNRAS, 443(4):31573173, 2014

Co-author

5. *Constraining the Infalling Envelope of Embedded Protostars: BHR71 and its Hot Corino*, Yao-Lun Yang, Neal J. Evans II, Aaron Smith, Jeong-Eun Lee, John J. Tobin, Susan Terebey, **Hannah Calcutt**, Jes K. Jørgensen, Joel D. Green, Tyler L. Bourke, ApJ, submitted.
6. *Temperature profiles of young disk-like structures: The case of IRAS 16293A.*
   Merel L.R. van t Hoff, Ewine F. van Dishoeck, Jes K. Jørgensen, and **Hannah Calcutt**, A&A submitted.

7. *The ALMA-PILS survey: O-bearing complex organic molecules inventory towards IRAS 16293–2422 A.*
S. Manigand, J. K. Jørgensen, **H. Calcutt**, N. F. W. Ligterink, H. S. P. Müller, M. N. Drozdovskaya, A. Coutens. A&A, under review.

8. *Kinematics around the B335 protostar down to au scales.*
P. Bjerkeli, J. P. Ramsey, D. Harsono, **H. Calcutt**, L. E. Kristensen, M. H. D. van der Wiel, J. K. Jørgensen, S. Muller, and M. V. Persson. A&A, 631, A64.

9. *The Bridge: a transient phenomenon of forming stellar multiples.*
M. Kuffmeier, **H. Calcutt**, and L. E. Kristensen. A&A, 628, A112, 13.

10. *The ALMA-PILS survey: First detection of nitrous acid (HONO) in the interstellar medium.*
A. Coutens, N. F. W. Ligterink, J. -C. Loison, V. Wakelam, **H. Calcutt**, M. N. Drozdovskaya, J. K. Jørgensen, H. S. P. Müller, E. F. van Dishoeck, and S. F. Wampfler. A&A, 623, L13, 2019.

11. *The ALMA-PILS survey: gas dynamics in IRAS 16293–2422 and a connection between its two protostars.*
M. H. D. van der Wiel, S. K. Jacobsen, J. K. Jørgensen, T. L. Bourke, L. E. Kristensen, P. Bjerkeli, N. M. Murillo, **H. Calcutt**. A&A, 626, A93, 2019.

12. *The ALMA-PILS survey: The first detection of doubly-deuterated methyl formate (CHD_2OCHO) in the ISM.*
S. Manigand, **H. Calcutt**, J. K. Jørgensen, V. Taquet, H. S. P. Müller, A. Coutens, S. F. Wampfler, N. F. W. Ligterink, M. N. Drozdovskaya, L. E. Kristensen, M. H. D. van der Wiel, T. L. Bourke. A&A, 623, A69, 2018.

13. *The ALMA-PILS survey: Stringent limits on small amines and nitrogen-oxides towards IRAS 16293–2422B.*
N. F. W. Ligterink, **H. Calcutt**, A. Coutens, T. L. Bourke, M. N. Drozdovskaya, L. E. Kristensen, H. S. P. Müller, S. F. Wampfler, M. H. D. van der Wiel, E. F. van Dishoeck, and J. K. Jørgensen. A&A, 619, A28, 2018.

14. *Tracing the cold and warm physico- chemical structure of deeply embedded protostars: IRAS16293 versus VLA1623.*
N. M. Murillo, E. F. van Dishoeck, M. H. D. van Der Wiel, J. K. Jørgensen, M. N. Drozdovskaya, and **H. Calcutt**. A&A, 617, A120, 2018

15. *The ALMA-PILS survey: Isotopic composition of oxygen-containing complex organic molecules toward IRAS 16293–2422.*
J. K. Jørgensen, H. S. P. Müller, **H. Calcutt**, A. Coutens, M. N. Drozdovskaya, K. I. Öberg, M. V. Persson, V. Taquet, E. F. van Dishoeck, and S. F. Wampfler. A&A, 620, A170, 2018.

16. *The ALMA-PILS survey: The sulphur connection between protostars and comets: IRAS 16293–2422 B and 67P/Churyumov Gerasimenko.*
M. N. Drozdovskaya, E. F. van Dishoeck, J. K. Jørgensen, U. Calmonte, M. H. D. van Der Wiel, A. Coutens, **H. Calcutt**, H. S. P. Müller, M. V. Persson, S. F. Wampfler, and K. Altwegg. MNRAS, 476, 4, 2018

17. *First detection of cyanamide (NH_2CN) towards solar-type protostars.*
A. Coutens, E. R. Willis, R. T. Garrod, H. S. P. Müller, T. L. Bourke, **H. Calcutt**, M. N. Drozdovskaya, J. K. Jørgensen, N. F. W. Ligterink, M. V. Persson, G. Stephan, E. F. van Dishoeck, and S. F. Wampfler. A&A, 612, A107, 2018

18. *The ALMA-PILS survey: Formaldehyde deuteration in warm gas on small scales toward IRAS 16293–2422*
B. M. V. Persson, J. K. Jørgensen, H. S. P. Müller, A. Coutens, E. F. van Dishoeck, V. Taquet, **H. Calcutt**, M. H. D. van der Wiel, T. L. Bourke, and S. Wampfler. A&A, 610, A54, 2018

19. *The ALMA-PILS survey: 3D modeling of the envelope, disks and dust filament of IRAS 16293–2422.*
S. K. Jacobsen, J. K. Jørgensen, M. H. D. van Der Wiel, **H. Calcutt**, T. L. Bourke, C. Brinch, A. Coutens, M. N. Drozdovskaya, L. E. Kristensen, H. S. P. Müller, and S. F. Wampfler. A&A, 612, A72, 2018

20. *Protostellar and cometary detections of organohalogens.*
E. C. Fayolle, K. I. Öberg, J. K. Jørgensen, K. Altwegg, **H. Calcutt**, H. S. P. Müller, M. Rubin, M. H. D. van der Wiel, P. Bjerkeli, T. L. Bourke, A. Coutens, E. F. van Dishoeck, M. N. Drozdovskaya, R. T. Garrod, N. F. W. Ligterink, M. V. Persson, and S. F. Wampfler. Nature Astronomy, 1(10):703, 2017

21. *The ALMA-PILS survey: detection of CH_3NCO towards the low-mass protostar IRAS 16293–2422 and laboratory constraints on its formation.*
N. F. W. Ligterink, A. Coutens, V. Kofman, H. S. P. Müller, R. T. Garrod, **H Calcutt**, S. F. Wampfler, J. K. Jørgensen, H. Linnartz, and E. F. van Dishoeck. MNRAS, 469(March):22192229, 2017

22. *The ALMA-PILS survey: First detections of ethylene oxide, acetone and propanal toward the low-mass protostar IRAS 16293–2422.*
J. M. Lykke, A. Coutens, J. K. Jørgensen, M. H. D. van Der Wiel, R. T. Garrod, H. S. P. Müller, P. Bjerkeli, T. L. Bourke, **H. Calcutt**, M. N. Drozdovskaya, C. Favre, E. C. Fayolle, S. K. Jacobsen, K. I. Öberg, M. V. Persson, E. F. van Dishoeck, and S. F. Wampfler. A&A, 597:A53, 2017

23. *The ALMA-PILS survey: First detections of deuterated formamide and deuterated isocyanic acid in the interstellar medium.*
A. Coutens, J. K. Jørgensen, M. H. D. van der Wiel, H. S. P. Müller, J. M. Lykke, P. Bjerkeli, T. L. Bourke, **H. Calcutt**, M. N. Drozdovskaya, C. Favre, E. C. Fayolle, R. T. Garrod, S. K. Jacobsen, N. F. W. Ligterink, K. I. Öberg, M. V. Persson, E. F. van Dishoeck, and S. F. Wampfler. A&A, 590:L6, 2016

24. *The ALMA Protostellar Interferometric Line Survey (PILS): First results from an unbiased sub- millimeter wavelength line survey of the Class 0 protostellar binary IRAS 16293–2422 with ALMA.*
J. K. Jørgensen, M. H. D. van der Wiel, A. Coutens, J. M. Lykke, H. S. P. Müller, E. F. van Dishoeck, **H. Calcutt**, P. Bjerkeli, T. L. Bourke, M. N. Drozdovskaya, C. Favre, E. C. Fayolle, R. T. Garrod, S. K. Jacobsen, K. I. Öberg, M. V. Persson, and S. F. Wampfler. A&A, 595:A117, 2016

25. *Laboratory characterization and astrophysical detection of vibrationally excited states of vinyl cyanide in Orion-KL.*
A. López, B. Tercero, Z. Kisiel, A. M. Daly, C. Bermúdez, **H. Calcutt**, N. Marcelino, S. Viti, and B. J. Drouin. A&A, 44:1–39, 2014