# Pooneh Nazari

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### **Positions**

**ESO Fellow** 2023-present

Garching, Germany

**IAU Gruber Foundation Fellow** 2023-present

#### Education

Leiden University Leiden, Netherlands 2019-2024

Ph.D. in Astrophysics Promotor: Prof. E. F. van Dishoeck, Co-Promotors: Dr. B. Tabone and Dr. G. P. Rosotti

- Thesis: "Bridging the gap between physics and chemistry in early stages of star formation"

**University of Cambridge** Cambridge, UK 2018-2019

MPhil in Astrophysics

Supervisor: Prof. C. J. Clarke

- Thesis: "Observational consequences of planet migration"

MASt (Part III) in Astrophysics 2017-2018

University of St Andrews St Andrews, UK 2013-2017

B.Sc. in Astrophysics

## Research Interests

Interstellar molecules, Planet formation, Submillimetre and infrared astronomy, Astrochemistry

### **Publications**

I have 28 publications with 11 as first author and 10 as second to fourth author. H-index = 12, total citations > 400, first-author citations > 140. See the full list at the end of the CV.

### **Talks**

I have given 27 talks including 10 invited. See the full list at the end of the CV.

#### **Awards**

■ Gruber Foundation Fellowship	2023–2025
■ ESO Fellowship	2023–2026
<ul> <li>Funding from Leids Kerkhoven-Bosscha Fonds (LKBF)</li> </ul>	2022
<ul> <li>Sheepshanks Scholarship and Studentship in Astronomy (Trinity College, Cambridge)</li> </ul>	2017–2018
<ul> <li>Harvard Origins of Life Initiative Undergraduate Research Award</li> </ul>	2017

<ul> <li>The Astrophysics Project Prize (University of St Andrews)</li> </ul>	2017
<ul> <li>Royal Astronomical Society Undergraduate Research Bursary (University of St Andrews)</li> </ul>	2015

## Observing programs

I am a PI of 16.9 hours of JWST NIRSpec-IFU observations and Co-I of 243 hours of JWST NIRCam, NIRSpec, and MIRI observations.

# Major collaborations

HEFE: High Angular Resolution observations of Stellar Emergence in Filamentary Environments PI: T. Megeath JWST NIRCam, NIRSpec, and MIRI-MRS large program of the OMC2/3 region	2024–present
COMPASS: Complex Organic Molecules in Protostars with ALMA Spectral Surveys PI: J. K. Jørgensen ALMA large program and NIRSpec MOS medium program of 11 protostars	2023-present
JOYS+: Jwst Observations of Young protoStars PIs: E. F. van Dishoeck; M.E. Ressler; T. P. Ray; T. P. Greene Combination of MIRI-MRS and NIRSpec-IFU observations of $\sim\!30$ protostars	2023-present
IPA: Investigating Protostellar Accretion JWST program PI: T. Megeath MIRI-MRS and NIRSpec-IFU observations of 5 protostellar systems	2023-present

## Research visits

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	Research visits, Universities of St Andrews, Cambridge, and Harvard University	Summers 2015-2018
	Extended research visit, Harvard University	Oct 2022–Nov 2022
	Frequent research visits to University of Copenhagen	2023-present

# Supervision

<b>Kasra Hajian</b> (Sharif Univ. of Tech., Iran), Funded by Gruber Foundation Working on high- $z$ universe as a summer student At ESO, In collaboration with Danial Langeroodi	Summer 2024
<b>Lauren Mason</b> (Univ. of Cambridge, UK), Funded by ESO Working on protostellar disk winds as a summer student <i>At ESO</i>	Summer 2024
Co-supervision of one LEAPS student and three MSc students  At Leiden Observatory	2020-2022

# Teaching

<ul><li>Teaching Assistant of Astrochemistry course taught by Prof. E. F. van Dishoeck</li></ul>	2022
Leiden Observatory	
■ Teaching Assistant of SPF course taught by Prof. E. F. van Dishoeck and Dr. M. K. McClure	2020, 2021, 2022
Leiden Observatory	

### Selected outreach and service activities

- Spending 25% of my time on ESO duties working with: Observing Programmes Office (OPO), ELT Observing Simulations, and Science Policies, 2023-present
- Scientific Assistant at ESO's Observing Programmes Committees (OPCs), 2024
- Reviewer for A&A, ApJ, Nat. Astron., and Front. Astron. Space Sci.
- Organiser of the NOVA Network II seminars in the Netherlands, 2019-2022
- Main author of a CASSIS manual, 2022
- ALMA proposal reviewer, 2021-2024
- Invited talk at Astronomy on Tap, 2021
- Author at She Speaks Science, 2018

## Presentations

I have given 27 talks, including 10 invited.

Invited talk at Astrochemistry Seminar

'Can disks explain lack of COM emission from low-mass protostars?'

■ Invited talk at COSPAR panel F3.4	South Korea, 2024
'Complex organic molecules in the gas and ices'	
<ul> <li>Invited talk at Villa Vigoni workshop</li> </ul>	Villa Vigoni, 2024
'Complex organic molecules in the gas and ices around protostars'	
<ul> <li>Invited talk at Celebrating 30 Years of Protoplanetary Disk Chemistry</li> </ul>	Ringberg, 2024
'Bridging the gap between physics and chemistry in early stages of star formation'	
■ PhD Colloquium	Leiden University, 2024
'Bridging the gap between physics and chemistry in early stages of star formation'	
Star and Planet Formation Seminar	ESO, 2024
'Bridging the gap between physics and chemistry in early stages of star formation'	
<ul> <li>Invited talk at Workshop on Interstellar Catalysis</li> </ul>	Aarhus, 2023
'Complex organic molecules around protostars'	
■ NOVA Network II seminar	Netherlands, 2023
'Complex organic molecules around protostars'	
■ Blaauw workshop	University of Groningen, 2023
'Evidence for ubiquitous carbon grain destruction around young protostars'	
<ul> <li>Origins seminar series</li> </ul>	University of Arizona, 2022
'Complex organic molecules around low- and high-mass protostars'	
■ Lunch talk	University of Virginia/NRAO, 2022
'Complex organic molecules around low- and high-mass protostars'	
<ul> <li>Star and planet formation meeting</li> </ul>	University of Michigan, 2022
'Complex organic molecules around low- and high-mass protostars'	
Star formation journal club	Harvard University, 2022
'Complex organic molecules around low- and high-mass protostars'	
<ul> <li>Disk and Astrochemistry meeting</li> </ul>	Harvard University, 2022
'Complex organic molecules around low- and high-mass protostars'	
<ul> <li>Invited talk at Niels Bohr Legacy Symposium in Astrochemistry</li> </ul>	Copenhagen University, 2022
'Complex organic molecules toward low- and high-mass protostars'	

Leiden University, 2022

 Invited talk at Iranian National Observatory workshop Online, 2022 'Astrochemistry in the embedded phase of star formation' Invited talk at InterCat Centre meeting Online, 2021 'N-bearing complex organic molecules: From low- to high-mass protostars' Star formation meeting Leiden University, 2021 'Methanol emission from protostars: Can disks explain lack of emission from some sources?' Informal seminar at Centre for Star and Planet Formation Copenhagen University, 2021 'Complex organic molecules: From low- to high-mass protostars' Contributed talk at Chemical processes in Solar-type star forming regions Torino, 2021 'Complex organic molecules: From low- to high-mass protostars' Contributed talk at Astrochemical Frontiers Online, 2021 'Methanol emission from protostars: Can disks explain lack of emission from some sources?' Invited talk at Astrochemistry Seminar Leiden University, 2021 'Complex organic molecules in low-mass protostars' Contributed talk at ALMA day Leiden University, 2021 'Complex organic molecules in low-mass protostars' Contributed talk at Five Years After HL Tau Online, 2020 'Observational consequences of planet migration' Seminar at Institute of Astronomy University of Cambridge, 2020 'N-bearing complex organic molecules in low-mass protostars' Contributed talk at Trinity forum, Trinity college University of Cambridge, 2019 'Observational consequences of planet migration' Invited talk at Kavli Institute University of Cambridge, 2019 'Observational consequences of planet migration'

#### **Publications**

I have 28 publications with 11 as first author and 10 as second to fourth author. H-index =12, total citations >400, first-author citations >140.

### First author

- 11. **P. Nazari**, A. D. Sellek, and G. P. Rosotti, "Hidden under a warm blanket: Planets can exist within protostellar disks without producing observable sub-structures", *Submitted to A&A Letters*, 2024
- 10. **P. Nazari**, B. Tabone, A. Ahmadi, S. Cabrit, *et al.*, "ALMA view of the L1448-mm protostellar system on disk scales: CH<sub>3</sub>OH and H<sup>13</sup>CN as new disk wind tracers", *A&A*, vol. 686, A201, 2024
- 9. **P. Nazari**, B. Tabone, G. P. Rosotti, and E. F. van Dishoeck, "Correlations among complex organic molecules around protostars: Effects of physical structure", *A&A*, vol. 687, A263, 2024
- 8. **P. Nazari**, W. R. M. Rocha, A. E. Rubinstein, K. Slavicinska, *et al.*, "Hunting for complex cyanides in protostellar ices with the JWST. A tentative detection of CH<sub>3</sub>CN and C<sub>2</sub>H<sub>5</sub>CN", *A&A*, vol. 686, A71, 2024, See press release
- 7. **P. Nazari**, J. S. Y. Cheung, J. F. Asensio, N. M. Murillo, *et al.*, "A deep search for large complex organic species toward IRAS16293-2422 B at 3 mm with ALMA", *A&A*, vol. 686, A59, 2024
- 6. **P. Nazari**, B. Tabone, M. L. R. van't Hoff, J. K. Jørgensen, et al., "Evidence for Ubiquitous Carbon Grain Destruction in Hot Protostellar Envelopes", *ApJ Letters*, vol. 951, L38, 2023

- 5. **P. Nazari**, B. Tabone, and G. P. Rosotti, "Importance of source structure on complex organics emission. III. Effect of disks around massive protostars", *A&A*, vol. 671, A107, 2023
- 4. **P. Nazari**, J. D. Meijerhof, M. L. van Gelder, A. Ahmadi, *et al.*, "N-bearing complex organics toward high-mass protostars. Constant ratios pointing to formation in similar pre-stellar conditions across a large mass range", *A&A*, vol. 668, A109, 2022
- 3. **P. Nazari**, B. Tabone, G. P. Rosotti, M. L. van Gelder, *et al.*, "Importance of source structure on complex organics emission. II. Do disks explain lack of methanol emission from low-mass protostars?", *A&A*, vol. 663, A58, 2022
- 2. **P. Nazari**, M. L. van Gelder, E. F. van Dishoeck, B. Tabone, *et al.*, "Complex organic molecules in low-mass protostars on Solar System scales. II. Nitrogen-bearing species", *A&A*, vol. 650, A150, 2021
- 1. **P. Nazari**, R. A. Booth, C. J. Clarke, G. P. Rosotti, *et al.*, "Revealing signatures of planets migrating in protoplanetary discs with ALMA multiwavelength observations", *MNRAS*, vol. 485, pp. 5914–5923, 2019

### Second-Fourth author

- 10. J. C. Santos, M. L. van Gelder, **P. Nazari**, A. Ahmadi, *et al.*, "SO2 and OCS toward high-mass protostars: A comparative study between ice and gas", *A&A*, 2024
- 9. K. Slavicinska, E. F. van Dishoeck, Ł. Tychoniec, **P. Nazari**, et al., "JWST detections of amorphous and crystalline HDO ice toward massive protostars", A&A, 2024
- 8. A. E. Rubinstein, H. Tyagi, **P. Nazari**, R. Gutermuth, *et al.*, "IPA. Class 0 Protostars Viewed in CO Emission Using JWST/NIRSpec", *Submitted to ApJ*, 2023
- M. L. van Gelder, M. E. Ressler, E. F. van Dishoeck, P. Nazari, et al., "JOYS+: Mid-infrared detection of gas-phase SO<sub>2</sub> emission in a low-mass protostar. The case of NGC 1333 IRAS 2A: Hot core or accretion shock?", A&A, vol. 682, A78, 2024
- 6. Y. Chen, M. L. van Gelder, **P. Nazari**, C. L. Brogan, *et al.*, "CoCCoA: Complex Chemistry in hot Cores with ALMA. Selected oxygen-bearing species", *A&A*, vol. 678, A137, 2023
- 5. N. G. C. Brunken, A. S. Booth, M. Leemker, **P. Nazari**, et al., "A major asymmetric ice trap in a planet-forming disk. III. First detection of dimethyl ether", A&A, vol. 659, A29, 2022, See press release
- 4. M. L. van Gelder, **P. Nazari**, B. Tabone, A. Ahmadi, *et al.*, "Importance of source structure on complex organics emission. I. Observations of CH<sub>3</sub>OH from low-mass to high-mass protostars", *A&A*, vol. 662, A67, 2022
- 3. M. L. van Gelder, J. Jaspers, **P. Nazari**, A. Ahmadi, *et al.*, "Methanol deuteration in high-mass protostars", *A&A*, vol. 667, A136, 2022
- 2. F. Meru, G. P. Rosotti, R. A. Booth, **P. Nazari**, et al., "Is the ring inside or outside the planet?: the effect of planet migration on dust rings", MNRAS, vol. 482, pp. 3678–3695, 2019, See press release
- 1. J. D. Ilee, C. J. Cyganowski, **P. Nazari**, T. R. Hunter, *et al.*, "G11.92-0.61 MM1: a Keplerian disc around a massive young proto-O star", *MNRAS*, vol. 462, pp. 4386–4401, 2016, See press release

### Other co-author

- 7. D. A. Neufeld, P. Manoj, H. Tyagi, (incl. **P. Nazari**), *et al.*, "JWST/MIRI detection of suprathermal OH rotational emissions: probing the dissociation of the water by Lyman alpha photons near the protostar HOPS 370", *ApJL*, vol. 966, L22, 2024
- N. G. C. Brunken, W. R. M. Rocha, E. F. van Dishoeck, (incl. P. Nazari), et al., "JWST observations of <sup>13</sup>CO<sub>2</sub> ice: Tracing the chemical environment and thermal history of ices in protostellar envelopes", A&A, vol. 685, A27, 2024
- M. Narang, P. Manoj, H. Tyagi, (incl. P. Nazari), et al., "Discovery of a Collimated Jet from the Low-luminosity Protostar IRAS 16253-2429 in a Quiescent Accretion Phase with the JWST", ApJL, vol. 962, L16, 2024
- 4. E. F. van Dishoeck, S. Grant, B. Tabone, (incl. **P. Nazari**), et al., "The diverse chemistry of protoplanetary disks as revealed by JWST", Faraday Discussions, vol. 245, pp. 52–79, 2023
- 3. G. M. Williams, C. J. Cyganowski, C. L. Brogan, (incl. **P. Nazari**), *et al.*, "ALMA observations of the Extended Green Object G19.01-0.03 II. A massive protostar with typical chemical abundances surrounded by four low-mass pre-stellar core candidates", *MNRAS*, vol. 525, pp. 6146–6169, 2023
- 2. G. M. Williams, C. J. Cyganowski, C. L. Brogan, (incl. **P. Nazari**), *et al.*, "ALMA observations of the Extended Green Object G19.01-0.03 I. A Keplerian disc in a massive protostellar system", *MNRAS*, vol. 509, pp. 748–762, 2022
- 1. A. J. Cridland, G. P. Rosotti, B. Tabone, (incl. **P. Nazari**), et al., "Early planet formation in embedded protostellar disks. Setting the stage for the first generation of planetesimals", A&A, vol. 662, A90, 2022