Aditya Mahadeva Arabhavi

PhD Student

Kapteyn Astronomical Institute, Landleven 12 (Kapteynborg, 5419), 9747AD Groningen, Netherlands

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Education

Kapteyn Astronomical Insitute, University of Groningen *Groningen, Netherlands*

PH.D. ASTRONOMY *Oct 2021 - Sept 2025*

- JWST spectroscopy of planet-forming disks
- Supervisors: Prof. Inga Kamp and Prof. Ewine van Dishoeck

Delft University of technology *Delft, Netherlands*

M.SC. AEROSPACE ENGINEERING (CUM LAUDE, 8.84/10.00) *Aug 2018 - Jul 2020*

- Profile: Space exploration
- Supervisors: Prof. Stéphanie Cazaux and Prof. Peter Woitke (St.Andrews)

Sri Jayachamarajendra College of Engineering *Mysore, India*

B.E. MECHANICAL ENGINEERING (DISTINCTION, 9.51/10.00) *Aug 2014 - May 2018*

- Supervisors: Prof. Y. C. Arun and Prof. K. Chandrashekhara

Research

MIRI mid-INrared Disk Survey (MINDS) *Groningen, NL*

OBSERVATION PROJECT, JWST GTO PROGRAM (PID: 1282) *Oct 2021 - Present*

- Leading the systematic study of very low-mass star sample of the GTO program.
- Developed 0D, 1D and 2D modeling and fitting tools for analysing and interpreting JWST mid-infrared with ProDiMo and prodimopy.
- Experience in JWST MIRI data reduction for MRS mode of point sources.

Midinfrared molecular diagnostics of disks *Groningen, NL*

PHD MODELING PROJECT, KAPTEYN ASTRONOMICAL INSTITUTE *Oct 2021 - Present*

- Studying effects of transport processes and planet formation on midinfrared emission of protoplanetary disks with modeling tools such as ProDiMo and FLiTs.
- Identifying molecular diagnostics from grid based parameter exploration of elemental abundances, disk gaps, and planet-disk mass ratios.

Ice opacities in planet-forming discs *St. Andrews, UK*

MASTER'S THESIS, UNIVERSITY OF ST. ANDREWS *2019-20*

- Advisors: Prof. Peter Woitke, Prof Stéphanie Cazaux
- Studied the effect of ice accretion on opacity of the dust in protoplanetary disk. Implemented conputationally efficient and consistent position dependent opacity calculations in ProDiMo code.
- Studied the role of ices on disk structure and their synthetic spectra. Thereby investigated possible ice observation scenarios in disks. (publication|thesis)

Internal combustion engine design *Mysore, IN*

BACHELOR'S PROJECT, SRI JAYACHAMARAJENDRA COLLEGE OF ENGINEERING *2017-18*

- Devised a new engine arrangement which has 48% increase in mechanical efficiency, 60% lighter, 32% less number of parts compared to current equivalent engines.
- Presented the project in PACE Global Annual Forum - 2017, Toluca, Mexico and won 2nd prize in Collaboration and Innovation Challenge.

Designing solid propellant rocket engines *Hyderabad, IN*

INTERNSHIP, DEFENCE RESEARCH AND DEVELOPMENT LABORATORY (DRDL) *2017*

- Worked on optimizing solid propellant rocket motors by modelling the burn surface, generating thrust profiles and selecting the best solution.
- Worked on static testing of solid grain rocket motor and analysing the thrust curves.

Accepted observation proposals

2023	**JWST/MIRI Cycle-2**, Co-I, Probing carbon chemistry and dust in the planet-forming zones of brown dwarf disks (PID:3886)	*42.4 hrs*
2023	**JWST/MIRI Cycle-2**, Co-I, A NIRSpec pilot program on planet-forming disks around very-low mass stars (PID:3962)	*5.7 hrs*
2024	**ALMA Cycle-11**, Co-I, A deep dive into the carbon-rich disk around the very low-mass star 2MASS J16053215-1933159 (PID:2024.1.01296.S)	*13.4 hrs*
2024	**ALMA Cycle-11**, Co-I, Connecting Inner and Outer Disks around Very Low Mass Objects (PID:2024.1.00902.S)	*31.7 hrs*
2024	**ALMA Cycle-11**, Co-I, Water in PDS 70: how much vapour resides in a disk currently forming planets? (PID:2024.1.00714.S)	*23.3 hrs*
2024	**ALMA Cycle-11**, Co-I, Linking disk structure to a unique CO2-rich chemistry at very high angular resolution (PID:2024.1.00466.S)	*8.9 hrs*

Talks

2025, JWST observations of planet-forming disks: the hydrocarbon revolution, Dutch Astrochemistry Network mini-symposium 2025, Leiden

2025, Uncovering hidden water in carbon-rich terrestrial planet forming regions, Netherlands Astronomy Conference 2025, Berg en Dal

2024, Chemical characterization of ingredients for planet formation around young stars, NOVA@25 symposium, Den Haag

2024, Unravelling the terrestrial planet-forming ingredients with James Webb Space Telescope, Radboud University Colloquium, Nijmegen

2024, The exotic gas composition around TRAPPIST-1 progenitors unveiled by JWST, Origins seminar, University of Arizona, Tucson

2024, Probing the terrestrial planet-forming ingredients with JWST, EAS Annual meeting, Padova

2024, How common are carbon-rich inner disks around very low-mass stars?, MIRI EC meeting, Stockholm

2024, Probing the planet-forming ingredients around very low-mass stars with JWST, Kapteyn Friday Talk

2023, Unveiling the planet-forming regions around very low-mass stars with JWST, Dutch astronomy network (NOVA) Network-2 meeting, Leiden

2023, Findings from JWST spectra (short talk), Blaauw workshop: The (geo)chemistry of terrestrial planet formation and evolution

2022, Ices in planet-forming disks: self-consistent ice opacities in disk models, Kapteyn Interstellar Medium group meeting

2021, Optical properties of ices in protoplanetary disks, Dutch astronomy network (NOVA) Network-2 meeting, Leiden

2021, Optical properties of ices in planet forming disks, Kapteyn Wednesday Lunch Talk

Teaching Experience

Fall 2021-22	**Introduction to Programming and Computational Methods (Astronomy)**, Teaching Assistant
Summer 2022-25	**Planetary systems**, Teaching Assistant

Workshops

Mar 2023	**Blaauw workshop**, The (geo)chemistry of terrestrial planet formation and evolution, Groningen, Netherlands
Aug 2022	**JWST data reduction workshop**, NOVA, Leiden Observatory, Netherlands
Jan 2022	**CHAMELEON School II**, Virtual

Press & Outreach

Aug 2024	**NanoSpace Astrochemistry Training School**, Trainer and Local Organizing Committee	*Groningen*
Jun 2024	**NASA,ESA,NOVA,MPIA**, Webb Finds Plethora of Carbon Molecules Around Young Star	
Sept 2023 - Oct 2024	**Star and Planet Formation and Evolution (SPFE) group meetings (weekly)**, Organiser	*Groningen*
May 2023	**NOVA**, Astronomers spot benzene in planet-forming disk around star for first time	
Jul 2022	**JWST First Light**, Volunteer	*Groningen*
Jun 2019	**Asteroid day Delft 2019**, Volunteer	*Delft*
Apr 2018	**SJCE Astronomy and Space Technology Club**, Co-founded	*Mysuru*

Total: 28 refereed publications

NASA ADS, Google Scholar

First author articles:

A. M. Arabhavi, I. Kamp, Th. Henning, E. F. van Dishoeck, et al., MINDS: The very low-mass star and brown dwarf sample. Detections and trends in the inner disk gas, *Astronomy & Astrophysics*, 2025

A. M. Arabhavi, I. Kamp, E. F. van Dishoeck, Th. Henning, et al., MINDS: The Very Low-mass Star and Brown Dwarf Sample Hidden Water in Carbon-dominated Protoplanetary Disks, *The Astrophysical Journal Letters*, 2025

A. M. Arabhavi, I. Kamp, Th. Henning, E. F. van Dishoeck, et al., Abundant hydrocarbons in the disk around a very-low-mass star, *Science*, 2024

A. M. Arabhavi, P. Woitke, S. M. Cazaux, I. Kamp, et al., Ices in planet-forming disks: Self-consistent ice opacities in disk models, *Astronomy & Astrophysics*, 2022

Co-authored articles (up to 5th author):

G. Perotti, N. Kurtovic, T. Henning, G. Olofsson, **A. M. Arabhavi**, MINDS. Anatomy of a water-rich, inclined, brown dwarf disk: lack of abundant hydrocarbons, *Astronomy & Astrophysics*, 2025

T. Kaeufer, M. Min, P. Woitke, I. Kamp, **A. M. Arabhavi**, Bayesian Analysis of Molecular Emission and Dust Continuum of Protoplanetary Disks, *Astronomy & Astrophysics*, 2024

T. Henning, I. Kamp, M. Samland, **A. M. Arabhavi**, et al., MINDS: The JWST MIRI Mid-INfrared Disk Survey, *Publications of the Astronomical Society of the Pacific*, 2024

P. Woitke, W.-F. Thi, **A. M. Arabhavi**, I. Kamp, et al., 2D disc modelling of the JWST line spectrum of EX Lupi, *Astronomy & Astrophysics*, 2024

I. Kamp, Th. Henning, **A. M. Arabhavi**, G. Bettoni, et al., The chemical inventory of the inner regions of planet-forming disks – the JWST/MINDS program, *Faraday Discussions*, 2023

B. Tabone, G. Bettoni, E. F. van Dishoeck, **A. M. Arabhavi**, et al., A rich hydrocarbon chemistry and high C to O ratio in the inner disk around a very low-mass star, *Nature Astronomy*, 2023

P. Woitke, **A. M. Arabhavi**, I. Kamp, and W.-F. Thi, Mixing and diffusion in protoplanetary disc chemistry, *Astronomy & Astrophysics*, 2022

P. Rivière-Marichalar, A. Fuente, R. Le Gal, **A. M. Arabhavi**, et al., H_2S observations in young stellar disks in Taurus, *Astronomy & Astrophysics*, 2021