

Prakruti Sudarshan | Ph.D. student

CONTACT INFORMATION

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EDUCATION

**Max Planck Institute for Astronomy &
Ruprecht-Karls-Universität Heidelberg**, Germany
Ph.D. in Astronomy, IMPRS Fellow

October 2022 — Present

- Advisor: Dr. Mario Flock
- Working thesis title: *Dust dynamics in radiative protoplanetary disks*

Eberhard Karls Universität Tübingen, Germany

M.Sc. in Astro and Particle Physics, Overall Grade: 1.1

September 2022

- Advisors: Late Prof. Dr. Wilhelm Kley, Dr. Christoph Schäfer
- Thesis: *Spirals and gravitoturbulence in 2D disks*, Thesis grade: 1.0

Christ University, Bangalore, India

B.Sc. *triple major* in Physics, Mathematics and Chemistry, GPA: 3.93/4.00

June 2020

- Research Education and Advancement Program (REAP) student in Astrophysics, Jawaharlal Nehru Planetarium, Bangalore.

RESEARCH INTERESTS

I work on **planet formation theory**, studying **dust–gas dynamics of starlight heated protoplanetary disks**— specifically, testing the effects of stellar irradiation on disk geometry using global radiation hydrodynamical simulations with the PLUTO code. I am involved in **ongoing collaborations** modeling **circumbinary disks**, **pressureless dust fluids**, **gravitational instability**, and the **streaming instability**. I also recently joined the Indian science team of the SKAO consortium.

TECHNICAL SKILLS

- **Programming languages**: C, Python (*Advanced*); Rust, CUDA, C++ (*Basic*)
- **Astrophysical Codes**: PLUTO with radiation multifluid hydrodynamics (*Advanced*); RADMC3D, Rebound, IDEFIX (*Intermediate*)
- **Data visualization & other tools**: \LaTeX , Origin Pro (*Advanced*); Matlab, JavaScript, Hugo (*Intermediate*);
- **High Performance Computing** with MPI/GPUs (*Advanced*)

RESEARCH STAYS

Computational Physics Group (CPT), Universität Tübingen, Germany July 2021 – March 2022
Research assistant (HiWi)

Worked on a project of **how cooling influences circumbinary disks** with the GPU–PLUTO code with Dr. Anna Penzlin, Dr. Alex Ziampras, Prof. Dr. Wilhelm Kley and Prof. Dr. Richard Nelson.

- related paper published in A&A (664, A157)

PUBLICATIONS

Sudarshan, P., Ziampras, A., Flock, M., et al. in prep, “The multifluid dust module for the PLUTO code”

Kavipurapu, P., **Sudarshan, P.**, Flock, M., et al. in prep, “Dust scale-heights in protoplanetary disks susceptible to the vertical-shear instability”

Baronett, S., et al. (incl. **Sudarshan, P.**), in prep, “Streaming instability code comparison: the unstratified BA problem” [[Results online](#)]

GRAVITY Collaboration. Sanchez-Bermudez, J., **Sudarshan, P.**, et al., in prep, “HD45677: the inner cavity of a possible close binary disk”

Sudarshan, P., Flock, M., et al. submitted to A&A, “Shadows, staircases and thermal waves in starlight-heated protoplanetary disks: radiation hydrodynamical models with FLD”

Ziampras, A., **Sudarshan, P.**, et al., 2025, MNRAS, 536, 4, pp.3322-3337 “Dusty substructures induced by planets in ALMA disks: how dust growth and dynamics changes the picture” [ADS]

Ueda, T., et al. 2024 (incl. **Sudarshan, P.**), Nature Astronomy 8, 1148-1158 (2024) “Support for fragile porous dust in a gravitationally self-regulated disk around IMLup” [ADS]

Sudarshan, P., Penzlin, A. B. T., Ziampras, A., Kley, W., & Nelson, R. P., 2022, A&A, 664, A157 “How cooling influences circumbinary disks” [ADS]

TEACHING AND SUPERVISION	Summer project supervision of <i>Niranjan Ashok</i> (→ <i>Grad student at Alabama</i>) Topic: Temperature and radiation fields at gap edges in protoplanetary disks	Summer 2025
	Master thesis co-supervision of <i>Pundari Kavipurapu</i> , Heidelberg University Topic: Dust dynamics in VSI active disks with parameterized cooling laws	2023 – 2025
	Advanced Astronomy Lab Tutor , Heidelberg University <i>F36 Adaptive optics: Wavefront analysis using the Shack Hartmann Sensor</i>	Summer 2023
TALKS AND POSTERS	Exo-ELT, ESO, Germany (<i>upcoming Contributed Talk</i>)	November 2025
	AG Planet Formation Splinter, Görlitz, Germany (<i>upcoming Contributed Talk</i>)	September 2025
	Partially Ionized Plasmas in Astrophysics, Bergen, Norway (<i>Contributed Talk</i>)	September 2025
	Multiplicity in young stars, NBI, Copenhagen (<i>Contributed Talk</i>)	August 2025
	Planet & Star Formation Coffee, MPIA	March 2025
	Astronomical Society of India Meeting, Rourkela, India (<i>Contributed Talk</i>)	February 2025
	IMPRS retreat, Mosbach, Germany	September 2024
	PLUTO symposium, Torino, Italy (<i>Contributed Talk</i>)	September 2024
	Gravity+ conference, Grenoble, France (<i>Poster</i>)	June 2024
	Theory Group seminar, IPAG Grenoble, France	June 2024
	DisktoPlanet Group meeting, MPIA, Germany	May 2024
	Astronomy Unit Group meeting, Queen Mary University London	April 2024
	Group seminar, Imperial College London	April 2024
	MHD flows in young circumstellar disks, Ringberg, Germany (<i>Poster</i>)	September 2023
	Theory group meeting, Charles University, Prague	May 2023
	Protostars and Planets VII, Kyoto, Japan (<i>Poster</i>)	April 2023
	DisktoPlanet Group meeting, MPIA, Germany	October 2022
	The inner regions of protoplanetary disks, Ringberg, Germany (<i>Poster</i>)	September 2022
	Formation and Evolution of Planetary systems conference, Tübingen (<i>Contributed Talk</i>)	August 2022
	European Astronomical Society Annual Meeting (S22 session), Valencia, Spain (<i>Contributed Talk</i>)	July 2022
HONORS AND AWARDS	International Max Planck Research School (IMPRS-HD) Fellowship	2022 – 2026

	SN Bhatt Memorial ICTS Fellowship, 1/10 selected All India (<i>cancelled due to Covid-19</i>)	2020
	Christ University Physics and Electronics Club Quiz Champion	2019
	Research Education and Advancement Program (REAP) scholarship	2018 – 2019
	Secondary School Certificate (SSLC Board), 99.04%, Rank 5 in Karnataka State	2015
PROFESSIONAL SERVICE / OUTREACH	Co-chair & SOC , “Early career astronomers and their supporters” session, European Astronomical Society Annual Meeting (EAS) Cork, Ireland Co-chair & SOC , “Early career astronomers and their supporters” session, European Astronomical Society Annual Meeting (EAS) Padova, Italy Disk2Planet Group mailing list organizer LOC , Ringberg meeting on “MHD flows in young circumstellar disks” Volunteer, MPIA Tag der offenen Tür (Open day) LOC , Formation and Evolution of Planetary systems conference, Tübingen Mentoring on STEM Careers for students with economically weak backgrounds, Viveka Scholar Program, SVYM, Sargur Village, India Mediator , Virtual PSYCHE exhibition season, Science Gallery Bengaluru	July 2025 July 2024 2024 – 2025 October 2023 October 2023 August 2022 December 2023 April – May 2022
OBSERVING TIME	30-inch telescope, Vainu Bappu Observatory, Kavalur, India <i>Time series spectra of the Sun</i>	2 nights, 2019
INDUSTRY EXPERIENCE	Bosch Sensortec GmbH, Reutlingen, Germany <i>Working Student Intern</i> Worked on the analysis of MEMS-based Bosch sensor data and in-house code documentation using Python and Matlab.	April 2022 – July 2022