

## 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: *Shadows and starlight substructures in dusty, 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:** L<sup>A</sup>T<sub>E</sub>X, Origin Pro (*Advanced*); Matlab, JavaScript, Hugo (*Intermediate*);
- **High Performance Computing** with MPI/GPUs (*Advanced*)

## RESEARCH EXPERIENCE

**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.**, Flock, M., to be subm., A&A, “Shadows and staircases in starlight heated protoplanetary disks: Limits to the irradiation instability with FLD”

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”

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 *incoming student Niranjan A.* June 2025  
Topic: Temperature and radiation fields at gap edges in protoplanetary disks

**Master thesis co-supervision** of *Pundari Kavipurapu*, Heidelberg University 2023 – 2025  
Topic: Dust dynamics in VSI active disks with parameterized cooling laws

**Advanced Astronomy Lab Tutor**, Heidelberg University Summer 2023  
*F36 Adaptive optics: Wavefront analysis using the Shack Hartmann Sensor*

#### TALKS AND POSTERS

Planet & Star Formation Coffee, MPIA March 2025  
Astronomical Society of India Meeting, Rourkela, India (*Contributed Talk*) February 2025  
IMPRS retreat, Mosbach, Germany September 2024  
PLUTO symposium, Torino, Italy (*Contributed Talk*) September 2024  
Gravity+ conference, Grenoble, France (*Poster*) 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 (*Poster*) September 2023  
Theory group meeting, Charles University, Prague May 2023  
Protostars and Planets VII, Kyoto, Japan (*Poster*) April 2023  
DisktoPlanet Group meeting, MPIA, Germany October 2022  
The inner regions of protoplanetary disks, Ringberg, Germany (*Poster*) September 2022  
Formation and Evolution of Planetary systems conference, Tübingen (*Contributed Talk*) August 2022  
European Astronomical Society Annual Meeting (S22 session), Valencia, Spain 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 (*cancelled due to Covid-19*) 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 July 2025  
**Co-chair & SOC**, “Early career astronomers and their supporters” session,

	European Astronomical Society Annual Meeting (EAS) Padova, Italy	July 2024
	Disk2Planet Group mailing list organizer	2024 – 2025
	<b>LOC</b> , Ringberg meeting on “MHD flows in young circumstellar disks”	October 2023
	Volunteer, MPIA Tag der offenen Tür (Open day)	October 2023
	<b>LOC</b> , Formation and Evolution of Planetary systems conference, Tübingen	August 2022
	Mentoring on STEM Careers for students with economically weak backgrounds, Viveka Scholar Program, SVYM, Sargur Village, India	December 2023
	<b>Mediator</b> , Virtual PSYCHE exhibition season, Science Gallery Bengaluru	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	<b>Bosch Sensortec GmbH, Reutlingen, Germany</b> <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