Dr. Rajika Kuruwita — Citizenship: Australian

Contact Information

Heidelberg Institute for
Theoretical Studies
Schloß-Wolfsbrunnenweg 35
69118 Heidelberg, Germany

Tel: +49 176 2485 8379
E-mail: rajika.kuruwita@h-its.org
Website: https://rajikalk.github.io/index.html
ORCID: 0000-0002-9236-2919

Research Interests

Star formation, binary and multiple star systems, protoplanetary disks and planets in binary star systems, MHD simulations, and software development.

Education

Australian National University, Canberra, Australia **February, 2015 - January, 2019**

PhD

- Thesis Topic: "The formation, evolution, and survivability of discs around young binary stars"
- Primary Supervisor: Associate Professor Christoph Federrath
- Secondary Supervisor: Professor Michael Ireland

Macquarie University, Sydney, Australia **February, 2010 - January, 2015**

MRes. Physics and Astronomy

- Thesis Topic: "Fallback disks and the end of the common envelope phase"
- Primary Supervisor: Professor Orsola De Marco
- Secondary Supervisor: Assistant Professor Jan Staff

BSc. Astronomy and Astrophysics

Employment History

Heidelberg Institute for Theoretical Studies, Heidelberg, Germany
Independent Postdoc Fellow **October, 2019 - Present**
Research the formation of binary and multiple star systems via numerical simulations.

University of Copenhagen, Copenhagen, Denmark
Marie Sklodowska-Curie Interactions Fellow) **April, 2019 - August, 2022**
Investigate protostellar multiplicity and binarity on disk evolution.

Australian National University, *Canberra, Australia*
Research Assistant **February, 2019 - April, 2019**
Research the formation of binary star systems via simulations.
Outreach Assistant **December, 2015 - April, 2019**
Organize observing and site tours, and design activities for the observatory visitor center.

Macquarie University, *Sydney, Australia*
Laboratory Demonstrator **February, 2014 - January, 2015**
Taught lab experiments for undergraduate students. This also involved marking lab books.
Observatory and Planetarium Supervisor **February, 2010 - January, 2015**
Coordinated groups, created tours/presentations, operated observatory and planetarium.
Vacation Scholarship Researcher **December, 2012 - February, 2013**
Simulated light curves to understand the influence of exoplanets on the asteroseismological pulsation spectrum of stars.
Vacation Scholarship Researcher **January, 2012 - February, 2012**
Carried out research on nanowires using white light interferometry.

Time Awarded

Australian National University 2.3m Telescope

- **PI***: Building a Census of Disks in Binary Star Systems (20 nights over 3 years)*

LUMI Supercomputer

- **CO-I***: Embedded Disks: 24000000 core hours over 12 months*

PRACE

- **CO-I***: Embedded Disks (2021250113): 40000000 core hours over 12 months*

Selected Talks

European Astronomical Society ASM — **July, 2024**
Invited Review Talk — *Padua, Italy*

ESO Star & planet formation seminar — **September, 2023**
Invited Talk — *Garching, Germany*

Anton Pannekoek Institute for Astronomy — **April, 2022**
Invited Talk — *Amsterdam, The Netherlands*

Distorted Astrophysical Discs — **May, 2021**
Contributed Talk — *Cambridge, UK*

Niels Bohr Institute — **January, 2019**
Invited Talk — *Copenhagen, Denmark*

Sutherland Astronomical Society Incorporated — **September, 2018**
Invited Talk — *Sydney, Australia*

Franco-Australian Astrobiology and Exoplanet School and Workshop — **December, 2017**
Contributed Talk — *Canberra, Australia*

Star Formation — **August, 2016**
Computational Astrophysics splinter session (Invited) — *Exeter, UK*

Awards and Honors

- *2023: Isobel Rojas Travel Award recipient (3000EUR)*
- *2023: 10000EUR Hochschulwettbewerb award to make a project about 'Our Universe'.*
- *2022: Became the first HITS Independent Research Fellow (5000EUR per year)*
- *2021: Kvinder i Fysik (Danish Women in Physics) Prize 2021 Nominee*
- *2020: European Union INTERACTIONS Fellowship*
- *2017: Joan Duffield Research Supplementary Scholarship*
- *2015: Australian Postgraduate Award*
- *2013: Macquarie University Research Training Scholarship*
- *2011, 2012: Vacation Scholarship (Macquarie University)*

Teaching

Computational astrophysics lecturing — **November, 2019 - February 2021**
Post-graduate level lectures on computational astrophysics.

Laboratory demonstrator — **February, 2014 - January, 2015**
Taught lab experiments for undergraduate students. I also marked lab books.

Supervision

Niels Bohr Institute masters students — **August, 2021 - 2022**
I co-supervised three Master's students and two papers were published form this work.

Niels Bohr Institute bachelors projects — **February-April, 2021, 2022**
Supervised five groups (three to four students per group) on projects including modeling exoplanet interiors, and n-body simulations of the solar system and stellar systems.

Mt Stromlo Observatory summer research — **December, 2017 - February, 2018**
Co-supervised one honour's student and published a paper from this work.

Mt Stromlo Observatory winter school — **June-July, 2017**
Supervised four students in planning observations and writing telescope proposals.

Other Academic Services

- *Reviewer for Monthly Notices of the Royal Astronomical Society.*
- *Founded of Astronomy on Tap Copenhagen in 2020.*
- *Treasurer of Kvinder i Fysik (the Danish Women in Physics Society) from 2019 to 2022.*
- *Contributed popular science articles to the Sunday Space in the Canberra Times.*
- *Member of the Local Organizing Committee for the 2017 Harley Wood Winter School and Annual Scientific Meeting of the Astronomical Society of Australia.*
- *Member of the Science Organizing Committee for the 2016 Harley Wood Winter School.*
- *Chair of the Organizing Committee for the 2016 Mt Stromlo Student Seminars.*

Computer Skills

- *Computing Languages: Python, Fortran and HTML item Applications: LaTeX, yt, RAMSES, FLASH, and Enzo, reducing observational data.*
- *Operating Systems: Unix/Linux, Windows, and Mac.*

Refereed Publications

Kuruwita, R. *et al,* Protostellar spin-up and fast rotator formation through binary star formation*, 2024,* Accepted at Astronomy & Astrophysics
- *Lead author, and conductor of research and analysis.*

Kuruwita, R., *& Haubølle, T.,* The contribution of core-fragmentation on protostellar multiplicity*, 2023, Astronomy & Astrophysics, 674, A196*
- *Lead author, and conductor of research and analysis.*

Kuruwita, R. *et al.,* The dependence of episodic accretion on eccentricity during the formation of binary stars*, 2020, Astronomy & Astrophysics, 641, A59*
- *Lead author, and conductor of research and analysis.*

Kuruwita, R., *& Federrath, C.*, The role of turbulence during the formation of circumbinary disks*, 2019, Monthly Notices of the Royal Astronomical Society, 486, 3647-3663*
- *Lead author, and conductor of research and analysis.*

Kuruwita, R., *et al.,* Multiplicity of disc-bearing stars in Upper Scorpius and Upper Centaurus-Lupus*, 2018, Monthly Notices of the Royal Astronomical Society, 480, 5099–5112*
- *Lead author, and conductor of research and analysis.*
- *Collected the majority of observations.*

Kuruwita, R., *et al.,* Binary star formation and the outflows from their discs*, 2017, Monthly Notices of the Royal Astronomical Society, 470, 1626-1641*
- *Lead author, and conductor of research and analysis.*

Kuruwita, R., *et al.,* Considerations on the role of fall-back discs in the final stages of the common envelope binary interaction*, 2016, Monthly Notices of the Royal Astronomical Society, 461, 486-496*
- *Lead author, and conductor of research and analysis.*

Li, S. **et al**, Observations of high-order multiplicity in a high-mass stellar protocluster*, 2024, Nature Astronomy*
- *Used my models from Kuruwita & Haugbølle (2023) to interpret statistics of this massive star-forming region.*

Tuhtan, V., Al-Belmpeisi, R., Christensen, M. B., **Kuruwita, R.**, *& Haugbølle, T.,* Simulated Analogues I: apparent and physical evolution of young binary protostellar systems*, 2024,* Accepted at MNRAS
- *Co-supervised Vito, Rami, and Mikkel for their Master's thesis*

Al-Belmpeisi, R., Tuhtan, V., Christensen, M. B., **Kuruwita, R.**, *& Haugbølle, T.,* Simulated analogues II: a new methodology for non-parametric matching of models to observations*, 2024,* Accepted at MNRAS
- *Co-supervised Vito, Rami, and Mikkel for their Master's thesis*

Evans, E. **et al**, Orbital Architectures of Planet-Hosting Binaries III. Testing Mutual Inclinations of Stellar and Planetary Orbits in Triple-Star Systems*, 2024,* Accepted at MNRAS
- *Uses observations I obtained during my PhD*

Jørgensen, J. & **Kuruwita, R.** *et al,* Binarity of a protostar affects the evolution of the disk and planets*, 2021, Nature, Volume 606, Issue 7913, p.272-275*
- *Lead the theoretical component of paper. Conducted analysis of simulations used for comparison with observations.*

Gerrard, I., Federrath, C., & **Kuruwita, R.**, The role of magnetic field structure in the

launching of protostellar jets*, 2019, Monthly Notices of the Royal Astronomical Society, 485, 5532-5542*

- *Co-supervised Gerrard in running simulations and analysing them*

Green, J. D., **et al.**, Testing the binary trigger hypothesis in FUors*, 2016, The Astrophysical Journal, 830, 29*

- *Obtained observational data with Keck and contributed to paper writing.*

Childress, M., **et al.**, The ANU WiFeS SuperNovA Programme (AWSNAP)*, 2016, Publications of the Astronomical Society of Australia, 33, 29*

- *Obtained observational data with Australian National University 2.3m telescope.*

Little, D., **et al.**, Phase-stepping interferometry of GaAs nanowires: Determining nanowire radius*, 2013, Applied Physical Letters, 103, 161107*

- *Obtained experimental data with white light interferometry of nanowires.*

BOOK CHAPTERS

Kuruwita, R., *Tychoniec Ł, & Federrath, C*, Star Formation*, Encyclopedia of Astrophysics (edited by I. Mandel, section editor F.R.N. Schneider) to be published by Elsevier as a Reference Module.*

- *Lead author, and coordinated chapter structure and elements.*

PROCEEDINGS

Kuruwita, R., Accretion behaviour during binary star formation*, October 2021, Hypatia Colloquium 2021: Early Career Astronomer series at ESO.*

- *Lead author, and conductor of research and analysis.*