Kaustub P Anand

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Researcher

I am a graduate student at Purdue University with research interests in rings around non-planetary bodies, comets, and a variety of Solar System dynamics. I have experience with numerical simulations and observations in Planetary Sciences and Astronomy.

Technical Skills

Programming Languages	:	Python, FORTRAN, Java, IDL, LaTeX, SAOImage DS9, C, C++, Matlab, IRAF
Pertinent Coursework	:	Computational Physics Lab, Solar System Astronomy, Numerical Modelling of Orbital Dynamics, Quantum Mechanics 1 & 2, Observational Astronomy Techniques, Fourier Analysis, Stellar Evolution, General Relativity
Languages	:	English, Hindi, French
Telescopes Used	:	DECCam

Research Experience

Simulations of Deimos, Phobos, and the Mars debris disk Jan 2024 – Present
Advisor: Dr. David Minton and Dr. Matija Ćuk *Purdue University*
Developing numerical simulations to constrain the origin mechanism of Deimos and Phobos, and their related dynamics with the Mars debris disk and sesquinary impacts.

Numerical Simulations of Solar System Ring Systems Aug 2022 – Present
Advisor: Dr. David Minton *Purdue University*
Developing numerical simulations of ring systems around non-planetary objects such as Centaurs and Trans-Neptunian Objects (TNOs) to understand their origin, evolution, and physical interactions. Added gravitational harmonics capabilities to Swiftest.

Hydro Codes for Accretion disks in a Binary system May 2022 – Jun 2022
Advisor: Dr. Paul Duffell *Purdue University*
Understood the basic principles and worked on the creating a hydro code for analysis of Accretion Disks around binary systems.

Protoclusters in Simulation May 2021 – May 2022
Advisors: Dr. Kyoung-Soo Lee and Dr. Maria Celeste Artale *Purdue University*
Analysed and extracted various features such as Stellar Mass Functions, Luminosity Functions, and Correlation Functions of Lyman-Alpha galaxies and galaxy clusters from IllustrisTNG boxes in concurrence with ODIN observational data.

Dust-obscured Galaxy Clusters in far-IR May 2019 - May 2022
Advisor: Dr. Kyoung-Soo Lee *Purdue University*
Identified, refined, and stacked Herschel/SPIRE archival data in MaDCoWS and SPT clusters in SPIRE far-IR bands to obtain star formation rates for dust-obscured galaxy clusters that are modeled as a function of redshift and mass.

Fluid Simulation in XENON1T January 2018 - May 2018
Advisor: Dr. Rafael Lang *Purdue University*
Aided in the development of an ANSYS Fluent program designed to simulate the convection flow in the liquid Xenon tank due to a temperature gradient for the dark matter research (XENON1T) project.

Education

Purdue University West Lafayette, IN, USA
Bachelor of Science in Physics Honors. *Aug 2017 – May 2021*
Minors in Astronomy and Math. Graduated with Distinction.

Cum. GPA: 3.92/4.00; Major GPA: 3.96/4.00

Purdue University West Lafayette, IN, USA
Doctor of Philosophy in Physics. *Aug 2021 – Present*
GPA: 3.60/4.00

Leadership and Professional Experience

Physics Teaching Assistant — Purdue University
Teaching Assistant — *Aug 2018 – Mar 2020 & Aug 2021 – Dec 2022*
Aided students in group labs and recitations including python programming for modern mechanics (PHYS 172), electricity and magnetism (PHYS 272), senior-level Computational Physics Lab (PHYS 580), and Optics Lab (PHYS 450). Started as a Graduate Teaching Assistant in Aug 2021.

Saturday Morning Astrophysics — Purdue University
Undergrad teacher — *Jan 2020 – Mar 2020 & Jan 2021 – May 2022*
Teach and introduce common astronomy and physics concepts to elementary & middle school students through hands-on experiments monthly on Saturdays. Cut short due to COVID-19.

Peer Success Coach — Purdue University
Tutor — *Jan 2021 – May 2021*
Tutor and coach students at the Purdue Academic Success Center to improve their studying behaviour and motivate them to work towards achieving their current and new academic goals.

Protect Purdue Ambassador — Purdue University
Ambassador — *Jan 2021 – May 2021*
Educate, unify and encourage Purdue students to protect themselves, others and the entire Purdue community as they adjust to the new COVID-19 rules by creating social media content, presenting to campus organizations, etc.

International Student Ambassador — Purdue University
Ambassador — *May 2020 – May 2021*
Aid the Purdue International Students and Scholars (ISS) office as a student ambassador in organizing events for the international student community on campus including new student orientations, cultural mixers, Q&A sessions, etc.

Global Science Partners Leadership — Purdue University
Team Leader — *Aug 2019 – May 2021*
Organized and led events and discussions based on intercultural interactions in professional scientific settings among members of Global Science Partners learning community ($\sim$160 students) to stimulate conversations about the effects of culture on behaviour and scientific collaborations.

Papers

Swiftest: An *N*-body Integrator for Gravitational Systems — doi:10.21105/joss.05409
Carlisle Wishard, Jennifer Pouplin, Jacob Elliott, Dana Singh, ***Kaustub Anand****, David Minton*

Presentations

Division of Planetary Sciences-Europlanet Science Congress 2023 — San Antonio, TX
Presented a poster about my research on Centaur rings at the 2023 DPS-EPSC combined meeting — *Oct 2023*

Department of Physics and Astronomy annual poster symposium — Purdue University
Presented a poster about my research on Centaur rings with Dr. Minton. — *Fall 2023*

Department of Physics and Astronomy 1-minute colloquium — Purdue University
Presented a 1-minute summary of my research on small body ring systems with Dr. Minton. — *Dec 2022 & 2023*

Purdue Fall 2020 Research Expo — Purdue University
Presented a poster about my galaxy cluster research with Dr. Lee at the Fall 2020 Research Exposition. — *Fall 2020*

Awards & Certificates

- Dean's List. 2017 – 2021
- Semester Honors. 2017 – 2021
- Honors College. 2018 - 2021
- Arthur N. Pozner Memorial Scholarship for academic excellence in Physics. 2020
- Learning Beyond the Classroom Certificate for intercultural learning in Science. 2021
- Martin C. Jischke Outstanding International Student Award. 2021