

Tanmay Raswant

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EDUCATION

- University of Illinois Urbana-Champaign** 2023 - Present
Bachelor of Science in Astrophysics Honors, Minors: Computer Science, Data Science Urbana, IL
 - GPA: 3.76/4.00; Deans List, James Scholar Honors
 - Senior Thesis: *In prep*

AFFILIATIONS

- LSST Dark Energy Search Collaboration (DESC) 2025 - Present
- Supernovae in the InFRared avec Hubble Survey (SIRAH) 2025 - Present
- The Young Supernova Experiment (YSE) 2025 - Present
- NSF-Simons AI Institute for the Sky (SkAI) 2025 - Present

PUBLICATIONS AND PROPOSALS

- Pierel, J. D. R., et al. (including **Raswant, T.**) (2025). **SIRAH: II. Near-infrared Hubble Space Telescope Observations of Type Ia Supernovae.** Manuscript submitted for publication in *The Astrophysical Journal*.
- Jha, S. W., et al. (including **Raswant, T.**) **SIRAH: I.** *In preparation.*
- Larison, C., et al. (including **Raswant, T.**) (2026, in prep.). **SIRAH: III.** *In preparation.*
- Agrawal, A., **Raswant, T.**, et al. (2026, in prep.). **SIRAH: IV.** *In preparation.*
- Raswant, T.** (Co-PI), et al. **Que SIRAH SIRAH: Completing the Low-Redshift NIR Supernova Anchor for Roman.** *Hubble Space Telescope Cycle 34 GO Proposal #7819.*

RESEARCH EXPERIENCE

- Illinois Supernova Research Group, UIUC** Nov 2024 - Present
Supernova Cosmology Researcher | Advisor: Prof. Gautham Narayan Urbana, IL
 - Using Type Ia supernovae to test evidence for dark energy.
 - SIRAH: modeling ~30 supernovae photometry in near-infrared using the Hubble Space Telescope.
 - Integrating space-based NIR data with ground-based optical data from LCO, ZTF, and ATLAS.
 - Fitting light curves and constructing Hubble diagrams to validate distance-redshift relations and cosmological consistency.
- Illinois Exoplanet Research Group, UIUC** Aug 2025 - Feb 2026
Forward Modeling Team Lead | Advisor: Prof. Jiayin Dong Urbana, IL
 - Team Lead for single-star and planet models.
 - Reconstructed the Gaia telescope pipeline ahead of the DR4 release using PyTensor and PyMC.
 - Applied a Bayesian inference approach to infer planetary companion properties from Gaia Renormalised Unit Weight Error (RUWE) measurements.
- National Center for Supercomputing Applications (NCSA)** Jun 2025 - Jul 2025
HPC: ML + AI Summer Intern Urbana, IL
 - Built and trained image classification CNNs on MNIST-1D and CINIC-10 datasets using PyTorch.
 - Experimented with architecture depth and channel projection variations.
 - Used Lightning Fabric for distributed training across multiple GPUs on the Delta supercomputing cluster.
- Modeling of Nuclear Materials Group, UIUC** Jan 2024 - Aug 2024
Nuclear Physics Researcher | Advisor: Prof. Jianqi Xi Urbana, IL
 - Improved understanding of radiation defects in nuclear materials using ML and Density Functional Theory.
 - Solved Schrödinger like equations in the Kohn-Sham scheme for the electron densities of non-interacting electrons.
 - Ran Molecular Dynamics, Kinetic Monte Carlo, and cluster dynamics simulations to predict micro-structural evolution under nuclear radiation.
- Astronomy Department, IIT Roorkee** Jun 2023 - Jul 2023
Astrophysics Summer Intern Roorkee, India
 - Authored a 30+ page review paper on stellar evolution, developing scientific writing skills.
 - Completed advanced lectures on stellar astrophysics.
- Deepali Exhibitions Pvt Ltd** Nov 2021 - Sept 2022
Material Science Research Intern | Advisor: Dr. Akash Pandey India
 - Research and Development on applications of graphene in high-altitude structures.
 - Computed most efficient diagrams for maintaining laminar heat flow in high-altitude structures.
 - Improved turbine efficiency by 7% using ferromagnetic materials and Brake Energy Regeneration.

RELEVANT PROJECTS

- **Cold Molecular Gas Kinematics in a Type 2 Quasar Host Galaxy** *Advisor: Leslie Looney*
Radio Astronomy Capstone Project, UIUC
 - Reduced ALMA Band 5 observations of a low-redshift QSO2 (J1010, $z = 0.098$) targeting CO(2-1), executing the full pipeline from selfcalibration through spectral cube imaging in CASA.
 - Applied iterative selfcalibration via auto-selfcal on multi-SPW measurement sets, resolving data format issues and optimizing solution intervals to achieve $\sim 5.7\%$ SNR improvement.
- **Unveiling Jupiter: Core Structure, Formation Theories, and Solar System Influence** *Advisor: Charles Gammie*
Planetary Systems Honors Project, UIUC
 - Literature review on Jupiter's primordial core, EOS uncertainties, and migration effects on the early solar system.
 - Investigated Core Accretion and Disk Instability formation models against Juno mission data.
 - Examined Jupiter's role in shaping the solar system via the Grand Tack model and volatile delivery.
- **Role of Special and General Relativity in GPS Navigation** *Advisor: Elena Koptieva*
Special Relativity Honors Project, UIUC
 - Derived relativistic corrections to GPS satellite clocks using the Schwarzschild metric, quantifying gravitational time dilation ($+45 \mu\text{s}/\text{day}$) and motion-induced time dilation ($-7 \mu\text{s}/\text{day}$) for a net correction of $38 \mu\text{s}/\text{day}$.
 - Computed higher-order relativistic corrections up to v^4/c^4 , including Lense-Thirring frame-dragging effects, relevant for nanosecond-precision applications.
 - Analyzed practical implications of relativistic effects on GPS synchronization, showing uncorrected errors would accumulate to $\sim 11 \text{ km}/\text{day}$.

RELEVANT COURSEWORK

- **Astrophysics:** Stellar Astrophysics, Radio Astronomy, Computing in Astronomy, Fundamentals of Data Science in Astronomy, Planetary Systems
- **Physics:** Quantum Physics, Thermal Physics, Classical Mechanics, Electromagnetic Fields, Special Relativity
- **Mathematics:** Calculus III, Linear Algebra with Computational Applications, Differential Equations
- **Computer Science & Data Science:** Java, C++, Data Structures, Modeling and Learning

SKILLS

- **Skills:** Bayesian Statistics and Inference, Model fitting, Data Analysis, Statistical Analysis, Forward Modeling, Data Visualisation, Machine Learning, Pipeline Construction, Big Data Analysis
- **Tools:** BayeSN, SALT, SNCosmo, CASA, CARTA, , Astrometrica, VASP, Vesta
- **Python:** Proficient with numpy, astropy, pandas, matplotlib.
EX: space & ground-based data photometric analysis (SIRAH project), Pipeline Construction (Gaia pipeline).

EVENTS, POSTERS & TALKS

- **[Talk] Cold Molecular Gas Kinematics in a Type 2 Quasar Host Galaxy** *May, 2026*
Research Project, ASTR 496: Radio Astronomy
- **[Poster] Constraining H_0 with NIR SNe Ia from SIRAH** *April, 2026*
AstroFest, UIUC
- **[Hackathon] Setting up pre-SN alert with Lasair Broker** *April, 2026*
Rubin Alerts & AI Hackathon, The SkAI Institute
- **[Event] DESC February 2026 Virtual Meeting** *Feb, 2026*
Dark Energy Science Collaboration
- **[Event] DESC July 2025 In-person Meeting** *July, 2025*
UIUC
- **[Event] AstroFest** *April, 2025*
UIUC

LEADERSHIP EXPERIENCE

- **Astronomy & Math Tutor** *Feb 2024 - Jan 2025*
Math & Astronomy Department, University of Illinois Urbana-Champaign
 - Tutored Pre-Calculus and Calculus in the Math Department.
 - Tutored Calculus and Physics Mechanics in the Astronomy Department.
- **EYES ON THE SKY – Founder and President** *May 2022 - March 2023*
Astronomy Club
 - Indian Space Research Organisation (ISRO) certified.
 - Curated seminars, inviting ISRO scientists to discuss future ISRO missions.
 - Held multiple info sessions and meetings to institute interest in younger generations.

- **ACADEMIC CLUBS – Head and Mentor**

May 2022 - March 2023

School Clubs

- Led and overviewed all school academic clubs by working closely with Presidents of each club.
- Curated the framework and curriculum for each club and modelled deadlines.

- **SCHOOL COUNCIL – Sports Captain**

May 2022 - March 2023

School Council

- Scheduled and organised over 10 inter-mural and intra-mural sporting events.
- Carried out selection of players, teams, and training plan for all events.
- Worked closely with Sports Dean, Dr. Ruby Kumar, to perform all these tasks.

- **SPACE – Event Head**

May 2015 - March 2019

Astronomy Club

- Held events like stargazing sessions, dark site trips, and science museums.
- Executed Dark Site Trip to Astroport Sariska to view the night sky in low light pollution.
- Worked closely with Astronomy Department to hold all events.