Ishan F. Ghosh-Coutinho

Curriculum Vitae

University of Washington Department of Astronomy, Seattle
University of Washington School of Drama, Seattle
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Education

B.S. in Astronomy, University of Washington (UW) — 2024

B.A. Minor in Drama: Design for Performance, (UW) — 2024

Research Experience

Undergraduate Researcher (UW Massive Star Group & DiRAC Institute) — 2020 – Present
Supervisor: Prof. James R.A. Davenport, Prof. Emily M. Levesque, Dr. Trevor Dorn-Wallenstein
(Published: Ghosh-Coutinho et al. 2023a, 2023b; 2024a (accepted),2024b (expected))

30" Telescope Operator (Manashtash Ridge Observatory) — 2023 – Present
Supervisor: Prof. Oliver Fraser (University of Washington)

Publications & Conference Proceedings

Publication: Photometric Classification of Evolved Massive Stars: Spectroscopic Verification and Validation
Ishan Ghosh-Coutinho, Trevor Dorn-Wallenstein, Emily Levesque, & James Davenport. Research Notes of the American Astronomical Society (November 2023)

iPoster: Photometric Classification of Evolved Massive Stars: High-Resolution Spectroscopic Validation
Ishan Ghosh-Coutinho, Trevor Dorn-Wallenstein, Emily Levesque, & James Davenport. Bulletin of the American Astronomical Society, (January 2023)

iPoster: Census of Variability of Luminous Blue Stars in Gaia and ZTF
Ishan Ghosh-Coutinho, James Davenport, Emily Levesque, & Trevor Dorn-Wallenstein. Bulletin of the American Astronomical Society, (Accepted January 2024)

Employment

Committee Chair — October 2023 - Present
Associated Students of the University of Washington (ASUW),
Senate Committee for Resolution Follow Up, Seattle, WA

Honors & Awards

Deans List (UW) — 2023
Invited Panelist, Panel on Undergraduate Research in Phys. and Astro. (UW) — 2023
Chambliss Award Runner Up, American Astronomical Society 241, (AAS) — 2023
ASUW Senate, Senator Parliamentarian (UW) — 2023
2022 DiRAC Summer Research Prize (DiRAC) — 2022

Successful Observing Proposals

Manastash Ridge Observatory 30", Telescopes (12 full nights) - Certified Observer — 2023 – Present
Multiband variable star photometry with Evora.
P-I: **I. Ghosh-Coutinho**

APO 0.5-m ARCSAT (4 Half Nights) - Trained Observer — 2023
Observing variable massive stars identified from ZTF for the Astro 480 course.
P-I: S. Tuttle

APO 3.5-m (3 half nights) - Trained Observer 2021
Co-observing massive stars with the echelle spectrograph.
P-I: T. Dorn-Wallenstein

Speaking & Confrence Experience

Contributed Talk, Mary Gates Undergraduate Research Symposium (Planned)	2024
Contributed Talk, Astronomy on Tap (Planned)	2024
Contributed iPoster, 243rd Meeting of the American Astronomical Society, iPoster	2024
Invited Talk, Battle Point Astronomical Association	2023
Invited Panelist, Panel on Undergraduate Research in Physics and Astronomy	2023
Attendee, Dark Universe Science Center & Institute for Nuclear Theory, Cosmic Intersections	2023
Invited Speaker, Pacific Science Center 2023 Eclipse & Meet a Scientist Day	2023
Contributed Science Talk, Astro Fest	2023
Contributed Structural Talk, Astro Fest	2023
Contributed Talk, Mary Gates Undergraduate Research Symposium	2023
Contributed iPoster, 241st Meeting of the American Astronomical Society	2023
Contributed Talk, Mary Gates Undergraduate Research Symposium	2022
Contributed Talk, Mary Gates Undergraduate Research Symposium	2021

Technical Skills

Programming Languages: Python, SQL/ADQL, Java,
Other: Unix Shell, IRAF, SAO DS9, LaTex, PhotUtils, PyMC, Emcee, Adobe Suite, Visual Basic for Applications (VBA)
Observing Skills: Proposing, planning, and carrying out optical spectroscopic and photometric observations, Survey & time-domain data retrieval and analysis; machine learning methods (regression & classification);
Languages: English, Hindi, Bengali (Spoken), French

Service & Outreach

UW Sexual-Orientation and Gender Minorities in Astronomy, Founder & Co-Chair (UW)	2023 – Present
Planetarium Presenter, 40+ shows and events and counting (UW)	2021 – Present
School of Drama, Costume Designer - *Airness* (UW)	2024 – Present
School of Drama, Assistant Costume Designer - *The Moors* & Misc. (UW)	2023 – 2024
UW Astro Undergraduate Volunteer Coordinator & Undergraduate Outreach Site Lead for Pacific Science Center Outreach Event	2023
ASUW Senator, Chair of Committee for Resolution Follow Up	2023 – Present
ASUW Senator, Committee for Senate Steering	2023 – Present
ASUW Senate's Liason to UW Office of Government Relations, Committee on Legislative Steering	2023 – Present
ASUW Senator, Member of Committee for Resolution Follow Up	2022 – Present
ASUW President's Liaison to UW Tri-Campus Committee on Preparedness Oversight	2022 – Present
FIRST Washington, PNW District Control Systems Advisior	2022 – Present
FIRST Washington, PNW District Robot Inspector	2021 –Present
ASUW Senate's Liaison to the Husky Union Building, Board of Reps.	2020 – 2021
ASUW Senator, Member of On Campus Committee	2020 – 2021
Volunteer Game Master, Pen and Paper Gaming Association	2020 – Present
FIRST Washington, Mentor to FRC Team 8248 ChainLynx	2019 – Present

Teaching & Mentoring

Mentor for Lincoln Highschool CTE Programs & First Robotics Competition Team 8248, ChainLynx 2019 – Present
· Mentored >60 students in skills such as effective design strategies, control systems design and programming. Taught students effective scientific and engineering problem-solving, programming, and troubleshooting. Guided students through the design and design review processes. Guided students

through team management, leadership soft skills, curriculum development and peer mentoring. Provided students with networking opportunities.

Annual Data Science for Highschoolers Workshop 2022–Present
· Taught students basic use of Jupyter Notebooks, python, github, APIs, to pull data and analysis through various packages such as pandas, scipy, matplotlib, etc. Introduced students to basic data science concepts and bayesian statistics.

Journal Club for Highschoolers 2022,2023
· Created a program for high school students that used a combination of `astrobites` and presentations to simplify astronomy and astrophysics papers whose titles students found interesting and selected. There have been 14 such Journal Clubs.

High School Tutor 2020–Present
· Helped >20 high school students work through assignments and concepts related to science, engineering, history, and math.

Peer Tutor & Mentor 2022-2023
· Helped 5 students work through assignments and concepts in lower-division physics, astronomy and math coursework and gave advice on how to approach upper-division coursework and research.

Notable Astronomy Courses

18. Astro 499: Undergraduate Research (Capstone Class)
33 Credits between Winter 2021 and Spring 2024
Credit for working on various research projects, talks, and publications.
17. Astro 597 or 598: Graduate Machine Learning (Planned) Spring 2024
Builds on combining theoretical background with hands-on work on examples of data analysis with modern astronomical datasets towards learning modern computational techniques.
16. Astro 419: Exoplanets (Planned) Spring 2024
Exoplanet properties, discovery, and habitability. Examines the science involved in the search for Earth-like planets and life beyond our Solar System. Topics include: exoplanet environments, modelling exoplanet planetary systems, planetary habitability, detection, and properties of exoplanets.
15. Astro 531: Stellar Interiors (Permission Requested) Spring 2024
Physical laws governing the temperature, pressure, and mass distribution in stars. Equation of state, opacity, nuclear energy generation, computational methods. Models of main sequence stars and star formation.
14. Astro 507: Graduate Physical Foundations of Astrophysics Winter 2024
Introduction to astronomical hydrodynamics and magnetohydrodynamics, basic theorems and application to stellar and interstellar magnetic fields. Introduction to plasma physics and waves in a plasma.
13. Astro 519: Graduate Radiative Processes In Astrophysics Winter 2024
Theory and applications of astrophysical radiation processes: transfer theory; thermal radiation; theory of radiation fields and radiation from moving charges; bremsstrahlung; synchrotron; compton scattering; plasma effects. (Will count for Phys 322 completion)
12. Astro 421: Stellar Observations and Theory (Planned) Winter 2024
Observations and theory of the atmospheres, chemical composition, internal structure, energy sources, and evolutionary history of stars.
11. Astro 423: High-Energy Astrophysics Autumn 2024
High-energy phenomena in the universe. Includes supernova, pulsars, neutron stars, x-ray and gamma-ray sources, black holes, cosmic rays, quasi stellar objects, active galactic nuclei, diffuse background radiations. Radiative emission, absorption processes, and models derived from observational data.
10. Astro 481: Astronomical Observation (Capstone) Summer 2023
Theory and practice of obtaining optical data at a telescope. Preparation and operation of a telescope, obtaining data with a CCD and subsequent data analysis for completion of a self-guided research project.

9. Astro 480: Astronomical Data Analysis (Capstone) Spring 2023
   Hands-on experience with electronic imaging devices (CCDs) and software for image reduction and analysis. Introduction to operating systems, reduction software, and statistical analysis with applications to CCD photometry.
8. Astro 513: Cosmology And Particle Astrophysics Spring 2023
   Big bang cosmology; relativistic world models and classical tests; background radiation; cosmological implications of nucleosynthesis; baryogenesis; inflation; galaxy and large-scale structure formation; quasars; intergalactic medium; dark matter.
7. Astro 324: Astrostatistics and Machine Learning in Astronomy Spring 2023
   Kinematics, dynamics, and contents of the galaxy. Spiral structure. Structure and evolution of galaxies.
6. Astro 497 (Astr 511 Crosslist, Capstone): Graduate Galactic Structure Winter 2023
   Kinematics, dynamics, and contents of the galaxy. Spiral structure. Structure and evolution of galaxies.
5. Astro 300: Programming for Astronomical Applications Winter 2023
   Introduction to programming needed for astronomical applications: Linux operating systems, Python, SQL/ADQL.
4. Astro 321: The Solar System Spring 2022
   Solar system; planetary atmospheres, surfaces and interiors, the moon, comets. The solar wind and interplanetary medium. Formation of the solar system.
3. Astro 323: Extragalactic Astronomy and Cosmology Winter 2021
   Galaxies, optical and radio morphology and properties. Clusters of galaxies, radio sources, and quasars. Observational cosmology.
2. Astro 322: The Contents of Our Galaxy Autumn 2021
   Basic properties of stars, stellar systems, interstellar dust and gas, and the structure of our galaxy.
1. Astro 192: Pre-Major in Astronomy Research Seminar Autumn 2020
   Pre-MAP is for UW students without experience in programming and/or scientific research who are traditionally underrepresented in astronomy and allows them to learn astronomical research techniques and apply them to research projects conducted in small groups. These projects involve the use of cutting-edge facilities and/or data available to UW astronomers.

Notable Physics Courses

11. Phys 324: Quantum Mechanics I Autumn 2023
    Introduction to nonrelativistic quantum mechanics: need for quantum theory, Schrodinger equation, operators, angular momentum, the hydrogen atom, identical particles, and the periodic table.
10. Phys 322: Electromagnetism II Winter 2023
    Charges at rest and in motion; dielectric and magnetic media; electromagnetic waves; relativity and electromagnetism; physical optics. (Course requirement completion contingent on Astro 519)
9. Phys 321: Electromagnetism I Autumn 2023
    Charges at rest and in motion; dielectric and magnetic media; electromagnetic waves; relativity and electromagnetism; physical optics.
8. Phys 228: Mathematical Physics II Winter 2023
    Applications of mathematics in physics with emphasis on the mechanics of particles and continuous systems. Develops and applies computational methods, both analytic and numerical.
7. Phys 225: Introduction to Quantum Mechanics Winter 2023
    Introduces spin and applications in nuclear magnetic resonance. Emphasizes two-state systems.
6. Phys 227: Mathematical Physics I Winter 2023
    Applications of mathematics in physics with emphasis on the mechanics of particles and continuous systems. Develops and applies computational methods, both analytic and numerical.
5. Phys 294: Introduction to Research: Frontiers of Physics Winter 2023
    Provides a survey of contemporary research in experimental and theoretical physics, with an emphasis on subfields seeing revolutionary changes in understanding.

4. Phys 224: Thermal Physics Spring 2022
   Introduces heat, thermodynamics, elementary kinetic theory, and statistical physics.
3. Phys 123: Waves, Light, and Heat Spring 2022
   Explores oscillatory motion, electromagnetic waves, optics, waves in matter, fluids, thermodynamics, and related experiments for physical science and engineering majors. Lecture, laboratory, and tutorial components.
2. Phys 122: Electromagnetism Autumn 2022
   The basic principles of electromagnetism and experiments in these topics for physical science and engineering majors. Lecture, laboratory, and tutorial components.
1. Phys 121: Mechanics AP 2020
   Concepts such as kinematics; Newton's laws of motion, work, energy, and power; systems of particles and linear momentum; rotation; oscillations; and gravitation. Hands-on laboratory work and in-class activities to investigate phenomena and use calculus to solve problems.