Liam Becker

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http://example.example.org/

Education

2022 – 2025 **B.Sc. Astronomy (Honors) & Comprehensive Physics | University of Washington**
Cum. GPA: 3.75

2018 – 2022 **High School Diploma | Woodinville High School**
Cum. GPA: 3.99

Experience

Research

Mar 2025 – Present **Research Mentee**
Department of Astronomy | University of Washington
Advisors: Lauryn E. Williams, Prof. Emily M. Levesque I will be working with PhD student Lauryn E. Williams, under the supervision of Prof. Emily M. Levesque to study the end results of Thorne-Żytkow Object (TŻO) formation simulations. TŻOs are theoretical hybrid stars where a neutron star is at the core of a large, diffuse envelope. We are studying the formation scenario wherein a newly-formed neutron star receives a "kick" that results in the collision and merger with its secondary main-sequence companion. We plan to analyze the post-merger outcomes of Lauryn's moving-mesh hydrodynamical simulations to further understand the properties of these TŻOs and how they change as the initial conditions of the simulations are modified. We are ultimately aiming to evolve these objects with a stellar evolution code, such as MESA, to better understand how TŻOs may change over time and shed light on any observational characteristics of TŻOs that may lead to their discovery.

Jun 2024 – Sep 2024 **Full-Time Research Intern**
Institut für Astroteilchenphysik | Karlsruhe Institut für Technologie
Advisors: Lukas Guelzow, Prof. Tim Huege
Introduced to cosmic ray physics, air showers, and radio detection. Studied radiation energy differences between GRAND@Auger and GrandProto300 sites. Compared fluence maps between two frequency bands for both sites. Studied the significance of polarization components for determination of radiation energy. Used Python to analyze data and worked with remote servers/SSH connections.

Sep 2023 – Jun 2024 **Research Mentee**
Department of Astronomy | University of Washington
Advisors: Dr. Yakov Faerman, Prof. Matthew McQuinn
Utilized Python visualizations to compare models of hot virialized gas in the Circumgalactic Medium (CGM) to new X-ray observations from eROSITA to constrain the understanding of the physics of the hot CGM.

Experience (continued)

Oct 2022 – Jun 2023 — **Research Mentee**
Department of Astronomy | University of Washington
Advisors: Dr. Yakov Faerman, Prof. Matthew McQuinn
Using ionization data from the Hubble Space Telescope and models developed by Dr. Faerman, worked to model the effect of radiation on gas properties of cold clouds in the CGM and their role in galactic evolution. Extensively used Python to visualize and analyze cold gas models based on Star Formation Rate dependencies.

2013 – 2015 — **Lecturer.** Information Technology Department, School of Engineering, Science and Technology, XYZ College.

Leadership

Coursework

Astronomy

ASTR 531 — **Graduate Stellar Interiors:** 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.

ASTR 561/423 — **High-Energy Astrophysics:** 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. ***(Combined Grad/Undergrad course)***

ASTR 500 (Audit) — **Practical Methods For Teaching Astronomy:** Seminar in the preparation of lecture and workshop materials with emphasis on demonstration, visual aids, and the evaluation of students' progress.

ASTR 482 — **Scientific Writing:** Principles of organizing, developing, and writing resumes, scientific research papers for journals, and astronomy articles for general public interest.

ASTR 481 — **Introduction to Astronomical Observation:** Theory and practice of obtaining optical data at a telescope. Topics include observing preparation and execution, and the subsequent data analysis required for completion of a research project.

ASTR 480 — **Introduction to Astronomical Data Analysis:** 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.

ASTR 421 — **Stellar Interiors:** Observations and theory of the atmospheres, chemical composition, internal structure, energy sources, and evolutionary history of stars.

ASTR 300 — **Introduction to Programming for Astronomical Applications:** Introduction to programming needed for astronomical applications: Linux operating systems, PERL, IDL.

ASTR 302 — **Python for Astronomy:** Teaches how to effectively use Python for research and astronomical data analysis. Introduction to key tools and libraries used in astronomy and how to use these to analyze data, visualize datasets, automate analyses, and apply this knowledge to reproducing results of some key astronomy papers.

Coursework (continued)

- ASTR 321 — **The Solar System:** Solar system; planetary atmospheres, surfaces and interiors, the moon, comets. The solar wind and interplanetary medium. Formation of the solar system.
- ASTR 322 — **The Contents of Our Galaxy:** Introduction to astronomy. Basic properties of stars, stellar systems, interstellar dust and gas, and the structure of our galaxy.
- ASTR 323 — **Extragalactic Astronomy and Cosmology:** Galaxies, optical and radio morphology and properties. Clusters of galaxies, radio sources, and quasars. Observational cosmology.
- ASTR 324 — **Introduction to Astrostatistics and Machine Learning in Astronomy:** Introduces students to data science tools and techniques commonly used in data driven astronomy and astrophysics. Combines introductory theoretical background with hands-on work on examples of data analysis with modern astronomical datasets.

Physics

- PHYS 321 & 322 — **Electromagnetism I & II:** First two parts of a three-quarter sequence. Charges at rest and in motion; dielectric and magnetic media; electromagnetic waves.
- PHYS 324 — **Quantum Mechanics I:** First part of a two-quarter sequence. Introduction to non-relativistic quantum mechanics: need for quantum theory, Schrodinger equation, operators, angular momentum, the hydrogen atom.
- PHYS 329 — **Mathematical Methods and Classical Mechanics:** Mathematical methods applied to classical mechanics, including Lagrangian mechanics.
- PHYS 331 — **Advanced Laboratory—Optics:** Measurements of interference and diffraction, optical properties of matter, image processing, interferometry, holography.
- PHYS 334 — **Advanced Laboratory—Analog Electronics:** Basic principles of circuit design and analysis; DC, AC, equivalent circuits, analog devices such as transistors, op-amps, and circuits made from them.
- PHYS 224 — **Thermal Physics:** Introduces heat, thermodynamics, elementary kinetic theory, and statistical physics.
- PHYS 226 — **Particles & Symmetries:** Introduction to the fundamental constituents of matter and the symmetries which characterize their interactions. Topics include special relativity; strong, weak, and electromagnetic interactions; quarks and leptons; baryons and mesons; and neutrinos and nuclei.
- PHYS 227 & 228 — **Mathematical Physics I & II:** A two-quarter sequence. Applications of mathematics in physics with emphasis on the mechanics of particles and continuous systems. Develops and applies computational methods, both analytic and numerical.

Skills

- Languages — Native fluency in **English**; Intermediate reading, writing, and speaking comprehension in **German**; Conversational in **Japanese**.
- Computing — Python, LaTeX, SSH, Windows, Unix, HTML, CSS, Java
- Web Dev — HTML, CSS, JavaScript, Apache Web Server, Tomcat Web Server.
- Misc. — Academic research, teaching, training, consultation, LaTeX typesetting and publishing.

Miscellaneous Experience

Awards

2024
- **2024 Baer Prize:** Awarded to UW Astronomy undergraduates for excellence in Academics, Research, and Outreach
- **DAAD RISE Germany Scholarship:** Research Internships in Science and Engineering awarded by the German Academic Exchange Service (DAAD)

Certifications

2025
- **Official Student of Omotesenke:** Recognized by the Eastern Domonkai as an official student of the Omotesenke School of Japanese Tea Ceremony

References

Available on Request