

ALEXANDER ROSS

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EDUCATION

University of Washington

Seattle, WA ◊ Graduation June 2027

- *Bachelor of Science* in Physics & Astronomy with College Honors
- *Minors* in Aeronautics & Astronautics and Applied Mathematics

Honors Thesis: Neutron Star Equation of State and Nuclear Mass Model Uncertainty in Kilonova Observables
Advisor: Professor Sanjay Reddy

PUBLICATIONS AND WORKS IN PROGRESS

Ross, A., Imai, A., Mumpower, M., Ristić, M., & Wollaeger, R. (2026). Kilonova Signatures of Nuclear Mass Model and Composition Variations. *The Astrophysical Journal*. In preparation for submission in October 2026.

Ross, A., Khullar, G., Hutchison, T., Berry, D., Ghosh, A., et al. (2026). LEGGOS III: Mapping Star Formation and Dust in Gravitationally Lensed Galaxies with SUMAC, a UMAP and Clustering Framework. *Research Notes of the American Astronomical Society*, submitted. [arXiv:2606.20801](https://arxiv.org/abs/2606.20801).

Zhao, T., Yan, F., **Ross, A.**, & Lattimer, J. (2026). A Semi-Supervised Variational Autoencoder for Generating Neutron Star Equations of State. *Machine Learning: Science and Technology*, submitted. [arXiv:2605.27562](https://arxiv.org/abs/2605.27562).

Abedi, P., Sharon, K., Hutchison, T., Bayliss, M., Florian, M., Khullar, G., ... **Ross, A.**, et al. (2026). LEGGOS II: Strong Lens Model and Source-Plane Projection of the Clumpy Star-Forming Galaxy SGAS J111020.0+645950.8 at $z = 2.481$. *The Astrophysical Journal*, submitted. [arXiv:2606.20804](https://arxiv.org/abs/2606.20804).

Khullar, G., Florian, M., Bayliss, M., ... **Ross, A.**, et al. (2026). LEGGOS I: The JWST LEGGOS Survey — LEnsing and Galaxy Growth: Observing Substructures — Unpacks the Nature of Clumpy Star Formation and Quenching in Gravitationally Lensed Galaxies beyond Cosmic Noon. *The Astrophysical Journal*, submitted. [arXiv:2606.20845](https://arxiv.org/abs/2606.20845).

Hutchison, T. A., Khullar, G., Rigby, J. R., Florian, M. K., ... **Ross, A.**, Rivera-Thorsen, T. E., et al. (2025). JWST and The Waz Arc I: Spatially Resolving the Physical Conditions within a Post-Starburst Galaxy at Redshift 5 with NIRSpect IFS. *The Astrophysical Journal*, submitted. [arXiv:2512.02000](https://arxiv.org/abs/2512.02000).

RESEARCH EXPERIENCE

Los Alamos National Laboratory - Nuclear Astrophysics Summer Student

Jun 2026 – Present

PIs: Dr. Marko Ristić (LANL), Dr. Ryan Wollaeger (LANL)

Los Alamos, NM

- Building an end-to-end simulation pipeline using supercomputers to predict the light curves and spectra of kilonovae, the radioactive afterglows of neutron star mergers.
- Propagating the thermodynamic trajectories of GRMHD simulations into a nucleosynthesis code (PRISM) to model the r-process that forges heavy elements.
- Performing radiative transfer (SuperNu) on the resulting abundances to compute observable signatures across different nuclear mass models, studying how per-nuclide nuclear physics uncertainties propagate into astronomical observables.
- Preparing results for a first-author journal paper and professional conference presentation.

NASA Goddard Space Flight Center - Gravitational Astrophysics Intern

Jun 2025 – Aug 2025

PIs: Dr. Eleonora Castelli (NASA GSFC, UMBC), Dr. John Baker (NASA GSFC)

Greenbelt, MD

- Engineered open-source data analysis software (Python and C++) to process real-time signals from the upcoming Laser Interferometer Space Antenna (LISA) gravitational wave observatory.
- Developed and integrated software components including time series generation, dynamic spectrograms for transient signal detection, adaptive whitening filters, and Q-transform-based anomaly detection.
- Applied advanced signal processing and spectral estimation to enable low-latency characterization of weak signals in high-noise environments.

- Optimized system performance for deployment in mission-critical environments requiring autonomous detection, rapid data interpretation, and astrophysical event-driven response.
- Currently collaborating with 20+ LISA scientists from around the world to expand the pipeline for integration into the mission's end-to-end data analysis framework.

Institute for Nuclear Theory - Nuclear Astrophysics Research Intern

Mar 2025 – May 2026

PIs: Professor Sanjay Reddy (INT), Dr. Tianqi Zhao (INT)

Seattle, WA

- Developed a physics-constrained Variational Autoencoder (VAE) using Python and TensorFlow to rapidly generate and test new candidate neutron star (NS) equations of state (EOS).
- Expanded on previous VAE studies by quantifying how latent perturbations map to decoded EOS and NS observables.
- Implemented KL-annealing and custom loss weighting to improve training stability and latent space reconstruction, achieving considerably faster structure simulations than traditional TOV solvers and a reconstruction accuracy of $\sim 99\%$.
- Architected an open-source repository for the code to be disseminated to the nuclear astrophysics community.
- Co-author on submitted journal paper detailing the framework and its ability to accurately reconstruct known EOS.

UW Astronomy Department - Extragalactic Astronomy Researcher

Nov 2024 – Present

PI: Dr. Gourav Khullar (UW)

Seattle, WA

- Working in a 25+ person team (faculty, postdocs, undergraduates) studying distant galaxies whose light is magnified by gravitational lensing, using JWST imaging and spectroscopy to probe star formation and dynamics in the early universe.
- Developing a novel machine-learning pipeline (Python) to automatically map and classify star-forming clumps across lensed galaxies, work that turns a manual, subjective task into a reproducible one.
- First author on a submitted research note introducing this pipeline, and a co-author on three submitted collaboration papers covering the LEGGOS survey and galaxies within the survey.

PRESENTATIONS

(Upcoming) Kilonova Signatures of Nuclear Mass Model and Composition Variations (Talk and Poster)

Oct 2026

American Physical Society Division of Nuclear Physics Conference

Philadelphia, PA

Kilonova Signatures of Nuclear Mass Model and Composition Variations (Talk and Poster)

Aug 2026

Los Alamos National Laboratory Student Symposium

Los Alamos, NM

Stellar Biographies: A Tour of the Strangest Star Remnants in the Universe (Public Lecture)

May 2026

Theodor Jacobsen Observatory Open House

Seattle, WA

A Semi-Supervised Variational Autoencoder for Generating Neutron Star Equations of State (Talk)

May 2026

Mary Gates Research Symposium

Seattle, WA

Data-Driven Generation of Neutron Star Equations of State Using Variational Autoencoders (Talk)

Sep 2025, Nov 2025, May 2026

INT INTURN Lecture Series

Seattle, WA

LISA at a Glance: A Quick-Look Tool for Low Latency Gravitational Wave Data Analysis (Poster)

August 2025

NASA Goddard Space Flight Center Summer Research Symposium

Greenbelt, MD

Using Machine Learning to Map Star Formation at Cosmic Noon with Gravitational Lensing (Talk)

May 2025

AWARDS

- **Jul 2026:** Rhodes and Marshall Scholarship Nominee, University of Washington, Seattle, WA
- **Jul 2026:** Triangle Fraternity Outstanding Engineer, Architect, Scientist of the Year Award, Denver, CO
 - Selected from 39 chapters and over 1400 members for outstanding potential to make an impact in my field
- **Apr 2026:** Husky 100 Award, University of Washington, Seattle, WA
 - Recognized for connecting research across LANL, NASA Goddard, and UW
 - Selected as one of only two STEM juniors from a pool of undergraduates, graduates, and professional students across all three UW campuses
- **Nov 2025:** Barry Goldwater Scholarship Nominee, University of Washington, Seattle, WA
- **Nov 2025:** Mary Gates Research Scholar, University of Washington, Seattle, WA
 - Awarded \$5000 for outstanding independent research

RELEVANT SKILLS

Programming Languages	Python, Mathematica, C++, Fortran
Software and Libraries	PRISM, SuperNu, Bilby, GWpy, Astropy, TensorFlow, PyTorch, scikit-learn, UMAP, Git/GitHub, MPI, Slurm