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EDUCATION

- **DePaul University** — Chicago, IL
  Bachelor of Science in Astrophysics, Minor in Mathematics; Cumulative GPA: 3.92/4.0 — *Expected June 2026*

RESEARCH EXPERIENCE

- **California Institute of Technology Summer Undergraduate Research Fellowship** — Pasadena, CA
  Principal Investigators: Dr. Elias Most, Dr. Yoonsoo Kim — *June 2025 – Present*
  - **Adaptive Mesh Refinement in AthenaK**: Implemented adaptive mesh refinement (AMR) criteria in the GPU-accelerated astrophysical code AthenaK, targeting accretion disk–jet systems. Designed a refinement trigger based on a five-point finite-difference approximation of the fourth derivative to detect high-frequency oscillations in primitive variables, enabling up to 7 refinement levels in critical regions and $\sim 3.7\times$ computational speedups while preserving physical accuracy.
  - **High-Performance Computing**: Automated parameter sweeps on 64 CPUs and 8 NVIDIA GPUs, benchmarking refinement efficiency on simplified hydrodynamical problems prior to application in general relativistic magnetohydrodynamic (GRMHD) simulations of highly magnetized black holes.
  - **Research Output**: Produced a final research paper and presented results at Caltech's Summer Seminar Day.
  - **Professional Training**: Attended Caltech Relativistic Astrophysics Summer School (June 2025), engaging in advanced lectures and tutorials on numerical relativity, MHD, plasma physics, and computational methods

- **Northwestern CIERA Research Experience for Undergraduates** — Evanston, IL
  Principal Investigators: Dr. Alexander Tchekhovskoy, Dr. Deepika Bollimpalli — *June 2024 – Jan 2025*
  - **GRMHD Simulations**: Ran 2D and 3D simulations of black hole accretion disks using the HARMPI code on Northwestern's Quest cluster (32 cores, >2 TB of data).
  - **Pipeline Development**: Built a Python-based analysis pipeline to extract mass accretion rates and perform Fourier analysis of temporal variability in accretion flows, enabling quantitative characterization of GRMHD simulation outputs.
  - **Research Impact**: Investigated variability signatures in accretion flows and their connection to observed aperiodic variability in X-ray binaries. Authored a final paper and presented at the American Astronomical Society 245th Meeting and Northwestern CIERA symposiums.

- **DePaul University** — Chicago, IL
  Independent and Faculty-Supervised Research — *2023 – 2025*
  - **Independent Study (2025)**: Self-taught general relativity under faculty supervision, focusing on the Einstein field equations.
  - **Protoplanetary Disks (2023)**: Analyzed archival VLBA data on protoplanetary disk morphology and accretion processes; gained experience in radio astronomy data reduction and visualization.
  - **Magnetic Fields of W3(OH) (2024)**: Reviewed Zeeman diagnostics of astrophysical magnetic fields and examined the role of the VLBA in probing star-forming regions.

PRESENTATIONS

- **Oral Presentations**
  - **Caltech Summer Seminar Day**: *Grid refinement criterion for general relativistic magnetohydrodynamic simulations*
  - **Northwestern CIERA Symposium**: *Radial coherence in accretion disks around black holes*
- **Poster Presentations**
  - **American Astronomical Society, 245th Meeting**: *Radial coherence in accretion disks around black holes*
  - **Northwestern CIERA Symposium**: *Radial coherence in accretion disks around black holes*
  - **DePaul University STEM Showcases**: 2023, 2024

LEADERSHIP EXPERIENCE

- **DePaul Astrophysics Society** — Chicago, IL
  President — *Sep 2023 – Present*
  - **Leadership**: Founded and grew the society to 40+ active members in its first year.
  - **Event Organization**: Organized seminars, workshops, guest lectures, and career panels to promote learning, networking, and professional development.
  - **Peer Mentorship**: Established a mentorship system to support students pursuing astrophysics careers.

- **Society of Physics Students** — Chicago, IL
  Member — *Sep 2022 – Present*
  - **Networking**: Participated in meetings and events to engage with the broader physics community.

Technical Skills

- **Programming Languages**: Python, C++, MATLAB, Bash, LaTeX

- **Parallelization and HPC**: Kokkos, SLURM, MPI, OpenMP

- **Astrophysical Codes**: AthenaK, HARMPI

- **Version Control and Tools**: Git, CMake, GNU, NumPy, SciPy, Matplotlib, Pandas

Grants and Funding

- **Caltech Summer Undergraduate Research Fellowship (SURF)**: Supported by Caltech SURF funds raised annually from faculty grants, corporate sponsors, and institute resources.

- **National Science Foundation REU Grant (AST-2149425)**: Supported by the NSF-funded Research Experiences for Undergraduates (REU) program at CIERA, Northwestern University.

- **Undergraduate Research Assistant Program (URAP)**: Received internal research funding from DePaul University.

- **NASA Illinois Space Grant Consortium (ISGC)**: Funded research under the supervision of Dr. Bernhard Beck-Winchatz.