Shawn Ray

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Education

Master's of Science in Astrophysics — Expected May 2026
City University of New York (CUNY) - Graduate Center | New York, New York — *GPA: 3.93*

Bachelor's of Science in Physics — Dec 2023
Oklahoma State University (OSU) | Stillwater, Oklahoma — *Major GPA: 3.50*

Research Experience

Graduate Research Assistant — Jun 2024 – Present
CUNY Graduate Center | New York, New York

- Upgraded the Python based `McFACTS` code, an open-source software for modeling binary black hole (BBH) mergers within active galactic nuclei (AGN), through the implementation of a Numerical Relativity Surrogate model
- Improved `McFACTS` algorithms to generate more physically accurate descriptions of post-merger black hole spins
- Reviewed and revised documentation for `McFACTS` to facilitate a successful public release

Undergraduate Research Assistant — Jan 2022 – May 2023
Oklahoma State University | Stillwater, Oklahoma

- Analyzed Gamma-ray Burst (GRB) data from the Fermi Gamma-ray Space Telescope to help create a standard relationship between a GRB's total energy and distance using T90 durations
- Assisted in the grant writing process and acquiring funding for future departmental astrophysics projects
- Contributed to the revival OSU's Mendenhall Observatory

Undergraduate Research Assistant — Aug 2021 – July 2022
OSU Department of Electrical Engineering | Stillwater, Oklahoma

- Helped found the first Cube Satellite (CubeSat) program in Oklahoma
- Supported in systems development life cycle processes for both CubeSat and ground station operations
- Led collaborative weekly meetings to maintain efficient progress and brainstorm project expansion

Undergraduate Research Assistant — Jan 2019 – May 2021
OSU Department of Mechanical and Aerospace Engineering | Stillwater, Oklahoma

- Tested electrical and mechanical properties of artificial muscles to better determine applications within soft exoskeletons for use in rehabilitation
- Presented findings in numerous conferences and developed excellent scientific communication skills

Chief Designer — Sep 2017 – May 2018
OSU Micro-g NExT Space Cowboys | Stillwater, Oklahoma

- Led lifecycle development for a mechanical device to seal potential micrometeorite breaches on the hull of the International Space Station during extra-vehicular activities (EVAs)
- Collaborated in proposal writing and outreach events focused on bringing more students into STEM
- Successfully presented to NASA engineers and former astronauts at the Neutral Buoyancy Laboratory

Awards/Fellowships

- CUNY GC BrainE Blitz Lightning Competition (`McFACTS findings`) (2nd Place) — 2025
- Oklahoma State University Physics Department – Best Undergraduate Researcher — 2023
- AISES Lighting the Pathway Fellow – Academic honor, supporting future Indigenous faculty) — 2021 – 2023
- McNair Research Scholar – Academic honor, underrepresented minority researchers — 2019 – 2023
- OK-LSAMP Research Scholar – Academic honor, underrepresented minorities in STEM — 2019 – 2023
- Cobell Scholar – Academic scholarship, supporting Indigenous students — 2018 – 2023

Publications

Barry McKernan; K.E. Saavik Ford; Harrison E. Cook; Vera Delfavero; Emily McPike; Kaila Nathaniel Jake Postiglione, **Shawn Ray** and Richard O'Shaughnessy (Sept. 2025). "McFACTS I: Testing the LVK AGN channel with Monte Carlo For AGN Channel Testing Simulation (McFACTS)". In: *The Astrophysical Journal* 990.217, p. 17. URL: doi.org/10.3847/1538-4357/adf114.

Vera Delfavero; K.E. Saavik Ford; Barry McKernan; Harrison E. Cook; Emily McPike; Kaila Nathaniel Jake Postiglione, **Shawn Ray** and Richard O'Shaughnessy (Aug. 2025). "McFACTS III: Compact Binary Mergers from Active Galactic Nucleus Disks over an Entire Synthetic Universe". In: *The Astrophysical Journal* 989.67, p. 12. URL: doi.org/10.3847/1538-4357/ade4c1.

Pre-Print Publications

Harrison E. Cook; Barry McKernan; K.E. Saavik Ford ; Vera Delfavero; Kaila Nathaniel; Jake Postiglione **Shawn Ray**, Emily McPike and Richard O'Shaughnessy (Nov. 2024). "McFACTS II: Mass Ratio–Effective Spin Relationship of Black Hole Mergers in the AGN Channel". In: *arXiv* 2411.10590. URL: doi.org/10.48550/arXiv.2411.10590.

V. Delfavero; **S. Ray**; H. E. Cook; K. Nathaniel; B. McKernan; K. E. S. Ford; J. Postiglione, E. McPike and R. O'Shaughnessy (Nov. 2024). "Prospects for the formation of GW231123 from the AGN channel". In: *arXiv* 2508.13412. URL: doi.org/10.48550/arXiv.2508.13412.

In-Prep Publications

Shawn Ray, Keefe Mitman; Emily McPike; Barry McKernan and K.E. Saavik Ford (Oct. 2025). "Prospects for the formation of GW231123 from the AGN channel". In: *arXiv* 2508.13412. URL: doi.org/10.48550/arXiv.2508.13412.

Summer Research Experience

Maximizing Student Potential (MSP) Intern 2023

NASA Jet Propulsion Laboratory (JPL) | Pasadena, California

- Developed Python based galaxy simulations to better understand the identification process for spectral interlopers found in Euclid telescope simulated data catalog
- Successfully generated a power spectra of simulated Euclid telescope observations to identify baryonic acoustic oscillations (BAO) peaks

Dunlap Institute Astronomical Instrumentation Summer School Student 2023

University of Toronto | Toronto, Ontario, Canada

- Learned the basics of astrophysics instrumentation through hands on lab sessions and lectures, covering major sections of the EM spectrum such as radio, infrared, optical, and gamma-rays

Hardware Developer (Co-op) 2022

IBM | Durham, North Carolina

- Developed Python GUI for more efficient interaction with Power Line Disruption (PLD) testing equipment
- Learned common PLD testing methods and effects of RF emissions on IBM data servers
- Presented weekly updates to Electromagnetic Compatibility (EMC) group meetings

Stanford Undergraduate Research Fellow (SURF) 2021

Stanford University | Virtual

- Performed 3D modeling simulations to analyze the motion and forces of a drone grasping device
- Practiced presentation and communication techniques with a final poster report and analysis

Invited Talks

- Astrofest Presentation (`McFACTS findings`) Sep 2025
- Harvard CfA – Lars Hernquist Group Meeting Presentation (`McFACTS findings`) Aug 2025
- AstroOnTap Presentation (Upcoming T-Coronae Borealis nova) Sep 2024
- AMNH Astro Summer Camp Presentation (K-12 talk on the solar system and black holes) Jul 2024
- Stanford SURF Scholar Lightning Talks Aug 2021

Conference Oral Presentations

- Dynamix Conference (Cambridge, UK) (`McFACTS findings`) Jun 2025
- OK-LSAMP Symposium – (T90 GRB findings) Sep 2023
- NCUR Research Conference – (T90 GRB findings) Mar 2023
- NCUR Research Conference 2020 Cancelled due to COVID-19 – (Artificial muscle findings) Mar 2020
- OK-LSAMP Symposium – (Artificial muscle findings) Oct 2019

Conference Poster Presentations

- OK-LSAMP Symposium Oct 2020
- Oklahoma Research Day Mar 2020
- Emerging Researchers National (ERN) Conference Feb 2020
- Louis Stokes Midwest Regional Center of Excellence (LSMRCE) Annual Conference Oct 2019
- American Indian Science and Engineering Society (AISES) National Conference Oct 2019
- OK-LSAMP Symposium Oct 2019
- McNair Gallery of Engagement Jul 2019

Organizational Memberships

American Indian Science and Engineering Society (AISES) Aug 2018 – Present

Member

- Served as vice president by scheduling general meetings involving guest presenters from outside companies, institutions, and student support services around campus
- Currently an active member, attending meetings, events, and outreach activities

Society of Physics Students (SPS) Sep 2022 – Dec 2023

Member

- Served as secretary by planning student events such as star-watching parties and outreach physics demos
- Collaborated in discussions and preparations for the 2023 International Physics Tournament

Society for the Advancement of Chicano's and Native Americans in Science (SACNAS) Sep 2020 – Dec 2023

Member

- Helped serve as vice president by running science demo outreach events, general meetings, and organizational recruiting for the Oklahoma State area

Technical Skills

Languages: Python, Java, C/C++, HTML
Developer Tools: Git, VS Code, LaTeX, Visual Studio, Jupyter Notebook
Libraries: Astropy, SciPy, Pandas, NumPy, Matplotlib, Nbodykit