# Shawn Ray

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shray4
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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
*Thesis: Kicking Remnants to the Curb: Considering Surrogate Models for McFACTS Merger Dynamics*

**Bachelor's of Science in Physics** — Dec 2023
Oklahoma State University | Stillwater, Oklahoma

## Publications

**First Authored**

**Shawn Ray**, Keefe Mitman; Emily McPike; Barry McKernan and K.E. Saavik Ford (Dec. 2025). "Kicking Remnants to the Curb: Considering Surrogate Models for `McFACTS` Merger Dynamics". In: *The Astrophysical Journal, In Prep.*

**Co-Authored**

Vera Delfavero; **Shawn Ray**; Harry E. Cook; Kaila Nathaniel; Barry McKernan; K. E. Saavik Ford; Jake Postiglione, Emily McPike and Richard O'Shaughnessy (Aug. 2025). "Prospects for the formation of GW231123 from the AGN channel". In: *Physical Review Letters, In Review* 2508.13412. URL: doi.org/10.48550/arXiv.2508.13412.

Harrison E. Cook; Barry McKernan; K.E. Saavik Ford ; Vera Delfavero; Kaila Nathaniel; Jake Postiglione **Shawn Ray**, Emily McPike and Richard O'Shaughnessy (Oct. 2025). "McFACTS II: Mass Ratio–Effective Spin Relationship of Black Hole Mergers in the AGN Channel". In: *The Astrophysical Journal* 993.2, p. 19. URL: doi.org/10.3847/1538-4357/adfd56.

Vera Delfavero; K.E. Saavik Ford; Barry McKernan; Harrison E. Cook; Emily McPike; Kaila Nathaniel Jake Postiglione, **Shawn Ray** and Richard O'Shaughnessy (Oct. 2024). "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.

Barry McKernan; K.E. Saavik Ford; Harrison E. Cook; Vera Delfavero; Emily McPike; Kaila Nathaniel Jake Postiglione, **Shawn Ray** and Richard O'Shaughnessy (Oct. 2024). "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.

## 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 mergers within active galactic nuclei (AGN), through the implementation of a Numerical Relativity Surrogate model to generate more physically accurate descriptions of post-merger black hole spins
- Improved `McFACTS` algorithms through OOP codebase updates, unit testing, and dependency management
- Reviewed and revised documentation for `McFACTS` to facilitate a successful public release

**Maximizing Student Potential Intern** — May 2023 - Aug 2023
NASA Jet Propulsion Laboratory | Pasadena, California

- Developed Python based galaxy simulations to improve spectral interloper identification in Euclid telescope simulated data catalog
- Generated power spectra of simulated Euclid telescope observations to identify baryonic acoustic oscillations peaks

**Undergraduate Astrophysics Researcher** Jan 2022 – May 2023

Oklahoma State University | Stillwater, Oklahoma

- Analyzed Fermi Gamma-ray Space Telescope Gamma-ray Burst (GRB) data 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

**Hardware Developer (Co-op)** May 2022 - Aug 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

**Undergraduate Electrical Engineering Researcher** Aug 2021 – July 2022

OSU Department of Electrical Engineering | Stillwater, Oklahoma

- Founder of the first Cube Satellite 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

**Stanford Undergraduate Research Fellow** May 2021 - Jun 2021

Stanford University | Virtual

- Performed 3D modeling simulations to analyze the motion and forces of a drone grasping device

**Undergraduate Mechanical Engineering Researcher** 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
- Collaborated in proposal writing and outreach events focused on bringing more students into STEM

## Summer Schools

**Dunlap Institute Astronomical Instrumentation Summer School Student** Aug 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

## Awards/Fellowships

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|---|---|
| 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 ($2.5k/yr) – Academic honor | 2019 – 2023 |
| OK-LSAMP Research Scholar ($2.5k/yr) – Academic honor | 2019 – 2023 |
| Cobell Scholar – Academic scholarship supporting Indigenous students ($5k/yr) | 2018 – 2023 |

## Presentations

**Invited Talks**

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|---|---|
| Columbia University Astronomy Department Pizza Lunch: `McFACTS findings` | Nov 2025 |
| CUNY Astrofest: `McFACTS findings` | Sep 2025 |
| Harvard CfA – Lars Hernquist Group Meeting: `McFACTS findings` | Aug 2025 |
| AstroOnTap: Upcoming T-Coronae Borealis nova | Sep 2024 |
| AMNH Astro Summer Camp: K-12 talk on the solar system and black holes | Jul 2024 |
| Stanford SURF Scholar Lightning Talks | Aug 2021 |

**Conference Talks**

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|---|---|
| American Astronomical Society (AAS) | Jan 2026 |
| Dynamix Conference: `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 Posters**

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|---|---|
| Gravitational Wave Physics and Astronomy Workshop 2025 (GWPAW) | Dec 2025 |
| 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 |

## Outreach

**Secretary** Sep 2022 – Dec 2023

Oklahoma State University Chapter of Society of Physics Students (SPS)

- Planned student events such as star-watching parties and outreach physics demos.
- Collaborated in discussions and preparations for the 2023 International Physics Tournament.

**Vice President** Aug 2018 – Dec 2023

Oklahoma State University Chapter of American Indian Science and Engineering Society (AISES)

- Scheduled general meetings involving guest presenters from outside companies, institutions, and student support services around campus.

**Vice President** Sep 2020 – Dec 2023

Society for the Advancement of Chicano's and Native Americans in Science (SACNAS)

- Ran science demo outreach events, general meetings, and organizational recruiting for the Oklahoma State area.

## Technical Skills

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