Lorena Mezini

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Ph.D. candidate with expertise in machine learning, SQL, and large-scale statistical modeling. Eager to leverage strong analytical and research skills to tackle real-world challenges. Dedicated to lifelong learning and exploring cutting-edge technologies. Experienced in leading community initiatives, leading research projects, and teaching classes. I enjoy creating inclusive, collaborative environments that support both learning and discovery, while mentoring others and advancing meaningful research.

Education

2018 – Present	**Ph.D., University of Pittsburgh** Physics. Thesis title: *Is the Lyric "I can see your halo" in Beyonce's Hit Song "Halo" Accurate and Further Discussion of Dark Matter Halos*
Aug 2018 – Jun 2023	**MS. Physics, University of Pittsburgh** in Physics.
Jan 2015 – Dec 2017	**BS. Physics and Astronomy, Stony Brook University** in Physics and Astronomy.
Aug 2013 – Dec 2014	**Mount Holyoke College** in Physics and Astronomy (transferred to Stony Brook Spring 2015).

Relevant Experience

Aug 2018 – Present	**Graduate Student Researcher and Fellow**, University of Pittsburgh - Built Errësirë, a Monte Carlo-based simulation framework for forward modeling populations of strong gravitational lensing systems, (publication in prep). - Developed the field's most comprehensive SQL-based database to manage millions of data points, enabling scalable analysis. - Applied Random Forest algorithm to classify strong gravitational lenses using features derived from dark matter properties. - Developed processes to run statistical analyses of dark matter halo properties with large high resolution numerical simulation data. - Designed *DmHaloGeometry*, a software package to perform geometric calculations on 3D spatial data. - Used Markov Chain Monte Carlo to constrain models governing galaxy occupation of dark matter halos. **Teaching Assistant**, University of Pittsburgh - Taught recitation sections for introductory physics and astronomy courses. **Graduate Student Mentor**, I mentored a small group of University of Pittsburgh Physics PhD students during their first year (Aug 2022 - Apr 2023).
January 2025	**Super Analytics Challenge** - My team developed a GIS-based infrastructure for social services and street medicine teams to coordinate care for local homeless communities in Pittsburgh.
Jan 2018 - Aug 2018	**Student Researcher**, Brookhaven National Laboratory - Implemented source separation algorithm on simulated multi-band images of overlapping weakly lensed galaxies.

Additonal Data Science and Analytics Projects

FashionForecast Python, Machine Learning

Developed a data-driven approach to forecast fashion trends by extracting dominant color palettes from runway images using clustering algorithms.

Titanic Survival Prediction R, Machine Learning

Developed predictive model using logistic regression to classify passenger survival.

Skills

Programming & Tools	Python, sqlite, sql, Slurm, Git/GitHub, PyTorch, Pandas, scikit-learn, Astropy, Lenstronomy, Excel, RStudio/R
Data Science & Machine Learning	Predictive modeling, Random Forests, Monte Carlo simulation, statistical inference, causal analysis
Core competences	Research and development, technical writing, teaching and training

Awards and Achievements

2024   **PITT PACC Fellowship**, University of Pittsburgh.

2022   **Whittington Leadership and Innovation Challenge for Ph.D. Students**, Co-organized *PhDuh-What's next?* – a networking talk series connecting Ph.D. students with industry professionals.

First Author Research Publications

1. L. Mezini, A. Ç. Şengül, and A. R. Zentner, "Errësirë: A tool for forward modeling realistic populations of strong gravitational lenses," 2025 in prep.

2. L. Mezini, A. R. Zentner, K. Wang, and C. Fielder, "Subhalos are anisotropically distributed and aligned with the smooth matter distribution of their host halos," *Monthly Notices of the Royal Astronomical Society*, staf331, Feb. 2025, issn: 0035-8711. doi: 10.1093/mnras/staf331.

3. L. Mezini, C. E. Fielder, A. R. Zentner, Y.-Y. Mao, K. Wang, and H.-Y. Wu, "The influence of subhaloes on host halo properties," *Monthly Notices of the Royal Astronomical Society*, vol. 526, no. 3, pp. 4157–4172, Sep. 2023. doi: 10.1093/mnras/stad2929.

Community Involvement

Aug 2019 - April 2025   **University of Pittsburgh Women and Minorities in Physics Club**,
- Served as President from 2021 to 2023 and Vice President from 2023-2025.
- Organized fundraiser that collected over $1000 for The Education Partnership to provide supplies for local Pittsburgh area schools.
- Wrote proposals that secured $1000 from APS Women in Physics Group Grants and up to $1000 from University of Pittsburgh College of Arts and Sciences.

April 2022   **ACCelerate Creativity + Innovation Festival** (Smithsonian National Museum of American History)
Our team was selected to publicly present an exhibit about the Dark Energy Spectroscopic Instrument (DESI) titled "Making the Largest Maps of the Universe".