Isabel Rosa Marie Medlock

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Education

Yale University — New Haven, NJ
Astronomy PhD Student, Thesis Advisor: Prof. Daisuke Nagai — *Aug. 2021 – present*

Princeton University — Princeton, NJ
B.A. in Astrophysics; Certificates in Applications of Computing and Russian Language — *Sep. 2017 – Jun. 2021*

Publications

Medlock, I., Nagai, D., et al., "Properties of Cold Streams in IllustrisTNG-50 Simulations", in preparation

Medlock, I., and Nagai, D., "Constraining the Effect of Baryonic Feedback on the Matter Power Spectrum with Fast Radio Bursts", in preparation

Medlock, I., Neufeld, C., and Nagai, D., et al., "Quantifying Feedback in CAMELS: The impact of stellar and black hole feedback on galaxy evolution", in preparation

Medlock, I., Nagai, D., Singh, P., Oppenheimer, B., Anglés-Alcázar, D., and Villaescusa-Navarro, P., "Probing the Physics of the Circum-galactic Medium using Fast Radio Bursts: Insights from CAMELS", 2024, *ApJ*, in press (astro-ph/2403.02313)

Medlock, I., and Cen, R., "Dispersion Measure Distributions of Fast Radio Bursts Due to the Intergalactic Medium", 2021, *MNRAS*, 502(3), 3664-3669.

Oppenheimer, B., Nagai, D., Lau, E., Singh, P., Butler Contreras, A., Gluck, N., Dorigo Jones, J., **Medlock, I.**, and Villaescusa-Navarro, P., "A Multi-Wavelength, Multi-Model Exploration of How Feedback Disrupts Gaseous Atmospheres", 2022, *Bulletin of the AAS, 54*(1).

Singh, P., Nagai, D., Oppenheimer, B., Lau, E., Gluck, N., and **Medlock, I.**, "Galactic Gaseous Halos: Mini-Clusters Disrupted by Feedback", 2022, *Galactic Atmospheres*.

Presentations

2024 Santa Cruz Galaxy Workshop at University of California Santa Cruz (Talk) — *Aug 1st, 2024*
Baryons in the Universe 2024 at Kavli IPMU, Kashiwa, Japan (Talk) — *Apr 11th, 2024*
FRB2023 at IISER Bhopal, Indore, India (Remote Talk) — *Nov 9th, 2023*
SACNAS National Diversity in STEM Conference in Portland, Oregon (Poster) — *Oct 27th, 2023*
American Physical Society April Meeting in Minneapolis, Minnesota (Poster) — *Apr 17th, 2023*
American Astronomical Society Winter Meeting 241 in Seattle, Washington (Poster) — *Jan 12th, 2023*
CAMELS Workshop at the Center for Computational Astrophysics (Talk) — *Nov 30th 2022*
SACNAS National Diversity in STEM Conference in San Juan, Puerto Rico (Talk) — *Oct 28th, 2022*
Princeton Physics Junior Paper Symposium (Remote Talk) — *Apr 19th, 2020*

Research Experience

Cold Streams: The Umbilical of High-z Galaxies — *Aug 2023 - present*

- **PhD Thesis (with Daisuke Nagai)**: Developing high-resolution zoom-in simulations to study the interaction of cold streams feeding star-forming high-z galaxies with the circumgalactic medium.

Quantifying Feedback in the CAMELS Project — *Aug 2023 - present*

- **Co-mentoring Theory Project by Chloe Neufeld with Daisuke Nagai**: Quantifying the energetics of AGN and SNe feedback and the effect on halo properties such as the CGM gas fraction.

Probing the Physics of the CGM using FRBs: Insights from CAMELS — *Sep 2021 - March 2024*

- **Theory Project with Daisuke Nagai**: Used CAMELS to study fast radio bursts as probes of baryons in the circumgalactic medium and the effect of feedback.

AGN Classification with Modulos *Aug 2022 - Sep 2023*

- **Observational Project with Meg Urry**: Used Modulos (machine learning software) along with AGNDB to develop algorithms to classify AGN.

Electron Acceleration in Simulations of Collisionless Shocks *Jun 2020 - May 2021*

- **Senior Thesis with Anatoly Spitkovsky**: Studied electron acceleration in simulations of collisionless shocks. Developed methods for visualizing particle reflection and acceleration using Paraview and Python. Participated in the Princeton Astrophysics Undergraduate Summer Research Program.

Analysis of Vertical Structures of Edge-On Galaxies Using HSC-SSP *Feb 2020 - May 2020*

- **Junior Paper with Jenny Greene**: Identified sample of edge on nearby galaxies. Using imaging techniques and model fitting, investigated the diversity of vertical structures and connection to galaxy formation and evolution.

Dispersion Measure Distributions of Fast Radio Bursts *Oct 2019 - Jan 2020*

- **Junior Paper with Renyue Cen**: Used simulation data to calculate the dispersion measure of FRBs, considering redshift, phases of gas, and contribution of the IGM.

Fellowships and Awards

NSF ACCESS Computing Grant (Co-PI) with Daisuke Nagai (PI) *2024*

- **Title:**: Simulating Cold Gas Streams Feeding High-Redshift Galaxies
- **Allocation**: 300k Stampede3 node hours (equivalent of $62k)

Yale Graduate Student Assembly Conference Travel Fellowship ($800) *2024*
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APS Division of Astrophysics April Meeting Travel Grant ($300) *2023*
American Astronomical Society FAMOUS Travel Grant ($1000) *2023*
Dean's Emerging Scholars Research Award, Yale University ($2000) *2022*
SACNAS NDiSTEM Conference Travel Fellowship ($1000) *2022*

Activities and Outreach

SACNAS Yale Chapter *Jan 2023 - ongoing*

- **Co-President, Secretary and Treasurer**: In charge of communications, and managing funding. Assist in event planning.
- **Recruiter**: Recruiter for Yale Astro at NDiSTEM, 2022 and 2023

Yale Cosmology Seminar *Sep 2023 - ongoing*

- **Co-Organizer**: Invite and host weekly speakers. Facilitate seminar.

Leitner Family Observatory and Planetarium at Yale *Feb 2023 - ongoing*

- **Presenter**: Present to and assist in monitoring school visits to the Planetarium.
- **Leitner Planetarium Spanish Night**: Creator and organizer of Spanish Public Nights at Leitner Planetarium (including Planetarium shows and telescope viewing), targeted towards the Spanish-speaking community in New Haven.

Science in the News *Oct 2022 - May 2023*

- **Presenter**: Present short talks on exciting science topics at local libraries and schools.

Yale Astronomy Siblings *Sep 2022 - present*

- **Graduate Student Mentor**: Paired with undergraduate astronomy student as a mentor for advice including on research experiences and graduate school applications.

Astronomy Climate and Diversity Committee *Sep 2022 - present*

- **Member**: Working on putting together report of best practices for graduate school admissions interviews

Professional Societies

Society for the Advancement of Chicanos/Hispanics & Native Americans in Science *Sep 2021 - present*
American Astronomical Society (AAS) *Sep 2021 - present*
Yale Women in Physics (WiP) *Sep 2021 - present*
Princeton Undergraduate Women in Physics (PUWiP) *Apr 2018 - May 2021*

- **Co-President (2020)**: Planned Junior Paper Symposium and spearheaded formation of mentorship program for local high schools

Teaching Experience

Eduexplora Yale Summer Session *July 2023*

- **Instructor**: Developing two week intro to astronomy course that will be taught to Latin American high school students, visiting Yale through the Eduexplora program.

Teaching Fellow - ASTR 120: Galaxies and the Universe, Yale *Jan - May 2023*
Teaching Fellow - ASTR 160: Frontiers and Controversies in Astrophysics, Yale *Sep - Dec 2022*
Teaching Fellow - ASTR 180: Introduction to Relativity and Black Holes, Yale *Jan - May 2022*
Teaching Fellow - ASTR 110: Planet and Stars, Yale *Sep - Dec 2021*
Integrated Science Curriculum Tutor, Princeton *Sep 2018 - May 2019*

Skills

Technical: Java, Python, Javascript, C, MATLAB, HTML, Paraview
Language: Native Spanish speaker; Intermediate Russian