

Isabel Rosa Marie Medlock

Email : isabel.medlock@yale.edu

Website: <https://isamedlock.github.io>

EDUCATION

Yale University

Astronomy PhD Candidate, Thesis Advisor: Prof. Daisuke Nagai

New Haven, CT

Aug 2021 – present

Princeton University

B.A. in Astrophysics; Certificates in Applications of Computing and Russian Language

Princeton, NJ

Sep 2017 – Jun 2021

RESEARCH EXPERIENCE

PhD Dissertation (advised by Daisuke Nagai)

Aug 2021 - present

- **Probing the Physics of the CGM & Cosmological Tension with FRBs: Insights from CAMELS:** First-year theory project - exploring the potential of using fast radio bursts to constrain astrophysical feedback effects on galaxy evolution and cosmology with the CAMELS project
- **Quantifying Baryonic Feedback on Warm-Hot Circumgalactic Medium in CAMELS Simulations:** Co-mentoring (with Daisuke Nagai) Theory Project with Chloe Neufeld
- **Cold Streams: The Umbilical of High-z Galaxies (co-supervised by Frank van den Bosch):** Developing high-resolution zoom-in simulations to study the interaction of cold streams feeding star-forming high-z galaxies with the circumgalactic medium.

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.

PRESENTATIONS

33rd Texas Symposium: FRB Parallel Session in Tempe, Arizona (Invited Talk)

Dec 11th, 2025

Hernquist Group Meeting at Center for Astrophysics, Harvard-Smithsonian (Talk)

Oct 10th, 2025

ITC Luncheon at Center for Astrophysics, Harvard-Smithsonian (Invited Talk)

Oct 9th, 2025

Radio Lunch at Caltech (Talk)

Oct 7th, 2025

Monday Tea Talk at Caltech (Talk)

Oct 6th, 2025

Borthakur Group Meeting at Arizona State University (Invited Virtual Talk)

Oct 3rd, 2025

Astro Seminar at Kavli IPMU, Kashiwa, Japan (Talk)

Sept 22nd, 2025

2025 Santa Cruz Galaxy Workshop at University of California Santa Cruz (Talk)

Aug 7th, 2025

Cosmic Ecosystems at Perimeter Institute, Waterloo, Canada (Talk)

Aug 1st, 2025

Fast Radio Burst 2025 in Montreal, Canada (Talk)

Jul 7th, 2025

Cosmology at Home 2025 (Virtual Talk)

June 17th, 2025

FRB Journal Club at Max Planck Institute for Radio Astronomy (Invited Virtual Talk)

April 11th, 2025

Galaxy Evolution Coffee at European Southern Observatory - Garching, Germany (Talk)

March 27th, 2025

Galaxy Formation Club at Max Planck Institute for Astrophysics in Garching, Germany (Talk)

March 26th, 2025

CGM Meeting at European Southern Observatory - Garching, Germany (Talk)

March 21st, 2025

Astro Lunch at Astronomy Department, University of Washington (Invited Talk)

Feb 25th, 2025

Cosmology and galaxy astrophysics with simulations and machine learning at CCA (Talk)

Dec 8th 2024

Fast Radio Burst 2024	in Khao Lak Pang Nga, Thailand (Talk)	Nov 7th, 2024
2024 Santa Cruz Galaxy Workshop	at University of California Santa Cruz (Talk)	Aug 1st, 2024
European Astronomical Society Annual Meeting	(Virtual Poster)	July 2nd, 2024
Baryons in the Universe 2024	at Kavli IPMU, Kashiwa, Japan (Talk)	Apr 11th, 2024
Fast Radio Burst 2023	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	(Virtual Talk)	Apr 19th, 2020

FELLOWSHIPS & AWARDS

NSF ACCESS Computing Grant (Co-PI, Lead Author): 312.5k Stampede3 node hours (\$68.5k)	2025
NSF ACCESS Computing Grant (Co-PI, Lead Author): 300k Stampede3 node hours (\$62k)	2024
Yale Dean's Fund for Colloquia and Symposia - for Yale Cosmology Seminar (\$1800)	2024,2025
Yale Graduate Student Assembly Conference Travel Fellowship (\$1600)	2023,2024
American Astronomical Society Travel Grant (\$2000)	2023,2024
APS Division of Astrophysics April Meeting Travel Grant (\$300)	2023
Dean's Emerging Scholars Research Award, Yale University (\$2000)	2022
SACNAS NDiSTEM Conference Travel Fellowship (\$1000)	2022

ACTIVITIES & OUTREACH

First-Year Astronomy Buddy (FAB) Mentorship Program Mentor	Aug 2024 - ongoing
Yale SACNAS Chapter (YSACNAS) Co-President, Secretary, and Treasurer	Jan 2023 - ongoing
Yale Cosmology Seminar Co-Organizer	Sep 2023 - ongoing
Leitner Family Observatory and Planetarium Spanish Night Creator and Organizer	Feb 2023 - ongoing
Science in the News Presenter	Oct 2022 - May 2023
Yale Astronomy Siblings Mentor	Sep 2022 - present
Astronomy Climate and Diversity Committee Member	Sep 2022 - present

TEACHING EXPERIENCE

Yale Pathways Workshop Instructor for Local High School Students	July 2025
Eduexplora Yale Summer Session Instructor	July 2023
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

SKILLS

Technical: High Performace Computing, AREPO hydrodynamical cosmological simulations, Java, Python, Javascript, C, MATLAB, HTML, Paraview, Machine Learning
Language: Native English and Spanish speaker; Intermediate Russian

REFERENCES

Daisuke Nagai (PhD Advisor): Professor of Physics and of Astronomy, Yale University
Email: daisuke.nagai@yale.edu, Phone: +1 203-909-4266
Frank van den Bosch (Collaborator): Professor of Astronomy and Physics, Yale University
Email: frank.vandenbosch@yale.edu, Phone: +1 203-432-0196
Volker Springel (Collaborator): Director - Computational Astrophysics, Max Planck Institute for Astrophysics
Email: vspringel@mpa-garching.mpg.de, Phone: +49 89 30000 2195

Publications

Isabel Medlock

Email : isabel.medlock@yale.edu

Website: <https://isamedlock.github.io>

First Author

- [5] **Medlock, I.**, Nagai, D., Mandelker, N., Springel, V., van den Bosch, F., Zinger, E., and Chiang, B., “Statistical Properties of Cold Streams in Massive Star Forming Halos in the IllustrisTNG-50 Simulations”, submitted to *ApJ* (10.48550/arXiv.2511.21814)
- [4] **Medlock, I.**, Nagai, D., Anglés-Alcázar, D., and Gebhardt, M., “Constraining the Effect of Baryonic Feedback on the Matter Power Spectrum with Fast Radio Bursts”, 2025, *ApJ*, 983(1) 46
- [3] **Medlock, I.**, Neufeld, C., Nagai, D., Anglés-Alcázar, D., Genel, S., Oppenheimer, B., Singh, P., and Villaescusa-Navarro, F., “Quantifying Baryonic Feedback on Warm-Hot Circumgalactic Medium in CAMELS Simulations”, 2025, *ApJ*, 980(1) 61
- [2] **Medlock, I.**, Nagai, D., Singh, P., Oppenheimer, B., Anglés-Alcázar, D., and Villaescusa-Navarro, F., “Probing the Physics of the Circum-galactic Medium using Fast Radio Bursts: Insights from CAMELS”, 2024, *ApJ*, 967(1) 32
- [1] **Medlock, I.**, and Cen, R., “Dispersion Measure Distributions of Fast Radio Bursts Due to the Intergalactic Medium”, 2021, *MNRAS*, 502(3), 3664-3669.

Refereed Co-Author

- [5] Gebhardt, M., Anglés-Alcázar, D., Genel, S., Nagai, D., Kiat Oh, B., **Medlock, I.**, Mercedes-Feliz, J., Sutherland, S., Lee, M., Sims, X., Lovell, C., Spergel, D., Davé, R., Schaller, M., Schaye, J., Villaescusa-Navarro, F., “Cosmological back-reaction of baryons on dark matter in the CAMELS simulations”, submitted to *MNRAS*
- [4] Oppenheimer, B., Voit, M., Bahé, Y., Battaglia, N., Bregman, J., Burchett, J., Eckert, D., Faerman, Y., Gibson, J., Hummels, C., **Medlock, I.**, Nagai, D., Putnam, M., Qu, Z., Sun, M., Werk, J., and Zhang, Y., “The Descriptive Parametric Model I: Gaseous Profiles for Galaxies, Groups, and Clusters”, 2025, *MNRAS*, 543(3), 2649-2669
- [3] Zhang, Z., Nagamine, K., Oku, Y., Lee, K.G., Fukushima, K., Tomaru, K., Zhang, B., **Medlock, I.**, and Nagai, D., “Probing the cosmic baryon distribution and the impact of AGN feedback with FRBs in CROCODYLE simulation”, 2025, *ApJ*, 993(2), 162
- [2] Leung, C., Simha, S., **Medlock, I.**, Nagai, D., Masui, K., Kahinga, L., Lanman, A., Andrew, S., Bandura, K., Curtin, A., Gaensler, B., Gusinskaia, N., Joseph, R., Lazda, M., Mas-Ribas, L., Meyers, B., Nimmo, K., Pearlman, A., Prochaska, X., Sammons, M., Shin, K., Smith, K., Wang, H., “Stellar Mass-Dispersion Measure Correlations Constrain Baryonic Feedback in Fast Radio Burst Host Galaxies”, 2025, *ApJL*, 991(1), L25
- [1] Lau, E., Nagai, D., Bodgan, A., **Medlock, I.**, Oppenheimer, B., Battaglia, N., Anglés-Alcázar, D., Genel, S., Ni, Y., and Villaescusa-Navarro, F., “X-raying CAMELS: Constraining Baryonic Feedback in the Circum-Galactic Medium with the CAMEL Simulation and eRASS X-ray Observations”, 2025, *ApJ*, 984(2), 190

Non-Refereed Co-Author

- [2] 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).
- [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*.