CURRICULUM VITAE

Manami Roy

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Research Interest:

My research centers on *galaxy formation and evolution*, with a focus on the complex multiphase structure of the galaxy's diffuse gaseous halo — *the circumgalactic medium (CGM)* — and the impact of *cosmic rays (CRs)* on the CGM and the galaxy's evolution. I investigate the transport, interaction, and impact of CRs across various spatial scales in the galaxy. My work combines theoretical modeling and simulations with multi-wavelength observational comparisons to examine the role of CRs in shaping the evolutionary pathways of galaxies.

Employment :

- 2023– : CCAPP Fellow, *The Ohio State University, USA*
- 2022 : Pre-doctoral fellow, *Centre for Computational Astrophysics, Flatiron Institute*

Education :

- 2018–2023 : Ph.D., Astronomy and Astrophysics, *Raman Research Institute, India*
- 2016–2018 : Master of Science (M.Sc.), Physics, *University of Calcutta, India*
- 2013–2016 : Bachelor of Science (B.Sc.), Physics, *University of Calcutta, India*

Achievements and Awards:

- 2025 : Maximize, Access Computational Cluster Allocation, PHY250228 (13.6M CPU Hours, 23.6 TB; estimated value of the reward is $163,860.80)
- 2024 : Simon Foundation Travel Grant
- 2023– : CCAPP Fellowship, *The Ohio State University, USA*
- 2023 : Explore, Access Computational Cluster Allocation, PHY240003
- 2022 : Pre-doctoral Fellowship, *Center for Computational Astrophysics, Flatiron Institute, USA*
- 2020–2023 : Senior Research Fellowship, *Department of Science and Technology, India*
- 2018–2020 : Junior Research Fellowship, *Department of Science and Technology, India*
- 2013–2018 : INSPIRE (SHE) Scholarship, *Department of Science and Technology, India*

Publication List:

First-Authored Papers:

1. **Manami Roy**, Kung-Yi Su & Stephanie Tonnesen, "Effects of Cosmic Rays on Ram-pressure Stripping of satellite galaxies" (Submitted to ApJ)
2. **Manami Roy**, Kung-Yi Su, Smita Mathur, Jonathan Stern, "Where is the Super-Virial Gas? The Supply from hot inflows", Accepted to *The Astrophysical Journal,* 2025, arXiv:2409.17252
3. **Manami Roy**, Smita Mathur, Sanskriti Das, Armando Lara-DI, Yair Krongold, and Anjali Gupta, "Where is the Supervirial hot gas? II: a survey with sightlines to Galactic X-ray binaries", The Astrophysical Journal, Volume 982, Number 1
4. **Manami Roy,** Kung-Yi Su, Stephanie Tonnesen, Drummond Fielding & Claude-André Faucher-Giguère, "Seeding the CGM: How Satellites Populate the Cold Phase of Milky Way Halo", *Monthly Notices of the Royal Astronomical Society,* 2023; DOI: 10.1093/mnras/stad3142, arXiv:2310.04404
5. **Manami Roy** & Biman B. Nath, "Gamma-rays from the circumgalactic medium of M31" *Monthly Notices of the Royal Astronomical Society,* 2022; DOI : 10.1093/mnras/stac1465, arXiv:2205.12291
6. **Manami Roy** & Biman B. Nath, "Constraints on cosmic rays in the Milky Way circumgalactic medium from OVIII observations", *The Astrophysical Journal*, 2022; DOI : 10.3847/1538-4357/ac6a57, arXiv:2205.00020
7. **Manami Roy**, Biman B. Nath & Mark Voit, "A panoramic view of the circumgalactic medium in the photoionized precipitation model", *Monthly Notices of the Royal Astronomical Society*, 2021; DOI : 10.1093/mnras/stab2407, arXiv:2108.08320

Co-Authored Papers:

1. Anjali Gupta, Smita Mathur, Joshua Kingsbury, Esma Korkmaz, Sanskriti Das, Yair Krongold, **Manami Roy,** Armando Lara-DI, "Where is the Supervirial Gas? III. Insights from X-ray Shadow Observations and a revised Model for the Soft Diffuse X-ray Background", Accepted in *The Astrophysical Journal*, https://arxiv.org/pdf/2507.13331
2. Armando Lara-DI, Yair Krongold, Smita Mathur, **Manami Roy,** Rebecca L. McClain, Sanskriti Das, Anjali Gupta, "Where is the Supervirial hot gas? I: A pilot study with sightlines to Galactic X-ray binaries", Monthly Notices of the Royal Astronomical Society, 2024, DOI : 10.1093/mnras/stae1845, arXiv:2407.16790
3. Alankar Dutta, Mukesh Singh Bisht, Prateek Sharma, Ritali Ghosh, **Manami Roy** & Biman B. Nath, "Beyond radial profiles: Using log-normal distributions to model the multiphase circumgalactic medium", *Monthly Notices of the Royal*

Astronomical Society, 2023, DOI : 10.1093/mnras/stae977, arXiv:2310.03717

4. Ranita Jana, **Manami Roy** & Biman B. Nath, "Gamma-ray and radio background constraints on cosmic rays in Milky Way circumgalactic medium", *The Astrophysical Journal Letter*, 903(1), 2020; DOI : 10.3847/2041-8213/abbee4, arXiv:2007.11015

Publication List: [Continued …]

In Preparation: [*Student-led paper]

1. **Manami Roy,** Mark Krumholz, Roland Crocker & Todd Thomson, "Modeling displaced non-thermal emission near stellar cluster and pulser with anisotropic pitch angle scattering of cosmic ray population"
2. **Manami Roy,** Erwin Lau, Daisuke Nagai, Priyanka Singh & Yakob Faerman, "How non-thermal pressure affects the tSZ signal from different halo masses using Baryon Pasting Model"
3. **Manami Roy**, Todd Thompson, "How do Cosmic Rays affect the dynamics of the bubble of a star-forming galaxy?"
4. **Manami Roy**, Sanskriti Das, Smita Mathur, "Metallicity of MW-CGM from the Dispersion measure of local FRBs"
5. Fish Yu*, **Manami Roy**, Joy Bhattacharya & Annika Peter, "Guardians of galaxies: Environmental Control of Star Formation in Satellite Galaxies"
6. Jorie McDermott*, Chris Hirata & **Manami Roy,** "Generation of the magnetic field at the time of reionization by Weibel Instability"
7. Florian Rünger*, Lily Yu*, **Manami Roy**, et al. "Where is the hot gas and how is it formed: Insights from cosmological simulations: HESITA and TNG"

Professional Activities:

- 2024– : Referee, *Astronomy & Astrophysics*
- 2024–2026: Coordinator, CCAPP seminar, *The Ohio State University*
- 2022– : Co-Founder, CARINAS, a platform for *Indian Women Astronomers*
- 2019–2022: Co-Founder and Organizer, Journal Club (VSM), *Raman Research Institute*

Mentoring Experience:

- 2023– : Fish Yu, Graduate Student, Physics, *The Ohio State University*
- 2023– : Jorie McDermott, Undergraduate Student, Physics, *The Ohio State University*
- 2024– : Florian Rünger, Graduate Student, University of Potsdam, Germany
- 2025– : Lily Yu, Undergraduate Student, Physics, *The Ohio State University*

Programming Skill:

- Language : Python, C, C++, Fortran, bash
- Simulation code : GIZMO, PLUTO, CLOUDY

Research Talks :

1. Unveiling the Complex Temperature Structure of the Galactic Atmosphere; *CCAPP Fellows symposium, 2024, The Ohio State University, USA, 2024*
2. Unveiling the Complex Temperature Structure of the Galactic Halo; *Multiphase Madness: Resolving the CGM in Theory and Observations, The Center for Astrophysics, Harvard & Smithsonian, USA, 2024;* https://youtu.be/76V7SGkC4cc?si=5wX_iB9asOQq8beL
3. Observational techniques to constrain non-thermal pressure in the CGM; *Cosmic Ray Feedback in Galaxies and Galaxy Clusters, Aspen Center for Physics, Aspen, Colorado, USA, 2024*
4. How do the satellite galaxies give "cool" gas to their host?; *CCAPP Fellows symposium, 2023, The Ohio State University, USA, 2023*
5. Unfolding the mystery of cosmic ray content in the circumgalactic medium along with different interactions of CGM with its surroundings; *Astro Colloquium, Australian National University, Australia, 2022 (online)*
6. Interactions of CGM with cosmic rays and satellite galaxies; *What matter(s) around galaxies 2022: Connecting the dots between the CGM and the large-scale environment. (Gas 2022), Italy, 2022*
7. The effect of satellite galaxies on the cooling of the host galaxy's circumgalactic medium: *A comprehensive view of galaxy evolution from the Milky Way to I Zwicky 18: a conference in honor of Monica Tosi, Italy, 2022*
8. Diving into the multiphase circumgalactic medium; *University of Milano Bicocca, Italy, 2022*
9. The effect of satellite galaxies on the cooling of the host galaxy's circumgalactic medium; *Predoctoral fellowship final presentation, Center for Computational Astrophysics, Flatiron Institute, USA, 2022; https://youtu.be/AZqRlO8a9sE*
10. Gamma-rays from the circumgalactic medium of M31; *Lunch Talk, Center for Computational Astrophysics, Flatiron Institute, USA, 2022*
11. Cosmic rays in the circumgalactic medium; *CCA-Tel Aviv collaboration Workshop, Center for Computational Astrophysics, Flatiron Institute, USA, 2022*
12. How does the circumgalactic medium talk to its surroundings?; *CCAPP talk, Ohio State University, USA, 2022*
13. Constraints on cosmic rays in the Milky Way circumgalactic medium from OVIII observations; *Astro coffee, Ohio State University, USA, 2022*
14. Diving into the multiphase circumgalactic medium; *Michigan State University, USA, 2022*

15. Unfolding the mystery of cosmic ray content in the circumgalactic medium along with different interactions of CGM with its surroundings; *Lunch Talk, University of Washington, USA, 2022*
16. Diving into the multiphase circumgalactic medium; *University of Pittsburgh, USA, 2022 (online)*
17. The effect of satellite galaxies on the cooling of the host galaxy's circumgalactic medium; *Science coffee, Space Telescope Science Institute, USA, 2022*
18. Unfolding the mystery of cosmic ray content in the circumgalactic medium along with different interactions of CGM with its surroundings, *Galaxy Lunch, Yale University, USA, 2022*

Research Talks: [Continued …]

19. Gamma-rays from the circumgalactic medium of M31; *UC Santa Barbara, USA, 2022 (online)*
20. Gamma-ray and radio background constraints on cosmic rays in Milky Way circumgalactic medium**;** *39th Meeting of Astronomical Society of India (online), 2021*
21. *Unfolding the mystery of the galactic halo; Center for Theoretical Physics, Polish Academy of Science, Warsaw (online), 2021*
22. Gamma-rays from the circumgalactic medium of M31; *New Results, Galactic Atmosphere, 2022, https://galacticatmospheres.pubpub.org/pub/xtbpk9e8/release/1 (online)*
23. Gamma-ray and radio background constraints on cosmic rays in Milky Way circumgalactic medium; *Fundamentals of Gaseous Halo (HALO21), Kavli Institute For Theoretical Physics (online), 2021; https://youtu.be/LYZBF2Oss_A (online)*
24. A panoramic view of the circumgalactic medium in the photoionized precipitation model; *Fundamentals of Gaseous Halos (HALO21), Kavli Institute For Theoretical Physics (online), 2021; https://youtu.be/ZM5nbnUvxxc (online)*

Poster Presentations:

1. Precipitation model of the circumgalactic medium; *38th Meeting of Astronomical Society of India, 2020*

Conferences And Schools Attended:

1. Cosmic Ray Feedback in Galaxies and Galaxy Clusters, Aspen Center for Physics, Aspen, Colorado, USA, 2024
2. Multiphase Madness: Resolving the CGM in Theory and Observations, The Center for Astrophysics, Harvard & Smithsonian, USA, 2024
3. What matter(s) around galaxies 2022: Connecting the dots between the CGM and the large-scale environment. (Gas 2022), Italy, 2022

4. A comprehensive view of galaxy evolution from the Milky Way to I Zwicky 18: a conference in honor of Monica Tosi, Italy, 2022
5. CCA-Tel Aviv collaboration workshop, Center for Computational Astrophysics, Flatiron Institute, USA, 2022
6. Summer School in Astrostatistics and Astroinformatics, Center for Astrostatistics at The Pennsylvania State University (online), 2022
7. Fundamentals of Gaseous Halos (HALO21) - Kavli Institute for Theoretical Physics (online), 2021
8. 39th Meeting of Astronomical Society of India (online), 2021
9. 38th Meeting of the Astronomical Society of India, 2020
10. Cosmology- The Next Decade at International Center for Theoretical Science, Bengaluru, India, 2019

Outreach Activities:

1. Public talk at Upper Arlington Public Library, Columbus, Ohio, 2024
2. Presentation in the science outreach program at the 39th meeting of the Astronomical Society of India 2021; https://youtu.be/Iij0nYupaVI

References:

- Stephanie Tonnesen, *Center for Computational Astrophysics, Flatiron Institute, USA*
- Todd Thompson, *The Ohio State University, USA*
- Biman B. Nath, *Raman Research Institute, Bengaluru, India*
- Smita Mathur, *The Ohio State University, USA*
- Kung-Yi Su, *The Center for Astrophysics, Harvard & Smithsonian, USA*
- Mark Voit, *Michigan State University, USA*