


RAJSEKHAR MOHAPATRA

Peyton Hall,
4 Ivy Lane, Princeton-NJ-08540,
USA.

rmohapatra@princeton.edu 
<https://www.astro.princeton.edu/~rm3395>



Academic appointments

Postdoctoral research associate, Department of Astrophysical Sciences, Princeton University, 2022–present.

Education

PhD, Research School of Astronomy and Astrophysics (RSAA), Australian National University (ANU), Canberra, 2018–2022.

B.Sc.(Research), Indian Institute of Science (IISc), Bengaluru, 2014–2018.

Major Subject: *Physics*.

Research Interests

Galaxies and galaxy clusters, physics of fluids and plasma, turbulence in astrophysical scales.

Research projects

The role of type Ia supernovae in elliptical galaxies, September 2022–present.

Primary supervisor: *Prof. Eliot Quataert, Princeton University*.

Stratified turbulence in the intracluster medium, October 2018–2022.

Primary supervisor: *Prof. Christoph Federrath, RSAA, ANU*.

Studying turbulence in the intracluster medium, May 2017–June 2018.

Supervisor: *Prof. Prateek Sharma, Dept of Physics, IISc*.

Papers (published)

Multiphase Gas in Elliptical Galaxies: The Role of Type Ia Supernovae, **Mohapatra, R**, and Quataert, E, APJ, 2024.

Multiphase condensation in cluster halos: interplay of cooling, buoyancy and mixing, **Mohapatra, R**, Sharma, P, Federrath, C and Quataert, E, MNRAS, 2023.

Measuring the hot ICM velocity structure function using XMM-Newton observations, Gatuuzz, E, **Mohapatra, R**, et al; accepted for publication, MNRAS, 2023.

Multiphase turbulence in galactic haloes: effect of the driving, **Mohapatra, R**, Federrath, C and Sharma, P; MNRAS, 2022.

Characterising the turbulent multiphase halos with periodic box simulations, **Mohapatra, R**, Jetty, M, Sharma, P and Federrath, C; MNRAS, 2022.

Velocity structure functions in multiphase turbulence: interpreting kinematics of H α filaments in cool core clusters, **Mohapatra, R**, Jetty, M, Sharma, P and Federrath, C; MNRAS, 2022.

Turbulent density and pressure fluctuations in the stratified intracluster medium, **Mohapatra, R**, Federrath, C and Sharma, P, MNRAS, 2021.

Turbulence in stratified atmospheres: implications for the intracluster medium, **Mohapatra, R**, Federrath, C and Sharma, P, MNRAS, 2020.

Turbulence in the intracluster medium: simulations, observables & thermodynamics, **Mohapatra, R** and Sharma, P, MNRAS, 2019.

Papers (submitted)	<p><i>The Type Ia Supernova and AGB-Regulated Interstellar Medium of Massive Galaxies</i>, Mohapatra, R., Quataert, E., Fielding, D. and Guo, M, submitted to APJ, 2025.</p> <p><i>XMAGNET: Velocity structure functions of AGN-driven turbulence in the multiphase intracluster medium</i>, Fournier, M, Grete, P, Brüggén, M, O’Shea, B. W, Prasad, D, Wibking, B. D, Glines, F. W., and Mohapatra, R., submitted to A&A, 2025.</p> <p><i>Chemical enrichment of ICM within the A3266 cluster I: radial profiles</i>, Gatuzz, E., Sanders, J., Liu, A., Fabian, A., Pinto, C., Russell, H., Eckert, D., Walker, S., ZuHone, J., and Mohapatra, R., submitted to A&A, 2024.</p>
Recent invited talks	<p><i>ICM Theory and Computation workshop</i>, University of Michigan, June 2024.</p> <p><i>Galaxy talk</i>, CCA, Flatiron Institute, March 2024.</p> <p><i>Turbulence in the Universe</i>, KITP, Santa Barbara, February 2024.</p> <p><i>Monday science seminar</i>, Department of Astronomy, UW-Madison, Wisconsin, April 2023.</p>
Recent conferences and seminars	<p><i>Baryons Beyond Galactic Boundaries conference</i>, IUCAA, Pune, India, Dec 2024.</p> <p><i>Galaxy cluster meeting</i>, Center for Astrophysics, Harvard University, November 2024.</p> <p><i>Astrophysics seminar</i>, Columbia University, November 2024.</p> <p><i>Cosmology lunch</i>, MPA Garching, October 2024.</p> <p><i>Galaxy lunch</i>, Leiden University, October 2024.</p> <p><i>Galaxy coffee</i>, MPA Heidelberg, September 2024.</p> <p><i>Multiphase CGM workshop</i>, Aspen Center for Physics, Aug–Sept 2024.</p> <p><i>Galaxy discussion</i>, IOA, University of Cambridge, May 2024.</p> <p><i>Galaxy lunch talk</i>, Department of Physics, University of Oxford, May 2024.</p> <p><i>KIPAC XOC group talk</i>, Stanford University, February 2024.</p> <p><i>Tea talk</i>, Caltech, February 2024.</p> <p><i>Turbulence in Astrophysical Environments</i>, KITP, Santa Barbara, United States, January–March 2024.</p>
Programming languages	C, C++, FORTRAN, Python, L ^A T _E X, VisIt, Shell scripting.
Computing time	PI: 3 million ACCESS credits (2023), Co-PI: 13 million ACCESS credits (2024), equivalent to 180,000 GPU hours.
Advanced code	Athenak, FLASH, PLUTO.
Super- computers used	Della, Stellar (Princeton), Delta, DeltaAI (Illionois), Lumi (Finland), Gadi, Raijin (Australia).

Refereeing	Referee for <i>MNRAS</i> , <i>APJ</i> , <i>A&A</i> , <i>Frontiers</i> , 2022–present.
Languages	<i>Odia</i> : Native Language (speaking, reading, writing). <i>English</i> : Fluent (speaking, reading, writing). <i>Hindi</i> : Fluent (speaking, reading, writing).
Mentoring	Co-mentoring senior year undergraduate project, Princeton University, August 2024–present. Mentor in the Undergraduate Summer Research Program, Princeton University, June–July 2024. Co-mentored Mrinal Jetti during his Master’s thesis, July 2020–August 2021. Mentored high school students in Astronomy projects at Mount Stromlo observatory through MSATT , February 2019–September 2020.
Tutoring	Tutor for <i>Advanced Electromagnetism</i> , with the ANU Tjabl center, February–June 2021. Tutor for <i>Physics of Materials</i> , February–June 2020.
Outreach activities	Member of the public observing team, Department of Astrophysical Sciences, Princeton University, NJ, USA, September 2023–present. Outreach assistant, organized more than 50 school visits at Mt. Stromlo Observatory, Canberra, Australia November 2018–2022. Volunteer for the Lunar eclipse event at the Australian Parliament House, 26 May 2021. Online public talks on astronomy in home series, 2020. Volunteer at Starfest, Siding Spring Observatory, Coonabarabran, NSW, Australia, October 2019. Open day presentations at Indian Institute of Science, Bangalore, India 2015–2018.
Other activities	Postdoc member of <i>Department of Astrophysics Climate committee</i> , Princeton University, October 2024–present. Member of the <i>PCTS workshop local organizing committee for Synergistic approaches to particle transport in magnetized turbulence: from the laboratory to astrophysics</i> , Princeton University, 2023–2024. Member of the <i>Inclusion, Diversity, Equity and Access (IDEA) committee</i> , RSAA, ANU, September 2020–2022. Member of the <i>Mount Stromlo student seminars organizing committee</i> , RSAA, ANU, May–November 2019.