

Alankar Dutta

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👤 Dutta, A.

Nationality: India

About me

- 📖 I am currently a postdoctoral research fellow in Computational astrophysics at the Max Planck Institute for Astrophysics, Garching near Munich in Germany.
- 📖 I was an integrated Ph.D. (M.Sc. + Ph.D.) candidate at the Indian Institute of Science, Bangalore as a Prime Minister's Research Fellow supported by the Ministry of Education, Government of India.
- 📖 I am a Computational astrophysicist interested in modeling and simulation of the multiphase gaseous environments around galaxies called the circumgalactic medium (CGM).
- 📖 My research spans over different aspects related to idealized simulations and modeling of the CGM, synthetic observations, cosmological simulations, and multiphase astrophysical plasma.

Work profile

- 2024 – present
- 📖 **MPA postdoctoral research fellow, Max-Planck-Institut für Astrophysik**
Garching b. München, Deutschland
in *Computational Astrophysics*

Education

- 2017 – 2024
- 📖 **Integrated M.Sc. + Ph.D., Indian Institute of Science**
Bangalore, India
in *Computational astrophysics*
Advisor: Prof. Prateek Sharma
Thesis: *Simulations and modeling of multiphase gas in the circumgalactic medium*
funded by the Prime Minister's Research Fellows (PMRF) scheme
awarded the best Ph.D. thesis (2024-25) in Theoretical Physics at IISc.
- 2014 – 2017
- 📖 **B.Sc. Physics, Presidency University**
Kolkata, India
Undergraduate with a major in Physics
Thesis: *X-ray environments of supermassive black holes* with Prof. Suchetana Chatterjee

Publications

- 1 R. Ghosh, M. Gronke, P. Sharma, and **A. Dutta**, "Woven by the whirls: the growth and entrainment of cold clouds in turbulent hot winds," *Monthly Notices of the Royal Astronomical Society*, vol. 550, no. 1, stig1018, Jul. 2026. 🔗 DOI: 10.1093/mnras/stg1018. arXiv: 2510.03552 [astro-ph.GA].
- 2 R. Mohapatra, **A. Dutta**, and P. Sharma, "Multiphase gas in Circumgalactic cloud complexes: Insights from kiloparsec-scale Magnetohydrodynamic Turbulence Simulations," *The Open Journal of Astrophysics*, vol. 9, p. 64831, Jul. 2026. 🔗 DOI: 10.33232/001c.164831. arXiv: 2511.00229 [astro-ph.GA].
- 3 M. S. Bisht, P. Sharma, **A. Dutta**, and B. B. Nath, "Misty, patchy, and turbulent: constraining the cool circumgalactic medium with mCC," *Monthly Notices of the Royal Astronomical Society*, vol. 542, no. 2, pp. 1573–1595, Sep. 2025. 🔗 DOI: 10.1093/mnras/staf1319. arXiv: 2411.17173 [astro-ph.GA].
- 4 **A. Dutta**, P. Sharma, and M. Gronke, "Fading in the Flow: Suppression of cold gas growth in expanding galactic outflows," *Monthly Notices of the Royal Astronomical Society*, Oct. 2025. 🔗 DOI: 10.1093/mnras/staf1845. arXiv: 2506.08545 [astro-ph.GA].

- 5 **A. Dutta**, M. S. Bisht, P. Sharma, R. Ghosh, M. Roy, and B. B. Nath, “Beyond radial profiles: Using log-normal distributions to model the multiphase circumgalactic medium,” *Monthly Notices of the Royal Astronomical Society*, stae977, Apr. 2024, ISSN: 0035-8711. [DOI: 10.1093/mnras/stae977](#). arXiv: 2310.03717.
- 6 R. Ghosh, **A. Dutta**, and P. Sharma, “Ram pressure stripping in clusters: Gravity can bind the ISM but not the CGM,” *Monthly Notices of the Royal Astronomical Society*, stae1345, May 2024, ISSN: 0035-8711. [DOI: 10.1093/mnras/stae1345](#). arXiv: 2404.02035.
- 7 **A. Dutta**, P. Sharma, and D. Nelson, “Cooling flows around cold clouds in the circumgalactic medium: steady-state models and comparison with TNG50,” *Monthly Notices of the Royal Astronomical Society*, vol. 510, no. 3, pp. 3561–3574, Mar. 2022. [DOI: 10.1093/mnras/stab3653](#). arXiv: 2107.02722 [astro-ph.GA].
- 8 V. Kanjilal, **A. Dutta**, and P. Sharma, “Growth and structure of multiphase gas in the cloud-crushing problem with cooling,” *Monthly Notices of the Royal Astronomical Society*, vol. 501, no. 1, pp. 1143–1159, Feb. 2021. [DOI: 10.1093/mnras/staa3610](#). arXiv: 2009.00525 [astro-ph.GA].
- 9 **A. Dutta** and P. Sharma, “On Modeling CC85 Wind in an Expanding Local Box [non-peer reviewed],” *Research Notes of the American Astronomical Society*, vol. 3, no. 10, 148, p. 148, Oct. 2019. [DOI: 10.3847/2515-5172/ab4bd8](#). arXiv: 1910.06339 [astro-ph.GA].
- 10 P. Chakraborty, S. Chatterjee, **A. Dutta**, and A. D. Myers, “Mean Occupation Function of High-redshift Quasars from the Planck Cluster Catalog,” *Publications of the Astronomical Society of the Pacific*, vol. 130, no. 988, p. 064 001, Jun. 2018. [DOI: 10.1088/1538-3873/aaab3e](#). arXiv: 1801.06522 [astro-ph.GA].
- 11 **A. Dutta**, “X-ray environments of supermassive black holes [non-peer reviewed; undergraduate thesis],” May 2017. [DOI: 10.13140/RG.2.2.26190.97606](#).

Skills

Languages	 Proficient in Bengali (native), English and Hindi. Also knows German (A2).
Coding	 C/C++ , Python, $\text{\LaTeX}$. Specialized in computational hydrodynamics. Leading code developer of AstroPlasma, an astrophysical plasma modeling interpolation package. Developed yt visualization frontend and Catalyst In-situ visualization for PLUTO and IDEFIX. Developed parallel hdf5 io on IDEFIX.
Misc.	 Academic research, teaching, high-performance computing, GPU programming, data analysis, analysis of cosmological simulation data like Illustris TNG, and 3D data visualization. Tools/Codes used: PLUTO, Arepo, Cloudy, ParaView, ...

Conferences, workshops & research visits

Selected talks

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| Jul 2026 |  2026 Ringberg Workshop on ‘Computational Galaxy Formation’, organized by Max Planck Institute for Astrophysics at Tegernsee, Bavaria, Germany (<i>invited</i>) |
| Feb 2026 |  MPA-MPE postdoc conference, organized by Max Planck Institute for Astrophysics and Max Planck Institute for Extra-terrestrial Physics postdocs at Schloss Ringberg, Tegernsee, Bavaria, Germany (<i>invited</i>) |
| Jan 2026 |  Weekly ASgard group meeting, organized by the Astronomisches Rechen-Institut , University of Heidelberg at Heidelberg, Germany (<i>seminar</i>) |
| Dec 2025 |  The Baryon Cycle from Reionization to the Cosmic Noon, organized by the Chinese Academy of Sciences South America Center for Astronomy (CASSACA) at Puerto Varas, Chile (<i>contributed</i>) |
-  Institute Colloquium on *Fading in the flow: Clouds in expanding galactic outflows*, organized by the **Faculty of Physical and Mathematical Sciences of the University of Chile** at Santiago, Chile (*seminar*)

Conferences, workshops & research visits (continued)

- Nov 2025 ■ *Modelling of Multiphase Astrophysical Media*, organized by **Max Planck Institute for Astrophysics** at Schloss Ringberg, Tegernsee, Bavaria, Germany (*contributed*)
- Oct 2025 ■ *Multi-phase, Multi-temperature and Complex*, organized by **European Southern Observatory** at Olbia, Italy (*contributed*)
- Sept 2025 ■ *Kapteyn Astronomical Institute, University of Groningen*, Groningen, Netherlands (*seminar*)
- May 2025 ■ *ORIGINS Windy Day*, organized by the **ORIGINS Excellence Cluster** at MPA, Garching b. München, Germany (*contributed*)
- Dec 2024 ■ *Baryons Beyond Galactic Boundaries - 2024*, organized by **Inter-University Centre for Astronomy and Astrophysics (IUCAA)** at Pune, India (*contributed*)
- Nov 2024 ■ *MPA Institute Seminar*, organized by the **Max Planck Institute for Astrophysics**, Garching b. München, Germany (*seminar*)
- Oct 2024 ■ *2024 Ringberg Workshop on 'Computational Galaxy Formation'*, organized by **Max Planck Institute for Astrophysics** at Tegernsee, Bavaria, Germany (*invited*)
- Sept 2024 ■ PLUTO symposium, **University of Turin**, Torino, Italy (*online*; talk on In-situ visualization module for PLUTO)
- May 2024 ■ *Observe Local Think Global: What Solar Observations can teach us about Multiphase Plasmas across Astrophysical Scales*, organized by **International Space Science Institute** at Bern, Switzerland (*online*)
- Mar 2024 ■ Research School of Astronomy & Astrophysics, **Australian National University**, Canberra, Australia (*seminar; online*)
- Feb 2024 ■ Astronomical Society of India Meeting, **ASI 2024, IISc Bangalore**, India (*contributed*)
- Jun 2023 ■ **European Southern Observatory**, Garching b. München, Germany; CGM meeting (*seminar*)
- *Modelling of Multiphase Astrophysical Media*, organized by **Max Planck Institute for Astrophysics** at Schloss Aspenstein, Kochel am See, Bavaria, Germany (*contributed*)
- Mar 2023 ■ *Observe Local Think Global: What Solar Observations can teach us about Multiphase Plasmas across Astrophysical Scales*, organized by **International Space Science Institute** at Bern, Switzerland (*contributed*)
- Feb 2023 ■ **University of Turin**, Torino, Italy (*seminar*)
- **Nicolaus Copernicus Astronomical Center**, Warsaw, Poland (*seminar*)
- Jan 2023 ■ **Leibniz Institute for Astrophysics**, Potsdam, Germany (*seminar; online*)
- **Max Planck Institute for Astrophysics**, Garching b. München, Germany; Cosmology Seminar
- Sept 2022 ■ *What matter(s) around galaxies 2022: Connecting the dots between the CGM and the larger-scale environment*, organized by **Università Milano-Bicocca** at Champoluc, Aosta Valley, Italy (*contributed*)
- Aug 2022 ■ *6th ICM Theory and Computation Workshop*, **Niels Bohr Institute**, Copenhagen, Denmark (*contributed*)
- Feb 2021 ■ Alumni Seminar Series, **Presidency University**, Kolkata, India (*invited*)

Poster presentations

- June 2026 ■ *PLUTO/OpenGadget3 Symposium 2026*, organized by **Max Planck Institute for Astronomy** at Heidelberg, Baden-Württemberg, Germany
- July 2025 ■ *18th Potsdam Thinkshop*, **Leibniz Institute for Astrophysics (AIP)** at Potsdam, Germany (*contributed*)
- Mar 2024 ■ Annual PMRF symposium 2024, **IIT Indore**, India (*invited*)
- Mar 2022 ■ Astronomical Society of India Meeting, **ASI 2022, IIT Roorkee**, India (*contributed*)

Conferences, workshops & research visits (continued)

Feb 2020  Astronomical Society of India Meeting, **ASI 2020**, **IISER Tiupati**, India (*contributed*)

Research visits

- Jan – Feb 2023  **Max Planck Institute for Astrophysics**, Garching b. München, Germany *as a visiting student*.
- May – Aug 2019  **Max Planck Institute for Astrophysics**, Garching b. München, Germany *as a visiting student*.
- Jun 2016  **Inter-University Centre for Astronomy and Astrophysics (IUCAA)**, Pune, India *as a visiting undergraduate student*.

Workshops attended

- Aug – Sept 2024  *Toward a Holistic Understanding of the Multi-scale, Multiphase Circumgalactic Medium*, organized by **Aspen Center for Physics** at Aspen, Colorado, USA (participation in research working groups & discussions on research areas related to multiphase gas physics in the CGM)
- Jan 2021  *KITP Program: Fundamentals of Gaseous Halos*, **Kavli Institute for Theoretical Physics**, Santa Barbara, California, USA (online)
- Jan 2019  *Cosmology: The Next Decade*, **International Centre for Theoretical Sciences (ICTS)**, Bangalore, India

Professional services & teaching

- Jul 2023  Organized *hands-on sessions* in the Workshop on Computational MHD with the PLUTO code, **IISc Bangalore**, India on basics of PLUTO code, makefiles and software development using Git to about 60 beginning Ph.D. and advanced masters students.
- Feb/Mar
2019,20,23,24  Actively volunteered in the organization of *Open Day* at **IISc Bangalore**, India, a public science outreach program which hosts around 50,000 people throughout the day. Led demonstrations like reversible fluid flow experiments at low Reynolds number, and presented talks on multi-messenger astronomy.
- Nov 2019  Demonstration of science experiments to about 600 primary and high school students at **Kendriya Vidyalaya**, IISc, Bangalore, India as a part of International Astronomical Union (IAU) global project 'Astronomy day in school'.

Teaching

- Aug - Sept 2024  Teaching an ISSS course on [Computational physics with Python](#)
- Jan - Apr 2024  Teaching Assistance for NPTEL course on [Problem Solving Through Programming In C](#)
- Jan - May 2023  Teaching Assistance for Computational Physics course as a part of the two-year masters in the School of Astrophysics, Presidency University, Kolkata (online)
- Jul - Sep 2022  Teaching Assistance for NPTEL course on [Python for Data Science](#)
- Jan - May 2022  Teaching Assistance for a course on Computer applications, Kendriya Vidyalaya, IISc
- Jan - May 2021  Teaching Assistance for Computational Physics course, Department of Physics, IISc
- Jan - May 2020  Teaching Assistance for Intermediate Electromagnetism and the Quantum Physics of Radiation, Department of Physics, IISc

Fellowships & awards

July 2026	📌	Kumari L. A. Meera Memorial Medal for the best Ph.D. thesis in Theoretical Physics, Indian Institute of Science, Bangalore, India for the period of 2024-2025
Aug 2024 - present	📌	Max Planck Institute for Astrophysics postdoctoral fellowship
Aug 2020 - July 2024	📌	Prime Minister's Research Fellowship awarded by the Ministry of Education, Government of India (Acceptance rate: 3.5% out of 3000 within institute)
Aug 2017 - Jul 2020	📌	Indian Institute of Science Fellowship for the Integrated Ph.D. program at the Department of Physical Sciences, IISc (0.3% out of 10000 to be selected in IISc Integrated Ph.D. program through JAM)
Jan - Mar 2017	📌	Qualified in JAM (rank 107), JEST (rank 36), TIFR-GS (declined offer from NCRA, Pune)

Students mentored

Navonila Karmakar	📌	Fate of fractal clouds in galactic outflows; Masters thesis project under the IISER-MPG Program
Ioannis Panagiotou	📌	Simulations of non-isobaric clouds in cloud-crushing simulations. Co-mentored with Prof. Filippo Fraternali, University of Groningen, the Netherlands.
Yash Mehul Mehta	📌	Investigating the properties and statistical distribution of cold cloud population in the CGM of simulated galaxies from the Illustris TNG50 cosmological simulation. Co-mentored with Prof. Prateek Sharma, IISc, India.
Vishnu Prasath T.	📌	Simulations of clouds with different geometries in cloud-crushing simulations & investigation of the role of geometry on shear-driven turbulent radiatively cooling boundary layers. Co-mentored with Prof. Prateek Sharma, IISc, India.

References

- 📌 **Volker Springel**, Director, Max Planck Institute for Astrophysics, Garching b. München, Germany
✉ vspringel@mpa-garching.mpg.de
- 📌 **Prateek Sharma**, Professor, Indian Institute of Science, Bangalore, India
✉ prateek@iisc.ac.in
- 📌 **Max Gronke**, Group Leader, ERC funded ASGARD group at ARI/ZAH, Heidelberg University, Heidelberg, Germany
✉ max.gronke@uni-heidelberg.de
- 📌 **Dylan Nelson**, Emmy Noether Research Group Leader, Institute for Theoretical Astrophysics, Heidelberg University, Germany
✉ dnelson@uni-heidelberg.de
- 📌 **Biman B. Nath**, Professor (retired), Raman Research Institute, Bangalore, India
✉ nath.biman@gmail.com