# DEOVRAT PRASAD

**Assistant Professor**
Department of Physics
Central University of South Bihar
Gayaji, Bihar 824236, India

deovratprasad.github.io/dp
deovrat987@gmail.com
+91 91130 13340

## RESEARCH PROFILE

Theoretical and computational astrophysicist studying how feedback from supermassive black holes shapes the evolution of galaxies, groups, and clusters. Research combines magnetohydrodynamic simulations, high-performance computing, and models of accretion and multiphase gas.

## RESEARCH INTERESTS

AGN feedback and accretion; galaxy formation and evolution; feedback processes in galaxies, groups, and clusters; numerical methods for astrophysical fluids.

## ACADEMIC APPOINTMENTS

**Assistant Professor**
Department of Physics, Central University of South Bihar, Gayaji, India | May 2026–present

**Postdoctoral Research Associate**
Cardiff University, Cardiff, UK | November 2022–June 2025

**Postdoctoral Fellow**
Michigan State University, East Lansing, Michigan, USA | July 2018–June 2022

**Research Associate**
Indian Institute of Science, Bengaluru, India | August 2017–June 2018

## EDUCATION

**PhD in Astronomy and Astrophysics**
Indian Institute of Science, Bengaluru, India | June 2018
**Thesis:** AGN Feedback in Galaxy Clusters: Controlling Cooling Flows in Galaxy Clusters by Momentum-Driven AGN Jets
**Advisor:** Prateek Sharma | **Funding:** CSIR Junior/Senior Research Fellowship

**Integrated MSc in Physics (five-year degree)**
UM-DAE Centre for Excellence in Basic Sciences, University of Mumbai, India | 2012
**CGPA:** 7.9/10 | **Thesis:** Study of Resonance Particles in Quantum Mechanics by Numerical Method
**Advisor:** Neelmani Mathur, TIFR Mumbai | **Funding:** INSPIRE Fellowship

## SELECTED HONORS AND FELLOWSHIPS

- **India Top Cited Author Award**, IOP Publishing and American Astronomical Society (2018; citation period 2015–2017).
- **CSIR NET Fellowship** (2012–2017); 24th All India Rank, National Eligibility Test, June 2012.
- **Certificate of Merit**, National Graduate Physics Examination (2010); national top 1%.
- **INSPIRE Fellowship**, Department of Science and Technology, Government of India (2007–2012).

## COMPUTING TIME AWARDS

**Study the Evolution of Massive Galaxies with Cold-Mode AGN Feedback at Low Redshift**
Supercomputing Wales (Hawk and Sunbird) | Co-PI | 1.0 million CPU hours | November 2022–December 2025

**Feedback and Energetics from Magnetized AGN Jets in Galaxy Groups and Clusters**
INCITE, Frontier, Oak Ridge Leadership Computing Facility | Co-PI | 630K + 600K GPU node hours | January 2023–December 2024

**Probing Galaxy Formation at Low and High Redshifts**
NSF XSEDE (Stampede and Expanse) | Co-PI | 1.6 million CPU hours | January–December 2022

**Precipitation-Regulated AGN Feedback in Halos from $10^{12}$ to $10^{15}$ solar masses**
NSF XSEDE (Comet and Expanse) | PI | 2.05 million CPU hours | January 2021–June 2022

**Precipitation-Regulated AGN Feedback in Halos from $10^{12}$ to $10^{15}$ solar masses**
NSF XSEDE (Comet) | PI | 1.23 million CPU hours | July 2019–June 2020

## TEACHING

**Instructor, Central University of South Bihar** | July–November 2026

- Mathematical Physics I, undergraduate course.
- Theory of Relativity, undergraduate course.
- Introduction to Astroparticle Physics, graduate course.

**Guest Lecturer, Energy and Gas in Interstellar Space**
Graduate course, Cardiff University | Spring 2024 and Spring 2025 | Instructor: Tim Davis

**Co-Instructor, Introduction to Astrophysics**
Undergraduate course, Cardiff University | Spring 2023 and Spring 2024 | Co-taught with Mathew Smith

**Teaching Assistant, Electricity, Magnetism and Optics**
Undergraduate course, Indian Institute of Science | January–April 2015 | Instructor: Tarun Deep Saini

**Teaching Assistant, Fluids and Plasma**
Graduate course, Indian Institute of Science | August–November 2014 | Instructor: Prateek Sharma

## STUDENT MENTORING

**MSc dissertation mentoring (Ongoing)**
Department of Physics, Central University of South Bihar | July 2026–May 2027
Madhu Bala; Kanchan Maurya; Yuvraj Chaitanya; Debjani Das.

**Internship mentoring**
Department of Physics, Central University of South Bihar | July–November 2026
Shalini Shikha Kumari.

**Annual project co-mentor**
School of Physics and Astronomy, Cardiff University | September 2024–May 2025
Kobe Richards.

**ACRES summer program co-mentor**
Department of Computational Mathematics, Science and Engineering, Michigan State University | May–July 2019
Sebastian Lacayo, Florida International University.

## ACADEMIC AND ADMINISTRATIVE SERVICE

- **Member**, Research Advisory Committee, Department of Physics, Central University of South Bihar (August 2026–present).
- **Warden**, Boys' Hostel, Central University of South Bihar, Gayaji, India (June 2026–present).
- **Peer review:** Science Advances (2025–2026); The Astrophysical Journal (2025); UKRI-funded computing resources proposal (2024); NASA peer review (2022); Monthly Notices of the Royal Astronomical Society (2018).

## COLLABORATIONS

- **XMAGNET / Feedback and Energetics from Magnetized AGN Jets**
  Michigan State University (2023–present)
- **Figuring Out Gas & Galaxies in Enzo (FOGGIE)**
  Space Telescope Science Institute (2019–2022)

## COMPUTATIONAL AND TECHNICAL EXPERTISE

**Languages:** Fortran 77/95, C, C++, Python, MATLAB, MPI.
**Simulation codes:** ZEUS-MP, PLUTO, Enzo, AthenaPK, AREPO (HD/MHD).
**HPC:** Experience with XSEDE, NASA, Michigan State University, IISc, and Supercomputing Wales facilities.

- **Enzo:** Co-developer; implemented AGN feedback using the Active Particle formulation.
- **PLUTO:** Co-developer of AGN feedback and Runge–Kutta–Legendre super-time-stepping methods for anisotropic thermal conduction.

## PROFESSIONAL DEVELOPMENT

- **Supervised Machine Learning: Regression and Classification**, DeepLearning.AI and Stanford University via Coursera (March 2026).
- **Machine Learning: Advanced Learning Algorithms**, DeepLearning.AI and Stanford University via Coursera (March 2026).

## SELECTED PRESENTATIONS

### Conference talks

**Environmental Effects on Black Hole Feedback Valve in Massive Galaxies**
Resolving Galaxy Ecosystems Across All Scales, The Chinese University of Hong Kong, Hong Kong | December 2023

**Environmental Effects on Black Hole Feedback Valve in Massive Galaxies**
6th ICM Theory and Computation Workshop, Niels Bohr Institute, Copenhagen, Denmark | August 2022

**AGN and Stellar Feedback in Galaxy Clusters**
ASTRONUM 2019, Paris, France | July 2019

**Role of BCG and AGN-Driven Turbulence in Galaxy Cluster Evolution**
SnowCluster: The Physics of Galaxy Clusters, Snowbird, Utah, USA | March 2018

**AGN Feedback in Galaxy Groups**
The Physics of Groups and Galaxy Properties Therein, Institut d'Astrophysique de Paris, France | December 2016

### Colloquia and invited presentations

**Cool-Core Cycles: From Massive Galaxies to Galaxy Clusters**
Raman Research Institute, Bengaluru | January 2026

**Environmental Effects on Black Hole Feedback Valve in Massive Galaxies**
Department of Physics, Indian Institute of Science, Bengaluru | October 2022

**Cool-Core Cycles: AGN Feedback in Galaxy Groups and Clusters**
Inter-University Centre for Astronomy and Astrophysics, Pune | September 2022

**Cool-Core Cycles: AGN Feedback in Galaxy Groups and Clusters**
Department of Astronomy and Astrophysics, Tata Institute of Fundamental Research, Mumbai | September 2022

**Environmental Dependence of Self-Regulating Black Hole Feedback in Massive Galaxies**
HALO 2021, KITP | Short video presentation | January–March 2021

**Environmental Effects on Black Hole Feedback Valve in Massive Galaxies**
Astro Group Meeting, Center for Computational Astrophysics, Flatiron Institute | October 2020

**The Feedback Loop: Controlling Cooling Flows in Galaxy Clusters**
Astronomy Colloquium, University of Notre Dame, USA | December 2018

## REFERENCES

**Mark Voit**
Professor, Department of Physics and Astronomy, Michigan State University
3270 Biomedical and Physical Sciences, East Lansing, MI 48824, USA
voit@msu.edu | +1 517 575 9926

**Brian O'Shea**
Professor, Department of Physics and Astronomy, Michigan State University
3258 Biomedical and Physical Sciences, East Lansing, MI 48824, USA
oshea@msu.edu | +1 517 431 0331

**Prateek Sharma**
Associate Professor, Department of Physics and Astronomy, Indian Institute of Science
D2/08, Physical Sciences Building, Bengaluru, Karnataka 560012, India
prateek@iisc.ac.in | +91 80 2293 3375

**Arif Babul**
Distinguished Professor, Department of Physics and Astronomy, University of Victoria
402A Elliott Building, 3800 Finnerty Road, Victoria, BC V8P 1A1, Canada
babul@uvic.ca | +1 250 721 8844

**Freeke van de Voort**
Reader, School of Physics and Astronomy, Cardiff University
N/2.08A, Queen's Buildings, 5 The Parade, Cardiff CF24 3AA, United Kingdom
vandevoortf@cardiff.ac.uk

## PUBLICATIONS

### Refereed articles — lead author

**XMAGNET: Kinetic, Thermal and Magnetic AGN Feedback in Massive Galaxies at Halo Masses $\approx 10^{13.5}$ solar masses**
Deovrat Prasad, Philipp Grete, Brian O'Shea, Forrest Glines, Mark Voit, Freeke van de Voort, Martin Fournier, and Ben Wibking. 2026, MNRAS, 545, 1–18.

**The Case for Hot-Mode Accretion in Abell 2029**
Deovrat Prasad, Mark Voit, and Brian O'Shea. 2024, MNRAS, 531, 259.

**Atmospheric Circulation in Simulations of the AGN–CGM Connection at Halo Masses $\approx 10^{13.5}$ solar masses**
Deovrat Prasad, Mark Voit, and Brian O'Shea. 2022, ApJ, 932, 18.

**Environmental Dependence of Self-Regulating Black-Hole Feedback in Massive Galaxies**
Deovrat Prasad, Mark Voit, Brian O'Shea, and Forrest Glines. 2020, ApJ, 905, 50.

**Cool-Core Cycles and Phoenix**
Deovrat Prasad, Prateek Sharma, Arif Babul, Mark Voit, and Brian O'Shea. 2020, MNRAS, 495, 594.

**Cool-Core Clusters: Role of BCG, Star Formation, and AGN-Driven Turbulence**
Deovrat Prasad, Prateek Sharma, and Arif Babul. 2018, ApJ, 863, 62.

**AGN Jets Drive Stochastic Cold Accretion in Cluster Cores**
Deovrat Prasad, Prateek Sharma, and Arif Babul. 2017, MNRAS, 471, 1531.

**Cool-Core Cycles: Cold Gas and AGN Jet Feedback in Cluster Cores**
Deovrat Prasad, Prateek Sharma, and Arif Babul. 2015, ApJ, 811, 108.

## Refereed articles — contributing author

**XMAGNET – Stir before Serving: A Lagrangian Perspective on Mixing-Driven Condensation in the Intracluster Medium**
M. Fournier, P. Grete, M. Brüggen, B. W. O'Shea, G. M. Voit, B. D. Wibking, and D. Prasad. 2026. Accepted for publication in Astronomy & Astrophysics. arXiv:2605.00563.

**XMAGNET: Velocity Structure Functions of AGN-Driven Turbulence in the Multiphase Intracluster Medium**
Martin Fournier, Philipp Grete, Marcus Brüggen, Brian W. O'Shea, Deovrat Prasad, Benjamin D. Wibking, Forrest W. Glines, and Rajshekhar Mohapatra. 2025, A&A;, 698, A121.

**The XMAGNET Exascale MHD Simulations of SMBH Feedback in Galaxy Groups and Clusters: Overview and Preliminary Cluster Results**
Philipp Grete, Brian W. O'Shea, Forrest W. Glines, Deovrat Prasad, Benjamin D. Wibking, Martin Fournier, Marcus Brüggen, and G. Mark Voit. 2025, ApJ, 988, 155.

**A Black-Hole Feedback Valve in Massive Galaxies**
G. Mark Voit, Greg L. Bryan, Deovrat Prasad, Rachel Frisbie, Yuan Li, Megan Donahue, Brian W. O'Shea, Ming Sun, and Norbert Werner. 2020, ApJ, 899, 70.

**Figuring Out Gas & Galaxies in Enzo (FOGGIE). IV. The Stochasticity of Ram Pressure Stripping in Galactic Halos**
Raymond C. Simons, Molly S. Peeples, Jason Tumlinson, Brian W. O'Shea, Britton D. Smith, Lauren Corlies, Cassandra Lochhaas, Yong Zheng, Ramona Augustin, Deovrat Prasad, Gregory F. Snyder, and Erik Tollerud. 2020, ApJ, 905, 167.

**Scalable Explicit Implementation of Anisotropic Diffusion with Runge–Kutta–Legendre Super-Time-Stepping**
Bhargava Vaidya, Deovrat Prasad, Andrea Mignone, Prateek Sharma, and Luca Rickler. 2017, MNRAS, 472, 3147.

## Non-refereed publication

**Circumgalactic Gas and the Precipitation Limit (Astro2020 Science White Paper)**
G. M. Voit, A. Babul, Iu. Babyk, G. L. Bryan, H.-W. Chen, M. Donahue, D. Fielding, M. Gaspari, Y. Li, M. McDonald, B. W. O'Shea, D. Prasad, P. Sharma, M. Sun, G. Tremblay, J. Werk, N. Werner, and F. Zahedy. 2019, arXiv:1903.11212.

**Complete publication list:** NASA ADS public library