

# Hitesh Kishore Das

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## EDUCATION

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### PhD in Astrophysics (Ongoing)

Thesis title: The dynamics of multiphase gas in astrophysical media

International Max Planck Research School on Astrophysics (IMPRS)  
Max Planck Institute for Astrophysics (MPA), Garching, Germany  
Ludwig Maximilians University (LMU), Munich, Germany

Duration: Aug 2021-Present  
Doctoral Advisor: Dr. Max Gronke  
Formal supervisor: Prof. Volker Springel

### Master of Science

Indian Institute of Science (IISc), Bengaluru, India  
Major: Physics  
Duration: Aug 2020 - July 2021

### Bachelor of Science (Research)

Indian Institute of Science (IISc), Bengaluru, India  
Major: Physics  
Duration: Aug 2016 - July 2020

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## RESEARCH EXPERIENCE

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- **Subgrid model for multiphase gas interactions** [ FEB 2024 - ]  
Collaborators: Rainer Weinberger, Dr. Max Gronke
- **Three-phase gas in a turbulent medium** [ MAY 2024 - ]  
Project is led by Zewei “Jason” Wu from UChicago during his DAAD-RISE internship. Involved as the advisor for his internship, including framing the research proposal. Collaborators: Zewei “Jason” Wu, Dr. Max Gronke
- **Linear and nonlinear evolution of thermal instability in 2D/3D** [ MAR 2021 - ]  
Collaborator: Dr. Prakriti Pal Choudhury, Prof. Prateek Sharma
- **Survival, destruction and formation of cold molecular gas** [ MAY 2023 - AUG 2023 ]  
Part of the work was done by Atal Agarwal from IIT Roorkee during his DAAD-WISE

internship. I was involved in the internship as a co-supervisor.  
Collaborators: Atal Agarwal, Dr. Max Gronke

- **Multiphase gas dynamics in Magnetised, turbulent medium** [ SEP 2021 - JAN 2024 ]  
Collaborators: Dr. Max Gronke
- **Role of temperature and metallicity in the evolution of thermal instability** [ AUG 2019 - APR 2021 ]  
Part of Bachelors thesis project under the supervision of Prof. Prateek Sharma  
Collaborators: Dr. Prakriti Pal Choudhury, Prof. Prateek Sharma
- **\*Computational Studies of Systems of Self-driven Particles** [ 8 MAY 2019 – 12 JUL 2019 ]  
Internship under supervision of: Assoc. Prof. Massimo Pica Ciamarra (NTU, Singapore)

## PUBLICATIONS

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### - Magnetic Fields in Multiphase Turbulence: Impacts on Dynamics and Structure

Hitesh Kishore Das, Max Gronke  
Monthly Notices of the Royal Astronomical Society, Volume 527, Issue 1, January 2024,  
Pages 991–1013, [doi.org/10.1093/mnras/stad3125](https://doi.org/10.1093/mnras/stad3125)  
arXiv: [2307.06411](https://arxiv.org/abs/2307.06411)

### - Shatter or not: role of temperature and metallicity in the evolution of thermal instability

Hitesh Kishore Das, Prakriti Pal Choudhury, Prateek Sharma  
**Journal:** Monthly Notices of the Royal Astronomical Society, Volume 502, Issue 4, April 2021, Pages 4935–4952, [doi.org/10.1093/mnras/stab382](https://doi.org/10.1093/mnras/stab382)  
arXiv: [2009.11317](https://arxiv.org/abs/2009.11317)

## CONFERENCES AND SEMINARS

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- **Talk** at Lars Hernquist group meeting at **Center for Astrophysics**, Harvard University on August 23, 2024.
- **Multiphase Madness: Resolving the CGM in Theory and Observations** (August 21-23, 2024). Gave a **talk** in-person at Center for Astrophysics, Harvard University, Cambridge.
- **Talk** at Computational Structure and Galaxy formation group meeting at **MIT Kavli Institute for Astrophysics** on August 19, 2024.
- **Talk** in GalRead at Peyton Hall, **Princeton University**, on August 16, 2024.
- **Team meeting for “Observe Local Think Global: What Solar Observations can teach us about Multiphase Plasmas across Astrophysical Scales”** (May 13-17, 2024)  
**Presented** my work. In-person at ISSI, Bern, Switzerland

- **Talk in Cosmology section meeting** at AIP, Potsdam, on May 8, 2024.
- **Annual Astronomical Society of India (ASI) meeting 2024** (Jan 30-Feb 4, 2024). Presented a at IISc, Bangalore, India.
- **2023 IAP colloquium: New simulations for new problems in galaxy formation** (December 11-15, 2023). Gave a in-person at IAP, Paris, France.
- **MIST2023 : Cosmic turbulence and Magnetic fields** (September 24 - October 1, 2023) Gave a in-person at Cargese, Corsica, France.
- **Modelling of Multiphase Astrophysical Media** (May 30-June 2, 2023)  
Presented a ~15 min talk about my work. In-person at Aspenstein Castle, near Lake Kochel, Germany
- **MPA weekly Institute Seminar** (May 15, 2023)  
Presented a ~45 min talk about my work. In-person at MPA, Garching, Germany
- **52nd Saas-Fee winter School on “The Circum-Galactic Medium across cosmic time: an observational and modelling challenge”**  
(March 19-24, 2023)  
Presented a poster about my work. In-person at Les Diablerets, Switzerland
- **Team meeting for “Observe Local Think Global: What Solar Observations can teach us about Multiphase Plasmas across Astrophysical Scales”**  
(March 13-17, 2023)  
Presented an introduction for simulations in ICM/CGM, and my work. In-person at ISSI, Bern, Switzerland
- **The Multiphase Circumgalactic Medium** (February 26- March 3, 2023)  
Presented a ~15 min talk about my work. In-person at Ringberg Castle, Germany
- **Lyman-X Day: ORIGINS workshop** (October 5, 2022)  
Attended in-person at European Southern Observatory (ESO), Garching
- **The National Astronomy Meeting (NAM) 2022** (July 11-15, 2022)  
Attended virtually and submitted a poster for the parallel session “Non-equilibrium thermodynamics across scales: from the solar corona to the intracluster medium”.
- **Gas Flows around Galaxies: ORIGINS workshop** (May 24, 2022)  
Presented my work in-person at MPA, Garching
- **Presision Presidency Physics Summit** (September 11-13, 2020)  
Organized by Presidency University, Kolkata  
Presented work done on Thermal Instability as a talk in the Undergraduate Symposium.
- **On the Origin, Nature, and Mixing of Multiphase Gas in Astrophysics** KITP online conference (October 15-16, 2020)  
Attended the conference virtually
- **IAP online Colloquium on Intracluster Medium/Circumgalactic medium** (June 22-26, 2020)  
Attended the conference virtually

## MENTORING

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- Fully **Supervised** the DAAD-RISE internship of Zewei “Jason” Wu (UChicago) at MPA, Garching between May - August 2024
- **Co-supervised** the DAAD-WISE internship of Atal Agarwal (IIT Roorkee) at MPA, Garching between May-August 2023
- **Mentored** Tapan Mayukh from LMU during their Masters thesis project at MPA during 2023-24 academic year

## SERVICE

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- Refereed:
  - Scientific article for A&A
  - Computing time proposal for DIRAC HPC facility
- **External PhD representative** at MPA (July 2024-)
- **13th IMPRS Symposium:** Chair of the Local Organising Committee

## EXTRA-CURRICULAR EXPERIENCE

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- **IISc Undergraduate Astro Club**  
Delivered a talk on “Astrophysical media and their behaviour”.
- **IISc Undergraduate Physics Club**  
Delivered a talk on “Special Relativity and Minkowski Diagrams”.
- **Indian Institute of Science Open Day**  
Constructed and demonstrated an experiment about Bernard convection cells on Sun.
- **Institute Fest - “Pravega”**  
Involved in planning and conducting events by Physics club for Pravega - 2016 and Pravega - 2017.

## AWARDS AND FELLOWSHIPS

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- Funded **Max Planck Society PhD position**  
Funding for the PhD salary at MPA Duration: Sept 2021 - Sept 2025
- **NTU-India Connect Research Fellowship** 2-month long internship opportunity at NTU, with funding for travel, accommodation and living costs. Funded by: Nanyang Technological University, Singapore (NTU) Duration: May 2019 – July 2019
- **Kishore Vaigyanik Protsahan Yojana** (KVPY) Fellowship  
Funded by: Department of Science and Technology, Government of India

Stream: SX  
Duration: 2016-2021

## SKILLS

**Compiled languages:** C, C++

**Hydrodynamic Simulation:** AREPO, Athena++ , PLUTO

**Interpreted languages:** Python, Matlab, Mathematica

**Others:** LaTeX, ROOT, Bash scripting, High Performance Computing, LAMMPS, Madgraph 5, Pythia

## LANGUAGE PROFICIENCY

- English (Proficient)
- Hindi (Proficient)
- Odia (Native)
- German (Beginner A1)

## WORKED WITH

### **Dr. Max Gronke**

Max Planck Institute for Astrophysics, Garching, Germany

Email: maxbg[AT]mpa-garching.mpg.de

Website: [max.lyman-alpha.com](http://max.lyman-alpha.com)

### **Prof. Prateek Sharma**

Physical Sciences

Indian Institute of Science, Bangalore, India

Email: prateek[AT]iisc.ac.in

Website: [www.physics.iisc.ernet.in/~prateek](http://www.physics.iisc.ernet.in/~prateek)

### **Dr. Rainer Weinberger**

Leibniz Institute for Astrophysics (AIP), Potsdam, Germany

Email: rweinberger[AT]aip.de

Website: [rainerweinberger.com](http://rainerweinberger.com)

### **Assoc. Prof. Massimo Pica Ciamarra**

Nanyang Associate Professor

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