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# Hitesh Kishore Das

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## EDUCATION

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### **PhD in Astrophysics (Ongoing)**

PhD Thesis: 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: 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: 2020-2021

### **Bachelor of Science (Research)** Indian Institute of Science (IISc), Bengaluru, India

Major: Physics  
Duration: 2016-2020

### **Senior Secondary (CBSE), 2016** Kendriya Vidyalaya No-4, Bhubaneswar, India

Stream: Science  
Date: 21/05/2016

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## RESEARCH EXPERIENCE

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- Subgrid model for multiphase gas interactions [ **FEB 2024 -** ]

Collaborators: Rainer Weinberger, Dr. Max Gronke  
Max Planck Institute for Astrophysics, Garching

- Three-phase gas in a turbulent medium [ **MAY 2024 -** ]  
This project is led by Zewei “Jason” Wu from UChicago during his DAAD-RISE internship. I was involved as the advisor for his internship, which included writing the research proposal and supervision for the whole duration of internship.

Collaborators: Zewei “Jason” Wu, Dr. Max Gronke  
Max Planck Institute for Astrophysics, Garching

- 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 intership as a co-supervisor.

Collaborators: Atal Agarwal, Dr. Max Gronke  
Max Planck Institute for Astrophysics, Garching

- Evolution of thermal instability in 2D and 3D [ **MAR 2021 -** ]

Collaborator: Dr. Prakriti Pal Choudhury, Prof. Prateek Sharma  
Physical Sciences, Indian Institute of Science, Bangalore

- Multiphase gas dynamics in Magnetised, turbulent medium [ **SEP 2021 - JAN 2024** ]

Collaborators: Dr. Max Gronke  
Max Planck Institute for Astrophysics, Garching

- Role of temperature and metallicity in the evolution of thermal instability [ **AUG 2019 - APR 2021** ]

Collaborator: Dr. Prakriti Pal Choudhury, Prof. Prateek Sharma  
Physical Sciences, Indian Institute of Science, Bangalore

- Computational Studies of Systems of Self-driven Particles [ **8 MAY 2019 – 12 JUL 2019** ]  
Under supervision of: Assoc. Prof. Massimo Pica Ciamarra  
School of Physical & Mathematical Sciences, Nanyang Technological University, Singapore
- Electrostatics of Spherical Topological Insulators [ **1 MAY 2018 – 30 JUN 2018** ]  
Under supervision of: Assoc. Prof. Subroto Mukerjee  
Physical Sciences, Indian Institute of Science, Bangalore
- Analysis of data from CERN 2010 open data and simulation of top pair production [ **1 MAY 2017 – 31 JUL 2017** ]  
Under supervision of: Asst. Prof. Jyothsna Rani Komaragiri  
Centre for High Energy Physics, Indian Institute of Science, Bangalore

## 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, 2023). 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 intership of Zewei “Jason” Wu (UChicago) at MPA, Garching between May - August 2024
- **Co-supervised** the DAAD-WISE intership of Atal Agarwal (IIT Roorkee) at MPA, Garching between May-August 2023

## EXTRA-CURRICULAR EXPERIENCE

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- **External PhD representative** at MPA
- **13th IMPRS Symposium**  
Was involved in organising the 13th IMPRS Symposium as the Chair of the Local Organising Committee.
- **Undergraduate Physics Club**  
Delivered a talk on “Special Relativity and Minkowski Diagrams”.
- **Indian Instiute of Science Open Day**  
Constructed and demonstrated an experiment about Bernard cells, convection and convection cells in Sun. Also, demonstrated an experiment about Polarization of light.
- **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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- **Kishore Vaigyanik Protsahan Yojana (KVPY) Fellowship}**  
Funded by: Department of Science and Technology, Government of India  
Stream: SX  
Duration: 2016-2021
- **National Cyber Olympiad 2014-15**  
National Rank: 1 (in 11th grade)  
Organised by: Science Olympiad Foundation

- **National Standard Examination in Astronomy , 2015**  
Got certificate for being in top 10% of the examination centre.  
Organised by: Indian Association of Physics Teachers (IAPT)

## SKILLS

C, C++	Python
Athena++	PLUTO
LAMMPS	ROOT
Madgraph 5	Pythia 8.2
Mathematica	SQL
High Performance Computing	Matlab
LaTeX	Bash scripting

## 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  
School of Physical & Mathematical Sciences  
Nanyang Technological University, Singapore  
Email: massimo[AT]ntu.edu.sg  
Website: [sites.google.com/site/ciamarragroup](http://sites.google.com/site/ciamarragroup)

### **Assoc. Prof. Subroto Mukerjee**

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Indian Institute of Science, Bangalore, India  
Email: smukerjee[AT]iisc.ac.in  
Website: [physics.iisc.ernet.in/~smukerjee](http://physics.iisc.ernet.in/~smukerjee)

### **Asst. Prof. Jyothsna Rani Komaragiri**

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