

# Hitesh Kishore Das

GALAXY PHYSICS · ASTROPHYSICAL FLUID DYNAMICS · CIRCUMGALACTIC MEDIUM

Max Planck Institute for Astrophysics, Garching, Germany

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## Education

### PhD in Astrophysics (Ongoing)

Munich/Garching, Germany

MAX PLANCK INSTITUTE FOR ASTROPHYSICS (MPA)

INTERNATIONAL MAX PLANCK RESEARCH SCHOOL FOR ASTROPHYSICS (IMPRS)

LUDWIG MAXIMILIANS UNIVERSITY (LMU)

Aug 2021 - Present

- **Thesis title:** The dynamics of Multiphase gas in Astrophysical media
- **Doctoral Advisor:** Dr. Max Gronke
- **Formal Supervisor:** Prof. Volker Springel

### Master of Science

Bengaluru, India

INDIAN INSTITUTE OF SCIENCE (IISc)

Aug 2020 - July 2021

- With full scholarship from KVPY fellowship

### Bachelor of Science (Research)

Bengaluru, India

INDIAN INSTITUTE OF SCIENCE (IISc)

Aug 2016 - July 2020

- With full scholarship from KVPY fellowship

## Research Experience

### Subgrid model for multiphase gas interactions

MPA

COLLABORATORS: DR. RAINER WEINBERGER, DR. MAX GRONKE

Feb 2024 - Present

### Three-phase gas in a turbulent medium

MPA

COLLABORATORS: ZEWAI WU, DR. MAX GRONKE

May 2024 - Present

- Project is led by Zewai Wu from UChicago during his DAAD-RISE internship.
- **Involved as the advisor** for his internship, including framing the research proposal.

### Linear and nonlinear evolution of thermal instability in 2D/3D

IISc/MPA

COLLABORATORS: DR. PRAKRITI PAL CHOUDHURY, PROF. PRATEEK SHARMA, DR. MAX GRONKE

Mar 2021 - Present

### Multiphase gas dynamics in Magnetised, turbulent medium

MPA

COLLABORATORS: DR. MAX GRONKE

Sep 2021 - Jan 2024

### Role of temperature and metallicity in the evolution of thermal instability

IISc

COLLABORATORS: DR. PRAKRITI PAL CHOUDHURY, PROF. PRATEEK SHARMA

Aug 2019 - Apr 2021

### Survival, destruction, and formation of cold molecular gas

MPA

COLLABORATORS: ATAL AGARWAL, DR. MAX GRONKE

Mar 2023 - Aug 2023

- Atal Agarwal did part of the work from IIT Roorkee during his DAAD-WISE internship
- I was **involved as a co-supervisor** in the internship

## Publications

**Summary - Total: 5, Submitted: 1, In prep: 2, citations: 38**

(as of Oct 2024)

### M3: Multifluid Model for Multiphase Gas

Submitted

HITESH KISHORE DAS, MAX GRONKE, RAINER WEINBERGER

### Shatter or not in 2D/3D: Linear and nonlinear evolution of thermal instability

In prep.

HITESH KISHORE DAS, PRAKRITI PAL CHOUDHURY, PRATEEK SHARMA, MAX GRONKE

### Three-phase gas in a turbulence medium

In prep.

ZEWAI WU, HITESH KISHORE DAS, MAX GRONKE

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

(2307.06411)

## Shatter or not: Role of temperature and metallicity in evolution of thermal instability [1009.11317](https://doi.org/10.1093/mnras/stad3125)

## Conferences and Seminars

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### - 2024

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| <b>Talk:</b> Baryons Beyond Galactic Boundaries   | <b>Dec 2-6, 2024</b> , IUCAA, Pune                      |
| <b>Talk:</b> ORIGINS Turbulence Day   | <b>Oct 16, 2024</b> , MPA, Garching                     |
| <b>Talk:</b> Lars Hernquist group meeting   | <b>Aug 23, 2024</b> , CfA, Harvard                      |
| <b>Talk:</b> Multiphase Madness: Resolving the CGM in Theory and Observations   | <b>Aug 21-23, 2024</b> , CfA, Harvard                   |
| <b>Talk:</b> Computational Structure and Galaxy Formation Group meeting   | <b>Aug 19, 2024</b> , Kavli Inst. for Astrophysics, MIT |
| <b>Talk:</b> presented my work at GalRead   | <b>Aug 19, 2024</b> , Peyton Hall, Princeton Univ.      |
| <b>Talk:</b> ISSI Team meeting for 'Observing Local Think Global: What solar obs. can teach us about Multiphase Plasma across Astrophysical scales' | <b>May 13-17, 2024</b> , ISSI, Bern                     |
| <b>Talk:</b> Cosmology section meeting  | <b>May 8, 2024</b> , AIP, Potsdam                       |
| <b>Talk:</b> Astrophysics Seminar Talk at the Physics Department  | <b>Jan 27, 2024</b> , IISc, Bengaluru                   |
| <b>Poster:</b> Annual meeting of Astronomical Society of India (ASI)  | <b>Jan 30-Feb 4, 2024</b> , IISc, Bengaluru             |

### - 2023

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| <b>Talk:</b> IAP 2023 Colloquium: New simulations for new problems in galaxy formation   | <b>Dec 11-15, 2023</b> , IAP, Paris                    |
| <b>Talk:</b> MIST 2023: Cosmic turbulence and Magnetic fields  | <b>Sep 24- Oct 1, 2023</b> , Cargese, Corsica          |
| <b>Talk:</b> Modelling of Multiphase Astrophysical Media   | <b>May 30- June 2, 2023</b> , Kochel, Germany          |
| <b>Talk:</b> MPA Institute Seminar   | <b>May 15, 2023</b> , MPA, Garching                    |
| <b>Talk:</b> ISSI Team meeting for 'Observing Local Think Global: What solar obs. can teach us about Multiphase Plasma across Astrophysical scales'        | <b>May 13-17, 2023</b> , ISSI, Bern                    |
| <b>Review Talk:</b> ISSI Team meeting for 'Observing Local Think Global: What solar obs. can teach us about Multiphase Plasma across Astrophysical scales' | <b>May 13-17, 2023</b> , ISSI, Bern                    |
| <b>Talk:</b> The Multiphase Circumgalactic Medium  | <b>Feb 26 - Mar 3, 2023</b> , Ringberg Castle, Germany |
| <b>School:</b> 52nd Saas-Fee Winter School on 'The Circumgalactic Medium across cosmic time: an observational and modelling challenge'                     | <b>May 15, 2023</b> , Les Diablerets, Switzerland      |

### - 2022

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| <b>Talk:</b> Gas Flows around Galaxies: ORIGINS Workshop | <b>May 24, 2022</b> , Remote     |
| <b>Poster:</b> The National Astronomy Meeting (NAM) 2022 | <b>July 11-15, 2022</b> , Remote |

## Mentoring

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- **Fully supervised** the DAAD-RISE internship of Zewei “Jason” Wu (UChicago) **May-Aug 2024**, MPA, Garching
  - ▶ Wrote a successful project proposal that was accepted by DAAD-WISE and got **over 60** student applications.
  - ▶ After the selection process, the internship was **fully funded**, by the DAAD Academy.
- **Co-supervised** the DAAD-WISE internship of Atal Agarwal (IIT Roorkee) **May-Aug 2023**, MPA, Garching
- **Mentored** Tapan Mayukh from LMU during their Master's thesis project **2023-24 Academic year**, MPA, Garching
- **Mentored** Benedikt Seidl from LMU during their Bachelor's thesis project **2022-23 Academic year**, MPA, Garching

## Service

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- **Refereed:**
  - ▶ Scientific article for the journal “Astronomy and Astrophysics”
  - ▶ Computing time proposal for DIRAC HPC facility
- **External PhD representative** for MPG PhDNet at MPA, Garching (July 2024-Present)
- **Chair of the Local Organising Committee** of 13th IMPRS Symposium
- **Outreach:**
  - ▶ Volunteered for demonstration at MPA, Garching Open Day (2024)
  - ▶ Outreach talk for Undergraduate students at IISc Astro Club (2021)

- Outreach talk for Undergraduate students at IISc Physics Club (2020)
- Outreach demonstrations at IISc Open Day (2021)
- Outreach demonstrations at IISc Institute festivals (2016-17)

## Awards and Fellowships

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- Funded **Max Planck Society PhD position** (Sep 2021 - Sep2025)
- Funded travel and accommodation to attend **two annual ISSI team meetings** for the working team **Observing Local Think Global: What solar obs. can teach us about Multiphase Plasma across Astrophysical scales**
- **NTU-India Connect Research Fellowship**: 2-month long internship opportunity at NTU, Singapore, with funded travel, accommodation and living costs. (May 2019 - July 2019)
- **Kishore Vaigyanik Protsahan Yojana (KVPY) Fellowship**: Scholarship from the Govt. of India for pursuing university studies in basic sciences (Aug 2016 - July 2021)

## Skills

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**Languages** C/C++, **Python**, Rust, Haskell, Matlab, Mathematica

**Simulation codes** Athena++, **AREPO**, **PLUTO**, AthenaPK

**HPC** **Over 10M CPU hours** used across different systems and architectures

**Others** LaTeX, HTML, Typst, ROOT, Bash, LAMMPS, Madgraph5, Pythia

**Spoken Languages** **English** (Proficient), **Hindi** (Proficient), **Odia** (Native), German (A1)

## References

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### Dr. Max Gronke

MAX PLANCK INSTITUTE FOR ASTROPHYSICS (MPA), GARCHING

**Email:** maxbg [at] mpa-garching.mpg.de

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

### Prof. Prateek Sharma

PHYSICAL SCIENCES, INDIAN INSTITUTE OF SCIENCE (IISc), BENGALURU

**Email:** prateek [at] iisc.ac.in

**Website:** [physics.iisc.ernet.in/prateek](https://physics.iisc.ernet.in/prateek)

### Dr. Rainer Weinberger

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