

# Hitesh Kishore Das

GALAXY PHYSICS · ASTROPHYSICAL FLUID DYNAMICS · CIRCUMGALACTIC MEDIUM

Max Planck Institute for Astrophysics, Garching, Germany

✉ hitesh@mpa-garching.mpg.de 🏠 hiteshkishoredas.github.io 🌐 hiteshkishoredas 📄 0000-0001-6171-6924

## 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.

## Three-phase gas in a turbulence medium

In prep.

ZEWEL WU, HITESH KISHORE DAS, MAX GRONKE

## Magnetic Fields in Multiphase Turbulence: Impacts on Dynamics and Structure (2307.06411)

HITESH KISHORE DAS, MAX GRONKE

Monthly Notices of the Royal Astronomical Society, Volume 527, Issue 1, January 2024, Pages 991–1013

Journal: [doi.org/10.1093/mnras/stad3125](https://doi.org/10.1093/mnras/stad3125)

## Shatter or not: Role of temperature and metallicity in evolution of thermal instability (2009.11317)

HITESH KISHORE DAS, PRAKRITI PAL CHOUDHURY, PRATEEK SHARMA

Monthly Notices of the Royal Astronomical Society, Volume 502, Issue 4, April 2021, Pages 4935–4952

Journal: [doi.org/10.1093/mnras/stad3125](https://doi.org/10.1093/mnras/stad3125)

## Conferences and Seminars

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### - 2024

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

### - 2023

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

### - 2022

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

LEIBNIZ INSITUTE FOR ASTROPHYSICS (AIP), POTSDAM

Email: rweinberger [at] aip.de

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