Hitesh Kishore Das

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Education

PhD in Astrophysics} (Ongoing)
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

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

Research Experience

The dynamics of magnetized, multiphase gas in a turbulent environment

[8 SEP 2021 - PRESENT]
We are studying the different aspects of multiphase gas, like survival, morphology and growth, in a turbulent medium in presence of magnetic fields. We use idealised MHD simulations run using Athena ++ for this study.

Doctoral Advisor: Dr. Max Gronke
Formal supervisor: Prof. Volker Springel
Max Planck Institute for Astrophysics, Garching

Role of temperature and metallicity in the evolution of thermal instability

[1 AUG 2019 - PRESENT]
In this project we investigate the role of different parameters like metallicity and temperature in the growth of thermal instability. The project includes setting up and running simulation for study of thermal instabilities using PLUTO.
This work led to some important insights into evolution of large-scale isochoric clouds.

This project contributed towards my Bachelors thesis and led to a research paper in collaboration with Dr. Prakriti Pal Choudhury and Prof. Prateek Sharma.

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

Computational Studies of Systems of Self-driven Particles

[8 MAY 2019 – 12 JUL 2019]
This project aimed at investigating the underlying physical origin of this "phase transition" via the development of appropriate computational models. The project goals included:
- Molecular dynamics code development (in LAMMPS), adapting existing code in the research group
- Reproduction of literature data

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]
Theoretical derivation of electric and magnetic scalar potentials for different cases of electric and magnetic fields near a spherical Topological insulator.

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]
It consisted of accessing CERN 2010 open data using CernVM and analysing the data using C++ and Python code incorporating ROOT to plot Dimuon spectra, Trimuon spectra and other related plots. High-energy particle physics event simulations of top pair production were done using Pythia 8.2 and Madgraph 5.

Under supervision of: Asst. Prof. Jyothsna Rani Komaragiri
Centre for High Energy Physics, Indian Institute of Science, Bangalore

Publications

- 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
arXiv: 2009.11317

Conferences and Seminars

- **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

Extra-curricular Experience

- **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

- **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

Compiled languages: C , C++
Hydrodynamic Simulation: Athena++ , PLUTO
Interpreted languages: Python , Matlab, Mathematica
Others: LaTeX, ROOT, Bash scripting, High Performance Computing

Language proficiency

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

References

Dr. Max Gronke

Max Planck Institute for Astrophysics, Garching, Germany
Email: maxbg[AT]mpa-garching.mpg.de
Website: max.lyman-alpha.com

Assoc. Prof. Prateek Sharma

Physical Sciences
Indian Institute of Science, Bangalore
Email: prateek[AT]iisc.ac.in
Website: www.physics.iisc.ernet.in/~prateek

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

Assoc. Prof. Subroto Mukerjee

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

Asst. Prof. Jyothsna Rani Komaragiri

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