

Bhargav Vaidya

Associate Professor

Head, Max Planck Partner Group

Discipline of Astronomy, Astrophysics and Space Engineering,
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Education

Year	Degree	Institute
2008-2011	Ph.D.	Max Planck Institute for Astronomy, Heidelberg, Germany
2006-2008	M.Sc. Physics	Indian Institute of Technology, Roorkee
2003-2006	B.Sc. Physics	D.G. Ruparel College of Science and Arts, University of Mumbai.
2001-2003	H.S.C.	Sathaye College, Mumbai.
2001	S.S.C.	Hansraj Morarjee Public School, Mumbai.

Experience

Associate Professor, Discipline of Astronomy, Astrophysics and Space Engineering, IIT Indore, India

November 2022 - Present

Assistant Professor, Discipline of Astronomy, Astrophysics and Space Engineering, IIT Indore, India

May 2017 - November 2022

Postdoctoral Fellow, Department of Physics, University of Torino, Torino, Italy.

February, 2014 - April 2017

Postdoctoral Fellow, School of Physics and Astronomy, University of Leeds, Leeds, UK.

September, 2011 - Jan, 2014.

Ph.D., Astronomy & Astrophysics, Max Planck Institute for Astronomy, Heidelberg.

August 2008 - October 2011.

Thesis: Theory of Disks and Outflows around Young Massive Stellar Objects.

Supervisors: Dr. Christian Fendt , Dr. Henrik Beuther

Current Research Interests

Computational Fluid Dynamics : Hydrodynamics, Magneto-hydrodynamics & Radiative transfer,

Particle Acceleration in AGN jets : Modeling Non-Thermal spectral signatures

Space Plasma Modelling: Numerical Space Weather, Physics of re-connection in Planetary Magneto-sphere.

Astrophysical Code Development : MPI Parallel Programming, Visualization software tools, best practices of coding with C and Python.

Current Group

Details - <http://www.iiti.ac.in/people/bvaidya/group.html>

PhD students (since July 2018): 06

Externally funded : 05 (PMRF (2 nos), DST-INSPIRE, Max Planck Partner Group, ISRO-RESPOND Grant)

Institute funded : 01

Postdoctoral Fellows:

Alumni : 01 Max Planck Partner Group Funded Postdoc (March 2020-Feb 2022) [Currently a member of EHT]

Awards, Grants & Honors

Awarded the ISRO RESPOND Grant INR \sim 27.23 lacs for the project on "Physics based modelling of inner heliosphere" for a period of three years Jan 2022 - Dec 2024

Appointed as Head for Max Planck - India Partner group with MPI for Astronomy, Heidelberg at IIT Indore

Awarded the CSIR EMR-II grant (INR \sim 19 lacs) for the project on "Synthetic Observations of X-shaped Radio Galaxies" for a period of three years Aug 2018 - July 2021

Awarded International Astronomical Union (IAU) Travel grant to present paper at the IAUS 342 Perseus in Sicily from black hole to cluster outskirts to be held in Noto, Italy in May 2018.

Successful in winning the grant as a PI of 1 million CPU hours at Eurora cluster of CINECA, Italy for the project of developing particle module for PLUTO code.

Awarded with "Klaus Tschira Stipendium" for 3 years by Heidelberg Graduate School of Fundamental Physics to carry out Doctoral Studies in Heidelberg, 2008-2011

Ranked among the top 1% in National Graduate Physics Examination (NGPE) conducted by Indian Association of Physics Teachers in 2006

Publications

Refereed Papers [2017-2022]

1. Giri, Gourab, Dubey, Ravi Pratap, Khatun, Rubinur, Vaidya, Bhargav and Kharb, Preeti, Dynamical Modelling and Emission Signatures of a Candidate Dual AGN with Precessing Radio Jets, Monthly Notices of the Royal Astronomical Society, [2022], *accepted for publication*
2. Dihingia, Indu K. and Vaidya, Bhargav, Properties of the accretion disc, jet and disc-wind around Kerr black hole, Journal of Astrophysics and Astronomy, [2022], 43, 23 10.1007/s12036-022-09804-z
3. Acharya, Sriyasriti and Vaidya, Bhargav, Understanding emission signatures of AGN jets through numerical simulations, Journal of Astrophysics and Astronomy, [2022], 43, 8 10.1007/s12036-021-09796-2
4. Giri, Gourab, Vaidya, Bhargav, Rossi, Paola, Bodo, Gianluigi, Mukherjee, Dipanjan, and Mignone, Andrea, Modelling X-shaped radio galaxies: Dynamical and emission signatures from the Back-flow model, Astronomy and Astrophysics, [2022], 662, A5 10.1051/0004-6361/202142546
5. Sow Mondal, Shanwlee, Sarkar, Aveek, Vaidya, Bhargav, and Mignone, Andrea, Acceleration of Solar Energetic Particles by the Shock of Interplanetary Coronal Mass Ejection, The Astrophysical Journal, [2021], 923, 80 10.3847/1538-4357/ac2c7a
6. Kundu, Sayan, Vaidya, Bhargav, and Mignone, Andrea, Numerical Modeling and Physical Interplay of Stochastic Turbulent Acceleration for Nonthermal Emission Processes, The Astrophysical Journal, [2021], 921, 74 10.3847/1538-4357/ac1ba5
7. Domnguez-Fernndez, P., Brggen, M., Vazza, F., Hoeft, M., Banda-Barragn, W. E., Rajpurohit, K., Wittor, D., Mignone, A., Mukherjee, D., and Vaidya, B., Morphology of radio relics - II. Properties of polarized emission, Monthly Notices of the Royal Astronomical Society, [2021], 507, 2714-2734 10.1093/mnras/stab2353
8. Acharya, Sriyasriti, Borse, Nikhil S., and Vaidya, Bhargav, Numerical analysis of long-term variability of AGN jets through RMHD simulations, Monthly Notices of the Royal Astronomical Society, [2021], 506, 1862-1878 10.1093/mnras/stab1775
9. Paul, Arghyadeep and Vaidya, Bhargav, Effects of a velocity shear on double current sheet systems: Explosive reconnection and particle acceleration, Physics of Plasmas, [2021], 28, 082903 10.1063/5.0054501
10. Dihingia, Indu K., Vaidya, Bhargav, and Fendt, Christian, Jets, disc-winds, and oscillations in general relativistic, magnetically driven flows around black hole, Monthly Notices of the Royal Astronomical Society, [2021], 505, 3596-3615 10.1093/mnras/stab1512

11. Mukherjee, Dipanjan, Bodo, Gianluigi, Rossi, Paola, Mignone, Andrea, and Vaidya, Bhargav, Simulating the dynamics and synchrotron emission from relativistic jets - II. Evolution of non-thermal electrons, *Monthly Notices of the Royal Astronomical Society*, [2021], 505, 2267-2284 10.1093/mnras/stab1327
12. Borse, Nikhil, Acharya, Sriyasriti, Vaidya, Bhargav, Mukherjee, Dipanjan, Bodo, Gianluigi, Rossi, Paola, and Mignone, Andrea, Numerical study of the Kelvin-Helmholtz instability and its effect on synthetic emission from magnetized jets, *Astronomy and Astrophysics*, [2021], 649, A150 10.1051/0004-6361/202140440
13. Dominguez-Fernandez, P., Bruggen, M., Vazza, F., Banda-Barragan, W. E., Rajpurohit, K., Mignone, A., Mukherjee, D., and Vaidya, B., Morphology of radio relics - I. What causes the substructure of synchrotron emission?, *Monthly Notices of the Royal Astronomical Society*, [2021], 500, 795-816
14. Mukherjee, Dipanjan, Bodo, Gianluigi, Mignone, Andrea, Rossi, Paola, and Vaidya, Bhargav, Simulating the dynamics and non-thermal emission of relativistic magnetized jets I. Dynamics, *Monthly Notices of the Royal Astronomical Society*, [2020], 499, 681-701 10.1093/mnras/staa2934
15. Kumar, Sandeep, Paul, Arghyadeep, and Vaidya, Bhargav, A comparison study of extrapolation models and empirical relations in forecasting solar wind, *Frontiers in Astronomy and Space Sciences*, [2020], 7, 92 10.3389/fspas.2020.572084
16. Dabhade, P., Mahato, M., Bagchi, J., Saikia, D. J., Combes, F., Sankhyayan, S., Rttgering, H. J. A., Ho, L. C., Gaikwad, M., Raychaudhury, S., Vaidya, B., and Guiderdoni, B., Search and analysis of giant radio galaxies with associated nuclei (SAGAN). I. New sample and multi-wavelength studies, *Astronomy and Astrophysics*, [2020], 642, A153 10.1051/0004-6361/202038344
17. Mignone, A., Flock, M., and Vaidya, B., A Particle Module for the PLUTO Code. III. Dust, *The Astrophysical Journal Supplement Series*, [2019], 244, 38 10.3847/1538-4365/ab4356
18. Bharati Das, Srijan, Basak, Arnab, Nandy, Dibyendu, and Vaidya, Bhargav, Modeling Star-Planet Interactions in Far-out Planetary and Exoplanetary Systems, *The Astrophysical Journal*, [2019], 877, 80 10.3847/1538-4357/ab18ad
19. Singh, K. K., Meintjes, P. J., van Soelen, B., Ramamonjisoa, F. A., and Vaidya, B., Optical polarization properties of February 2010 outburst of the blazar Mrk 421, *Astrophysics and Space Science*, [2019], 364, 88 10.1007/s10509-019-3579-z
20. Vaidya, Bhargav, Mignone, Andrea, Bodo, Gianluigi, Rossi, Paola, and Massaglia, Silvano, A Particle Module for the PLUTO Code. II. Hybrid Framework for Modeling Nonthermal Emission from Relativistic Magnetized Flows, *The Astrophysical Journal*, [2018], 865, 144 10.3847/1538-4357/aadd17

21. Mignone, A., Bodo, G., Vaidya, B., and Mattia, G., A Particle Module for the PLUTO Code. I. An Implementation of the MHD-PIC Equations, *The Astrophysical Journal*, [2018], 859, 13 10.3847/1538-4357/aabccd
22. Vaidya, Bhargav, Prasad, Deovrat, Mignone, Andrea, Sharma, Prateek, and Rickler, Luca, Scalable explicit implementation of anisotropic diffusion with Runge-Kutta-Legendre super-time stepping, *Monthly Notices of the Royal Astronomical Society*, [2017], 472, 3147-3160 10.1093/mnras/stx2176
23. Sarkar, Aavek, Vaidya, Bhargav, Hazra, Soumitra, and Bhattacharyya, Jishnu, Simulating Coronal Loop Implosion and Compressible Wave Modes in a Flare Hit Active Region, *The Astrophysical Journal*, [2017], 851, 120 10.3847/1538-4357/aa9a45
24. Falle, S. A. E. G., Vaidya, B., and Hartquist, T. W., The interaction of hydrodynamic shocks with self-gravitating clouds, *Monthly Notices of the Royal Astronomical Society*, [2017], 465, 260-268 10.1093/mnras/stw2795