VANSHAJ KERNI

https://vanshaj18.github.io/ | vkerni@ph.iitr.ac.in

EDUCATION

Indian Institute of Technology Roorkee *Fall 2018–Fall 2023 (tentative)*
Integrated Master (BSc+MSc) Physics ***92.4%***

Awards
IIT Roorkee Heritage Excellence Award(2019), IIT Roorkee Merit-cum-Means Scholarship (five semesters), Bronze Honour in International Astronomy and Astrophysics Competition, First Prize in IIT Kanpur Hyperion Case Study, Silver Medal Inter IIT Tech Meet 9.

Societies & Clubs
Student member Astronomical Society of India (S1048), Additional APS Undergraduate member, Indian Ambassador for IAAC, Radio Telescope Project Team, FOS Music section

PUBLICATIONS

• ***Conference Poster–General Relativity and Cosmology*** [e-poster]
Vanshaj Kerni(co-author), Julie Jacob Thomas, Geetanjali Sethi - *The spherical evolution of cosmic voids in Chaplygin gas dark energy models.*
Procedings of the 40^{th} Meeting of the Astronomical Society of India hosted jointly by IIT Roorkee and ARIES Nainital.

• ***Conference Poster–Instrumentation and Techniques*** [e-poster]
Vanshaj Kerni(presenter) on behalf of the Radio Telescope Project Team - *Building a 5m aperture small radio telescope at IIT Roorkee*
Procedings of the 40^{th} Meeting of the Astronomical Society of India hosted jointly by IIT Roorkee and ARIES Nainital.

• ***Conference Paper (pages 739-745)*** [paper][PPT]
Vanshaj Kerni, M.Majhi, A.K.Nayak - *Flow characteristics and platelet adhesion of blood flow in a corrugated microchannel with the reduction and extension of shear effects.*
Procedings of the 26^{th} National & 4^{th} International ISHMT-ASTFE Heat and Mass Transfer, December 17-20, 2021, IIT Madras, Chennai.

• **Eprint on *ResearchGate*** [PDF]
V.Kerni, A.Rawat et.al - Analysis of Stellar Parameters of Ultra Compact X-Ray Binary-OGLE-UCXB-01.

• ***Eprint on arXiv*** [PDF]
V.Kerni, J.Komaragiri - Verification of Bethe-Bloch formula using Geant4 toolkit.

RESEARCH EXPERIENCE

Statistical analysis of optical nebular properties of WRPNe and non-WRPNe Ongoing
Indian Institute of Astrophysics, Supervised by Prof Muthumariappan C

The spherical evolution of cosmic voids in Chaplygin gas dark energy models Ongoing
Remote work, Advised by Dr.Geetanjali Sethi

- Analysing the evolution of void structures in different dark energy models.
  (Presented Scientific Poster in 2022 ASI conference in General Relativity and Cosmology section.)

Analysis of Stellar Parameters of OGLE-UXCB-01 *Fall 2021*
Remote Work Advised by Ms.Feven Markos Hunde

- We analysed the observational and stellar parameters of the Ultra-Compact X-Ray binary OGLE-UCXB-01 in the Djorg 2 cluster was analysed.
- We used modelled and data from Gaia, Simbad, Viser databases to validate the model used in the theory.

- I worked with a diverse team of ten undergraduate and graduate student teams from different Indian Institutes.

Analytical derivation of fluid flow equation *Spring 2021 – Fall 2021*
IIT Roorkee, Advised by Dr.Ameeya K. Nayak

- Expanding on previous works, we analysed incompressible Navier Stokes equations with a power-law model to analyse blood flow velocity in two dimensions.
- I was primarily involved with theoretical derivation of analytical solution to the non-linear Navier Stokes equations
  with power-law viscosity model for blood flow in stenosed section with potential and pressure gradient as driving agents.
- I also contributed in the conference paper for the 4^{th}International IHMTC 2021 conference.

Verification of Bethe-Bloch formula using Geant4 toolkit *Summer 2020*
Remote Work, Advised by Dr.Jyothsna Rani Komaragiri.

- Used the electromagnetic package to verify the Bethe-Bloch energy loss formula for charged particles developed mainly by Hans Bethe and analyse the extent of its validity.
- Reviewed the different interaction, scattering mechanisms, energy loss relations and derived the cross-section relations-following classical and quantum field approaches.
- Work is a part of IAS Summer Research Program. [IAS]

Asteroseismology of Solar Type Stars *Fall 2019-Spring 2020*
HBCSE Mumbai, Advised by Dr.Anwesh Mazumdar.

- Studied the stellar evolution stars with emphasis on internal structure, characteristics based on HR diagram and oscillation processes. [PRs]
- Verified modelled data for seven different stars with age ranging from 73 million to 3.5 billion years using Python and and Gnuplot to correlate with theoretical study.

SELECTED PROJECTS

5m Radio Telescope Project *2020–Present*

- Co-leader in building student build 5m Radio Telescope on campus. (Abstract accepted for poster presentation in the ASI 2022 conference in the instrumentation section.)

Mathematical Modelling *Spring 2021*

- Written python scripts as self work for analysing different models arising in the mathematical modelling course work. The work helped in getting a GPA 10 in the course. [code][repo]

Open source contribution: Gravity Spikes, Dark Energy Hunters *Spring 2021-Present*
[profile] *Zooniverse*

- Classifying LIGO-VIRGO-KAGRA gravitational signal data-sets to generate high quality training dataset to train Machine Learning algorithms.
- Classifying HETDEX images of galaxies as `real` or `noise` to measure dark energy in universe.

CONFERENCE & SCHOOLS

Introductory Summer School in Astronomy and Astrophysics (ISSAA) Summer 2022
organised by IUCAA in Online mode

40th Meeting of the Astronomical Society of India *March 2022*
Organised by IIT Roorkee & Aries Nanital

- Presented scientific e-poster in Instrumentation and Techniques category.
- Co-authored scientific poster in General Relativity and Cosmology category.

- Volunteered in organising the conference from 25 to 29th March'22.

26th National 4th International ISHMT-ASTFE Heat and Mass Transfer *Winter 2021*
Organised by IIT Madras

- Presented my work on Blood Flow in Corrugated micro-channel under the microfluidic category in online mode.

National Initiative on Undergraduate Sciences (NIUS) *Summer 2019*
onsite, Hosted by HBCSE-TIFR, Mumbai

LEADERSHIP & MANAGEMENT EXPERIENCE

Additional Secretary, PaAC (Physics and Astronomy Club) *Spring 2021–Present*

- Supervised team in organising club activities.
- Organised group discussions, lectures, quizzes and star-gazing and telescope-handling sessions.
- Under my leadership, club won members achieved top position in competitions including silver medal in Inter IIT Tech Meet 9.0, First Prize in Research Case Study organised by IIT Kanpur.

PROGRAMMING AND DESIGN SKILLS

Languages	Python, Gnuplot, MATLAB, C++, HTML, CSS, Git, Jekyll LaTeX
Libraries	Numpy, Matplotlib, Pandas, Jupyter, Astropy, TensorFlow
Scientific software	DS9, Mathematica, Comsol Multiphysics, R, Geant4, MESA
Design	Canva, Figma
System	Linux, Windows