Akash Vani

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Education

Sept 2022   **Master of Science in Physics |** University of Heidelberg, Germany
Thesis: *Properties of stellar populations and white dwarfs in a semi-analytic Milky Way disk model based on Gaia DR3*
Supervisor: Prof. Andreas Just, Astronomisches Rechen-Institut (ARI), ZAH, Heidelberg

June 2019   **Bachelor of Science in Physics |** Savitribai Phule Pune University, India
Thesis: *Photometric Calibration of UVIT* (UV telescope on Astrosat)
Supervisor: Prof. Shyam Tandon, Inter-University Centre for Astronomy and Astrophysics, Pune

Key Projects

1. Nov 2022 – July 2023   **| Examination of redshift evolution of galaxy scaling relation between the semi-analytic L-Galaxies model and observational data**

   To examine scaling relations (such as SFR-M*, SMF, etc) of spatially resolved galaxies and examine their redshift evolution (z<10) between the L-Galaxies semi-analytic galaxy evolution model and observational data.
   Supervisor: Prof. Guinevere Kauffmann, Prof Volker Springel, MPA, Garching, MPA, Garching

2. Jun 2021 – Jul 2022   **| 5th Catalogue of Nearby Stars**

   To construct and explore the 5th Catalogue of Nearby Stars; early analysis of the completeness limit and the luminosity function, understanding local stellar density variations, and explore the properties of the stellar content of the catalogue.
   Supervisors: Alex Golovin, Prof. Sabine Reffert, LSW, Prof. Andreas Just and Prof. Stefan Jordan, ARI, Heidelberg

3. May 2021 – Jul 2021   **| Investigation of two M-dwarf Binaries in the CNS5**

   These two M-dwarf binaries are a potential candidate to quadruple. This project is about investigating the properties of these two systems.
   Supervisors: Prof. Sabine Reffert, LSW and Prof Andreas Just, ARI, University of Heidelberg

4. Oct 2020 - Oct 2020   **| Quantum Key Distribution: BB84 & E91 Protocol**

   We a team of two, demonstrated the working of the BB84 and E91 protocol on the IBMQ quantum computer. We also looked into the transmission of the qubits with and without repeaters to illustrate the working of a quantum network.
   Supervisor: Prof. Fred Jendrzejewski, KIP, Heidelberg

5. Sept 2020 - Oct 2020   **| Deep Learning in Astronomy**

   Understanding basic deep learning techniques by using TensorFlow. A simple neural network is implemented to find whether a galaxy is spiral or elliptical based on photometric data or images obtained from SDSS. The data was provided by Ashish Mahabal during the 7BISS (2020) summer school.
   Self-guided

6. Aug 2019 - Oct 2020   **| The study of LMXB 4U 1702-429 using ASTROSAT data**

   The spectral and timing study of a thermonuclear (Type-I) X-ray burst of 4U 1702-429, a low mass X-ray binary system, using ASTROSAT's LAPXC and SXT data.
   Supervisors: Prof. Sudip Bhattacharyya, TIFR, Mumbai and Navin Sridhar, University of Columbia, New York

7. Jun 2019 - Aug 2019   **| Introduction to Polarimetry**

   A literature survey and a presentation on the theme of polarimetry, covering the topics of Jones and Stokes formalism and material interactions with a hands-on laboratory component.
   Supervisor: Prof. Nirmalya Ghosh, IISER Kolkata

Employment

- Nov 2022 – Aug 2023 | Research intern, **Max Planck Institute for Astrophysics** (MPA), Garching
- Oct 2021 – Oct 2022 | Student Assistant, **German Cancer Research Center** (DKFZ), Heidelberg
- June 2019 – July 2019 | Summer Fellow, **IISER Kolkata**

Select MSc Courses

- Introduction to Machine Learning   Summer Semester 22
- Statistical Methods   Summer Semester 21
- Computational Statistics and Data Analysis   Summer Semester 21
- Solving Problems on Quantum Hardware   Winter Semester 21/22
- Introduction to GPU Accelerated Computing   Winter Semester 21/22
- Startup Lab 2020 (Hei Innovation)   Summer Semester 20
- Python: Programming for Scientists   Summer Semester 20

Competencies

Languages | English, German, Hindi, Marathi, Konkani
Programming | Python, C, C++, R, SQL
Packages/Tools | Numpy, Matplotlib, Astropy, Pandas
OS/Applications | Windows, Ubuntu, MacOS, LaTeX, MS-Office, GitHub

Community service and Volunteering

- Sept 2021 – Oct 2023 | International Student Buddy, University of Heidelberg, Germany
- May 2021 – June 2022 | ISC High Performance, Hamburg, Germany
- Apr 2020 – May 2020 | Covid – 19 Relief Support Mission, Mapusa-Goa, India
- Dec 2019 – Jan 2020 | Serendipity Arts Festival, Goa, India
- June 2014 – July 2016 | Youth Red Cross India, Goa, India

Select Schools and Workshops

- June 2023 | Summer School for Astrostatistics, Crete, Greece
- Sept 2022 | GaiaUnlimited workshop and unconference, Heidelberg, Germany
- Aug 2022 | Astronomy, astrochemistry & the origin of life, IMPRS, Heidelberg, Germany
- Jun 2022 | Junge AG summer school, MPIfR, Bonn, Germany
- Jun 2022 | EPS forum 2022, Paris, France
- Sept 2021 | Stellar Ecosystems, IMPRS (Virtual), Heidelberg, Germany
- Aug 2021 | ZTF (Virtual) Summer School 2021, Caltech, USA
- July 2021 | 2021 Sagan Exoplanet Summer Virtual Workshop, NExScI, Caltech, USA
- Jan 2021 | Astronomy Winter School (Virtual): High-Energy Astrophysics, NTHU, Taiwan
- Sept 2020 | Astronomy and Data Science, 7BISS (Virtual), Armenia
- June 2019 | Quantum Information and Quantum Technology, IISER Kolkata, India

Talks, Proceedings & Posters

- Talk: '*A NIRCam-dark galaxy detected with the MIRI/F1000W filter in the MIDIS/JADES Hubble Ultra Deep Field*', Galaxy Group Meeting (Mar 2023), MPA, Garching
- Talk: '*L-Galaxies: Debugging galaxy evolution across cosmic epochs through galaxy scaling relations*', LGalaxies workshop (Jan 2024), DIPC, San Sebastian, Spain
- Talk: '*The battle of three flavours: L-Galaxies and scaling relations*', ITA (Nov 2023), Heidelberg
- Talk: '*Quenching massive galaxies across cosmic time with the semi-analytic model SHARK v2.0*', Galaxy Group Meeting (Nov 2023), MPA, Garching

- Talk:'*Examining the redshift evolution of galaxy scaling relation between a semi-analytic galaxy evolution model and observed data*', EAS (July 2023), Krakow, Poland
- Talk: '*Are the ultra-high redshift galaxies surprising in the context of standard galaxy formation models?*', Galaxy Group Meeting (May 2023), MPA, Garching
- Talk: '*Properties of white dwarfs in a semi-analytic Milky Way model based on Gaia DR3*', White Dwarfs from Physics to Astrophysics (2022), KITP, Santa Barbara, USA
- Talk: '*The stellar content of the solar neighborhood & its modelling*', Arxiv Discussion (Sept 2022), University of California, Berkely, USA
- Talk: '*Properties of White Dwarfs in the JJ model based on Gaia (E)DR3*', EUROWD22: 22nd European Workshop on White Dwarfs, Tübingen, Germany
- Talk: Golovin, Reffert, **Vani**, '*The Fifth Catalogue of Nearby Stars (CNS5): catalogue construction, completeness, and luminosity functions*', IAU General Assembly (2022), Busan, South Korea
- Talk: Golovin, Reffert, **Vani**, '*The stellar content of the solar neighbourhood: completeness and luminosity function*', COOL STARS 21, Toulouse, France
- ePoster: '*Properties of White Dwarfs in the JJ model based on Gaia EDR3*', EAS Annual Meeting 2022 (virtual), Valencia, Spain
- Talk: '*Extending the JJ model to the White Dwarfs*', Teeminar (2022), at ARI, Heidelberg
- Talk: '*High-Mass X-ray Binaries in the Milky Way*', Coursework (2020) at ARI, Heidelberg
- Talk: '*Cosmic Star Formation History*', Coursework (2020) at ARI, Heidelberg
- Talk: '*Evidence for Galactic disc RR Lyrae stars in the Solar neighborhood*', Coursework (2020) at ARI, Heidelberg

Publications

1. Golovin, Reffert, **Vani**, Bastian, Jordan, and Just, '*Identification of 29 new nearby white dwarfs using Gaia DR3*' (2024, A&A, in-press)
2. Golovin, Reffert, Just, Jordan, **Vani**, and Jahreiß, '*The Fifth Catalogue of Nearby Stars (CNS5)*' (A&A, 670, A19, 2023)

Outreach and Activities

- Public outreach talk, '*Cosmic Chuckles and Star-Studded Shenanigans*', for 10th grade students (Aug 2023, Goa)