Harshal Raut

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MS (Research) - Space Science & Engineering ms2204121003@iiti.ac.in
Research Domain - Galaxy Evolution and Data Analytics harshal1908.hr@gmail.com
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Education

Degree/Certificate	Institute/Board	CGPA/Percentage	Year
M.S. (Research)	Indian Institute of Technology Indore	9.7 (Current)	2022-Present
B.Tech.(Electronics)	Mumbai University (V.J.T.I)	6.84	2015-2019
Higher Secondary	CBSE Board (D.P.S. Nagpur)	84.5%	2015
Secondary	CBSE Board (R.G.P.S.)	10.0	2013

Projects

- **Developing Novel method to find Multi-component stellar Disk in galaxy** *Nov. 2022 - Present*
  Asst. Prof Dr Narendranath Patra Github
  – Constructed a 3D model of galaxy using the combined Poisson-Boltzmann equations which combine the surface density and the velocity dispersion of star, Atomic gas and Molecular gas.
  – Leveraged advanced statistical techniques, including 2D Gaussian fitting (MGEFit) and Markov Chain Monte Carlo (MCMC), to extract precise measurements of surface density of stars and dark matter halo respectively.
  – Used a novel method to obtain intrinsic stellar velocity dispersion ($\sigma_\star$) from line-of-sight $\sigma_\star$ which is obtained from integral Field unit spectrograph.
  – **Found signature of thin stellar disk while comparing the 3D model MOM-0 map and CALIFA Integral Field Unit(IFU) MOM-0 map.**

- **Developing Visualizing Software for IIT-I Radio Interferometer** *Dec 2022 - Feb 2023*
  Asst. Prof Dr. Narendranath Patra
  – Developed software for demonstration of the IIT-I Radio Interferometer, showcasing the interference patterns.
  – Created plots displaying the cross-corelation, auto-corelation of multiple antenna signals, enabling researchers to observe the interference patterns.
  – **Conducted successful Sun Transit experiments, demonstrating the running of the interferometer.**

Publications

Raut, H. et al.(under review) The EDGE-CALIFA Survey: Thin and thick stellar disks in NGC 551. Submitted in A&A.

Technical Skills

- **Programming**: **Python**, C, C++, Linux, Latex, Matlab
- **Electronics**: $VHDL^*$, Raspberry Pi, Arduino

** Elementary proficiency*

Relevant Coursework

- **MS(R) in Space Science and Engineering**: Detectors and Sensors for Space Observations, Space Engineering System, **Astrophysical fluids & Plasma**
- **B.Tech in Electronics**: Applied Physics, Applied Chemistry, Mathematics for Engineers, Computer Programming and problem Solving, Signals and Systems, **Probability and Statistics**, **Electromagnetic Field and Waves, Microwave and Optical Communications**, Wireless communications, Satellite communications, Neural Networks and Fuzzy logic

Research Interest

Galaxy Structure and Formation, Optical, Infrared and radio Spectroscopy and Photometry, Data Analysis

Conferences

– Presented my thesis work as a poster during the annual meet of the Astronomical Society of India (ASI) 2023, held at IIT Indore
– Gave an oral talk about my Thesis at the National Space Science Symposium(NSSS 2024), held at Goa University.

Positions of Responsibility

- **Academics**: Performed the role of TA for the subjects Astro Labs I & II in my 2nd & 3rd Semester, respectively.
- **Management**: Volunteered for the URSI 2022, Radio conference and ASI 2023 conference.
  Provided technical support during oral presentations. Helped in conducting the overall event smoothly.
  Participated in various astronomy Outreach events like solar and lunar eclipse observations and planet conjunction events.