

Rohan Kumar

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DOB: January 6th, 2002

Education

- Jan 2022– Present **5 Year BS-MS Dual Degree**, *Indian Institute of Science Education and Research, Kolkata*.
CGPA: 9.07/10 (1ST SEMESTER)
- 2020 **Indian School Certificate Examination (12th Grade)**, *Hill Top School, Jamshedpur*.
Percentage: 87.25%
- 2018 **Indian Certificate of Secondary Education Examination (10th Grade)**, *Hill Top School, Jamshedpur*.
Percentage: 92.60%

Projects

- Dec 2021 **Direct Estimation of Mass and Radius of Kepler-21 using Asteroseismology (short-project)**.
I used the Python package Lightcurve to calculate the ν_{max} and $\Delta\nu$ from the lightcurve data product. Later used this result to evaluate the Mass and Radius of the star, assuming it to be a Sun-like oscillator.
- Dec 2021 **Transit Photometry of Kepler-17**.
I performed the transit photometric analysis using the Kepler Telescope's data for the star Kepler-17 and detected an exoplanet around it. Through this process, I estimated the parameters of the exoplanet, i.e., time period of revolution, transit duration, and the orbital radius by fitting a Box Least Squares model on the phase folded lightcurve. I then determined the mass of the exoplanet using Keplerian Mechanics and the radius of the exoplanet using Stefan-Boltzmann Law. The final results matched the literature value with error of less than 8%.
- Jul 2021 **Optical Spectral Analysis of M31**.
Analyzed the central region of M31 (Andromeda) using the Faint Object Spectrograph (FOV) of the Hubble Space Telescope (HST) in Optical wavelength and detected the absorption line of 3 elements Mg[I], Fe[I], Na[I] and later confirmed this by reviewing the literature data. I Also concluded from the spectra that older redder population II stars are present in this region with no active star formation going on as no $H\alpha$ emission could be found.
- Jun 2021 **Calculation of H_0 (Hubble's Constant)**.
Used the data of high redshift galaxies given by the Hubble Space Telescope to calculate the value of H_0 using Hubble's law.
- Feb 2021– Present **AstroBytes (Observational Astrophysics Community)**.
Made an International discord community (currently over 450+ members) called 'AstroBytes' for professionals and amateurs alike to interact and ask queries related to observational astrophysics. I Conducted talks and hands-on sessions by professional astronomers to get school students and other amateurs involved in observational astrophysics.

Research Interests

- **Observational Astrophysics** - Interested in understanding the *Stellar Structures* using the spectroscopic and lightcurve data products. Characterization of the *Exo-Planets* using transit photometry and direct imaging methods. Understanding the evolution of *Stellar Clusters* using the photometric techniques.
- **Computational Physics** - Interested in using the Computational and Numerical methods to develop simulations and models which predicts the real-world observations of a physical and astrophysical systems.
- **High-Performance Computing** - Interested in the use of HPC clusters to solve physics and astrophysics problems.

Conference & Workshops

- Sep 2021 **High Performance Computing for Astronomy and Astrophysics**, *SKA-India Consortium and IIT Kharagpur.*
- Jun 2021 **Intro to Astro 2021**, *SETI.*

Technical Skills

- **Programming Languages:** Python (modules: NumPy, Matplotlib, Astropy, Lightcurve, SciPy, PyVO, Numba, Photutils), FORTRAN (Beginner), C (Beginner), JAVA (Intermediate), SQL, TeX
- **Astronomy Softwares:** TOPCAT, SAO DS9, Aladin, IRAF, PyRAF, ADQL, APT
- **General Softwares:** Linux (CLI and GUI), Git, Vim, L^AT_EX, MS Office, Jupyter Lab, Shell Scripting (Bash and Fish)

Awards

- March 2022 **Nakshatra 2.0(Astronomy Fest)**, *IIT Indore.*
Astronomy Quiz event, **Second** Position
- March 2022 **Brain It On 2.0**, *Hansraj College, University of Delhi.*
Physics and Electronics Quiz, **First** Position
- Feb 2022 **Polaris**, *IIT (ISM) Dhanbad.*
Case study event, **First** Position
- Dec 2021 **National Student and Space Challenge**, *IIT Kharagpur and Red Wings.*
Astronomy Data Analytics event, **First** Position
- Aug 2021 **Cosmoquest**, *IIT (ISM) Dhanbad.*
Astronomy Quiz event, **Second** Position
- June 2021 **Nakshatra (Astronomy Fest)**, *IIT Indore.*
Astronomy Crossword event, **Fifth** Position

Interests

Piano, Ham Radio, DIY Electronics, Reading