Bhavesh Rajpoot
Curriculum Vitae

⌂ 5/1, Krishna Parisar, Ujjain - 456010, M.P., India
☎ +91 8284918730
@ rajputbhavesh04@gmail.com
📅 DOB: 12th February 1999 ○ Bhavesh Rajpoot

Education	**Bachelor of Science**	**07/2017 - 11/2020**

Majors: Physics   Minors: Mathematics, Chemistry
Fergusson College (Autonomous), Pune, Maharashtra, India
Affiliated to Savitribai Phule Pune University, India
CGPA: 8.34/10.0 (Overall)   9.38/10.0 (Major - Final Year)

Senior School Certificate (12th Grade)	**04/2016 - 04/2017**

Sri Guru Tegh Bahadur Public School, Patiala, Punjab, India
Affiliated to Central Board of Secondary Education, India
CGPA: 7.9/10 (Overall)

Secondary School Certificate (10th Grade)	**04/2014 - 04/2015**

Sri Guru Tegh Bahadur Public School, Patiala, Punjab, India
Affiliated to Central Board of Secondary Education, India
CGPA: 9.2/10 (Overall)

Research Experience	**Bayesian Analysis of Eclipsing Binaries**	**09/2020 - Present**

Undergraduate Research Assistant
Villanova University, Villanova, PA, U.S.A
Adviser: Dr. Kyle E. Conroy

- Modelling light curves (LCs) of detached Eclipsing Binaries (dEBs) using *ellc* & *PHOEBE* models as Forward Model in PHOEBE Python package.
- Fitting the LC model to dEB data using the Forward Models that were optimized through the Nelder-Mead algorithm and sampled through the Markov Chain Monte Carlo algorithm to estimate orbital and physical parameters with their uncertainties.
- Estimation of physical properties of the individual binary component using the estimated parameters.

Binaries: Study and Analysis	**05/2020 - 08/2020**

Summer Research Intern
Indian Institute of Technology, Bombay, India
Mentor: Mr. Vedant Shenoy

- Did a detailed study on Two-Body Problem and various Binary Star Systems, especially focusing on the Stellar Eclipses' geometry and mathematics.
- Created Python pipelines to model and analyze the Radial Velocity(RV) curves of Spectroscopic Binaries(SBs) in both circular and elliptical orbits using non-linear regression and χ^2 reduction.
- Mined fits LC data of *V453 Cyg* & *LL Aqr* from TESS database; processed with AstroPy.Timeseries & Lightkurve using Sigma-Clipping technique and Box Least Squares method.
- Attempted LC model fitting to the data using the model created by other teammates.

Effects of Coronal Mass Ejections on Earth's Thermosphere   **08/2019 - 02/2020**
Undergraduate Research Assistant
Fergusson College (Autonomous), Pune, India
BSc Thesis Adviser: Dr. Pratibha B. Mane, Dr. Raka V. Dabhade
- Conducted a detailed study on Coronal Mass Ejections (CMEs), Thermospheric Aerosols, Mie Scattering, Twilight Air Glow phenomena and its occurrence with respect to CMEs.
- Did an intensive analysis of the archived data of Aerosol No. Density (AND) and High-energy Proton Flux.
- Determined possible correlation between a CME hit and Aerosol No. Density (AND) variation from archival data plots of AND and High-energy Proton Flux.

Online Courses   **Scientific Computing in Astronomy**   **17/04/2020 – 03/05/2020**
Indian Institute of Technology, Bombay, India
- Daily tutorials on major computational topics and techniques plus daily 2-3 astronomy and astrophysics oriented assignments.
- Topics: AstroPy, CCD FITS Image Processing and Analysis, Time-Series Analysis, Web Scraping, Statistical Data Analysis, Differential Equation Solving, Object-Oriented Programming, Numerical Differentiation and Integration, Data Fitting and Root Finding.

Astronomy   **Radio Astronomy Winter School 2018**   **14/12/2018 – 24/12/2018**
Schools
Attended   National Centre for Radio Astrophysics - TIFR, and
Inter-University Centre for Astronomy and Astrophysics (IUCAA), Pune, India
- Gained hands-on experience in intermediate-level Radio Astronomy and Astrophysics through daily lectures focusing on conceptual aspects and active research in the field followed by experiments focused on Radio Astronomy and Instrumentation.
- Had field visit to Giant Meter Wave Telescope (GMRT), India.
- Operated 3m and 4m Simple Radio Telescope along with the Spectracyber module to observe HI emission-line sources in group.
- Estimated Brightness Temperature and Redshift of Galactic HI sources by analyzing Spectral Flux Density data through Baseline Correction, Gaussian fitting, and χ^2 test to plot Galactic Rotation Curve of Milky Way galaxy as the final school project.

Technical
Skills

Languages:	Python, LaTeX, Bash, C, Wolfram
OS:	Windows, Linux
Productivity tools:	Git/GitHub, Microsoft Office, Slack, Google Docs
IDEs:	Jupyter, Spyder, Pycharm, IDLE, Wolfram Mathematica
Python Tools:	NumPy, SciPy, AstroPy, Corner, Emcee, RMFit
Visualization:	Matplotlib, Origin
Eclipsing Binary Analysis:	PHOEBE, ellc, JKTEBOP, EBAI, Lightkurve, Allesfitter

Astronomical   Have handled and proficient in using,
Instrumentation

Reflectors:	Celestron 130EQ-RA motor, StarTracker 150EQ, Sky-Watcher 150EQ, Sky-Watcher 8-in Dob, GSO 8-in Dob, Celestron CGX EQ 925 SCT
Refractors:	StarTracker 90mm AZ, Vintage 90mm Refractor – EQ (Pier)
Eyepieces:	Plössl, Kellner (4mm, 10mm, 20mm, 25mm)
Sensors:	ZWO-ASI120MC CMOS camera, Canon 700D DSLR Camera
Filters:	Solarite Solar Filter, GSO (1.25"): #23A LIGHT RED Filter, #80A MEDIUM BLUE Filter, Moon Filter
Radio:	3m & 4m Dish Type Simple Radio Telescope – AZ, SpectraCyber I/II 1420 MHz Hydrogen Line Spectrometer, RTL-SDR V3 Dongle

Academic Achievements & Scholarships	*All India Rank 3* out of 3000 National Entrance Exam for M.Sc. Physics, Savitiribai Phule Pune University, Pune, IN	**11/2020**
	Merit Topper & Scholarship Topped Merit list and achieved Merit-based academic scholarship at National Entrance Exam for M.Sc. Physics (Astrophysics), Saint Xavier's College, Mumbai, IN	**10/2020**

Awards and Honors	*Top 30 Under 30 Young Achievers*, Astronomy Influencer, Hindustan Times: 2nd Anniversary Issue	**06/2019**
	International Ambassador Award for Excellent Encouragement, International Astronomy and Astrophysics Competition	**06/2019**

Talks & Presentations

Equinox Astrophysics Program, Naxxatra Club (Invited)
- The Physics of Eclipsing Binaries — **24/09/2020**
- Introduction to Observational Astronomy & Astrophysics — **21/09/2020**

Science Club, College of Engineering, Pune (Invited)
- Eclipsing Binaries: Our Winking Buddies — **03/08/2020**

Astro Club, Fergusson College, Pune (Contributed)
- Effects of CMEs on Earth's Thermosphere — **12/06/2020**
- Basics of Observational Astronomy — **10/12/2019**
- Introduction to Asteroid Hunting — **06/07/2019**

Posters Presented

Fergusson College, Pune
- *HI 21 cm Line: Significance and Detection*, Frontiers in Physics-XIII — [**02/2020**]
- *Solar Phenomena*, Frontiers in Solar Physics, Frontiers in Physics-XI — [**01/2018**]

Work Experience

Teaching Assistant — **12/2020 - Present**
Curiosity Space India, Pune, Maharashtra, India
Responsible for:
- Teaching Introductory Astronomy course to High-School students.
- Creating teaching materials, presentations and hands-on experiments.

Stargazing Guide — **05/2019 - 08/2020**
TrekkerBugs, Pune, Maharashtra, India
- Assigned to explain the night sky, constellations, motion of stars, etc. during stargazing sessions at night treks.
- Responsible to plan and conduct Star Parties during Astronomical Events such as Meteor Showers.

Ambassador — **02/2019 – 07/2020**
International Astronomy and Astrophysics Competition
Outreached astronomy through various activities to low-income community schools.

Summer Intern — **05/2019 – 08/2019**
Science Popularisation Centre of IUCAA, Pune, Maharashtra, India
- Taught basic physics and astronomy to summer school students.
- Designed and compiled various DIY experiments related to Moon for the IAU's 100th anniversary celebration.

Co-Curricular Activities	**Krittika Astronomy Club**, Indian Institute of Technology, Bombay, IN

Moderator   **12/2020-Present**

- Studying Electromagnetic Transients and Spectral Analysis of Gamma Ray Bursts (GRBs) using GSPec and RMFit and Python under Dr. Disha Sawant
- To study the Physics behind the generation of Gravitational Wave Signals from Black Hole Mergers and perform Bayesian Analysis of the signals.
- To study Electromagnetic Counterparts of Gravitational Wave sources and perform photometric analysis on the observed data.
- To moderate Astrophysics Workshop: Gravitational Wave Analysis and Electromagnetic Transients at annual TechFest 2020, IITB.**[17/2020-20/2020]**

Astro Club, Fergusson College, Pune, IN

Peer Advisor   **06/2019 - 06/2020**

- Advising junior students with elective selection, project hunting, career guidance, CV and Statement of Purpose drafting.
- Took online sessions on *stress handling, time management, opportunity recognition, and self-exploration* for junior members during the early period of nationwide COVID-19 lockdown.
- Mentored undergraduate students for designing and presenting scientific posters.

Coordinator & Organiser   **08/2018 - 03/2020**

- Organized Communal Solar Eclipse watching session, Observational Astronomy Session, Star Parties and Meteor Observations, Group Discussions & Problem Solving Sessions.
- Organized and co-ordinated Frontiers in Physics XII - XIII, 2/3 - day National Student Seminar Series aimed to provide research exposure to undergraduate students.
- Celebrated IAU's 100 Hours of Astronomy; Organized hands-on Astronomy Sessions for Low-Income School Kids and Communal Night Sky Watching.

Founder, Public Outreach Department   **07/2018 - 12/2019**

- Organised guest lectures of various researchers in Astrophysics
- Created **website**, social media accounts and brand **logo** for club.
- Trained junior club members on mass communication, content delivery, interactive outreach, and relation building.

Volunteer   **07/2017 - 07/2019**

- Designed and presented posters on the topic 'Our Future in the Universe' at *'Unravelling the Cosmos,'* club's 2018 Annual Poster Exhibition. **[09/2018]**
- National Science Day celebrations at IUCAA, Pune, India. **[02/2019 & 02/2018]**
- Telescope Setup & Handling ; Renovated a Vintage 15-yo 90mm Refractor – EQ (Pier).
- Presented posters on "Basics of Astronomy, Importance of Astronomy, Beginning of the Universe" at *The Omnipresent Science-What isn't Physics?* club's 2017 Annual Poster Exhibition. **[08/2017]**

Others

- Hobbies : Cooking and Baking; Trekking, Cycling, Badminton
- Languages : English (Proficient); Hindi and Punjabi (Native)