Riya Singh

(+91) 94301-87993
riyasingh@iitb.ac.in

Education

Bachelor of Technology, GPA: 9.36/10

Major: Mechanical, Minor: Physics

Publications

1. Riya, S. Chirame et al., Closed-Loop Simulation for Attitude Control of Nano-satellite, *Advances in Small Satellite Technologies*, pp 87-97, Springer, Singapore (2020).
2. Riya and V. Rentala, Neutrinos from the cosmic noon: a probe of the cosmic star formation history (2020), arxiv:2007.02951.
3. Y. Gupta, Aakash V, R. Singh et al., Lunar Exploration through ChipSats, International Astronautical Congresses (2020), IAC-20,A3,2C,30,x59667.

Conference Presentations

1. Resolution of discrepancy in SFR at Cosmic Noon using Diffuse Supernova Neutrino Background
   Advances in Astroparticle Physics and Cosmology 2020, Kolkata, India
2. Closed Loop Simulation for Attitude Control of Nano-Satellite
   International Conference on Small Satellites and Systems 2019, Hyderabad, India
3. Star Formation Rate using Diffused Supernova Neutrino Background
   National Space Science Symposium 2019, Pune, India

Honors and Awards

Undergraduate Research Award (URA 01), IIT Bombay, 2019

Future Research Talent Award, Australian National University, 2019

Kishore Vaigyanik Protsahan Yojna (KVPY), IISc, 2016

IIT Bombay Student Satellite Project

2019-2020 **System Leader, Great Lunar Expedition for Everyone (GLEE)**

GLEE is a collaboration of different institutions around the globe with a mission to conduct scientific experiments and test technology by deploying a network of 5-gram chipsatellites on the lunar surface.

- Supervised a team of **9 members** to select payloads, ideate the setup for their on-ground testing and develop electrical and communication design of the chipsats.
- Evaluated the use of chipsats to **space-qualify technologies developed at IIT Bombay** such as AJIT Microprocessor and Nanosniff gas detector; chose AJIT microprocessor for the purpose.

2017-2018 **Payload Engineer, Advitiy: Second Generation Student Satellite of IIT Bombay**

- Spearheaded a team to develop **quality assured** "satellite simulation-framework" for the ground-verification of control-algorithms; my leadership led to publication of a book-chapter in Springer.
- Proposed different payloads and analyzed their system requirements as per the guidelines of **ISRO**
- To ensure **team-continuity**, executed three-step recruitment process to select students, evaluating on their technical ability, practical approach, and teamwork.

Social Goal | *A pro bono outreach effort to facilitate knowledge sharing*

- Contributed to Satellite 101 wiki which now has **1Lakh+** views and **38.5k** users around the globe
- Conducted **Ground Station Workshop** attended by **50+** students and faculties from **15+** colleges

Research Experience

2018-Present **Neutrinos from the Cosmic Noon: a probe of the Cosmic Star Formation History**

Supervisor *Prof. Vikram Rentala, Department of Physics, Indian Institute of Technology (IIT), Bombay*

- Reviewed the existing methods of measuring the Star Formation Rate (SFR); Concluded that values of maximum SFR inferred from two different sets of methods are in disagreement.
- Simulated the detection signal at HyperK due to Diffuse Supernova Neutrino Background (DSNB)
- Based on χ^2 test-results **claimed potential of DSNB to resolve the discrepancy** in 1.6-20 years

2019 **Scintillator Material Characterisation for SABRE dark matter detector**

Supervisor *Dr Lindsey Bignell, Department of Nuclear Physics, Australian National University (ANU)*

- Measured relative light yields of scintillator samples to **verify absence of degradation** in scintillator properties after exposure to detector materials, implying no need for modification to detector design
- Measured charge distribution in BaF_2 and LAB due to ^{22}Na decay and fitted an exponential to time-delay to obtain the scintillation decay time (a parameter needed for simulation of detectors)
- Assisted in purification and storage of scintillator and detector-materials for setting-up the experiments

2019 **Electron Background Characterisation of ASTERiX and XENON dark matter detectors**

Supervisor *Prof. Rafael F. Lang, Department of Physics and Astronomy, Purdue University*

- Analyzed the detected signals and **deduced the absence** of observable amount of electron burst
- Obtained rate of e^-s and **detected dependence of decay** of rates with time on extraction voltage

Internship

Winter 2018 **Gear Shift/Select Malfunction in Manual Transmission** | Ford Motor Company

Identified the assembly point in manufacturing line where improper handling of components led to erroneous functioning of manual transmission; updated single point lessons to solve the problem

Winter 2017 **Aerostat for Military Surveillance** | Manastu Space Technologies Private Limited

Developed two-dimensional gore-profiles for a given design of kytoon (a combination of kite and balloon) and manufactured its **prototype** to experimentally determine the increase in the lift

Positions of Responsibility

Summer 2020 **Summer of Science Mentor** | Maths and Physics Club, IIT Bombay

Guided 4 students in learning various topics and tools of astrophysics and cosmology

Summer 2018 **Teaching Assistant** | Prof. D M Dwaikar, Department of Civil Engineering, IIT Bombay

Entrusted with responsibility of tutoring Engineering Mechanics to 35 undergraduate students

2017-2018 **Associate Secretary** | Department of Mechanical Engineering, IIT Bombay

Organized events like orientation, convocation, kurta day, department trip etc. to facilitate the interaction among 1100+ students and with 62 department faculties

Technical Skills

Machine Learning, Python, R, C++, MATLAB. Simulink, LaTeX, HTML

Miscellaneous

- Taught basic mathematics to **underprivileged students** for **a year** at Abhyasika, IIT Bombay
- Attended Football Girls Camp for two years and **won** institute girls' **football** tournament
- Assisted in execution of '**SHE**', an initiative by Techfest to promote Sanitary and Health Education
- Conducted a talk on **Dark Matter** to provide IIT Bombay students an essence about the topic
- Represented IIT Bombay as a contingent member in 6^{th} and 8^{th} **Inter-IIT Technical Meet**