Manan Seth, 20

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https://github.com/Manan-Seth/Projects
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Education

2019 - Present

B.Tech. Engineering Physics with Honours
Indian Institute of Technology, Bombay.
CPI: 8.56

Awards and Scholarships

2019

- Secured a rank in the **top 1%** in IIT-JEE Advanced examination among 160,000 applicants.

2018

- Conferred with the **KVPY Scholarship** by Govt. of India by securing a rank in the top 1%.
- **Rank 9 and Rank 3** in the first and second levels respectively of International Olympiad of Science by Silverzone Olympiads.
- **Rank 5** in the International Olympiad of Mathematics by Silverzone Olympiads.
- **All India Rank 71** in the National Level Talent Search Examination (NSTSE).

Projects

Helioseismology and Exotic Particle Physics [*May'21-Present*]
Prof. Vikram Rentala, IIT Bombay

- Studied the equations of stellar structure, stellar oscillations, basics of Helioseismology, including observational and inversion techniques and the solar abundance problem
- Discussed various solutions to the solar abundance problem as part of Prof. Rentala's research group
- Studied non-diffusive energy transport through exotic particles in the Sun as a possible solution
- Exploring possibilities of detection of g-modes to resolve the solar interior in greater detail

Quantum Imaging Using Complex Degree of Coherence [*Jan'21-Apr'21*]
Prof. Anshuman Kumar, Waves & Oscillations & Optics, IIT Bombay

- Analysed methods in **optical imaging and metrology** of remote bodies through measurements of quantum parameters using **linear optics** and quantum photon number resolving detectors
- Demonstrated the limitations of classical imaging due to the Rayleigh diffraction limit and suggested improvements by simulating a **quantum imaging framework** by creating an executable paper
- Implemented an **image reconstruction algorithm** based on Fourier Transformation
- The project demonstration was adjudged to be one of the best in the course and earned a perfect score

High Energy Astrophysics [*April'20-Jun'20*]
Summer of Science, Maths and Physics Club, Institute Technical Project, IIT Bombay

- Studied about the High Energy Astrophysics phenomena and allied areas
- Studied several high energy particle and astrophysical phenomena such as Nuclear Interactions, Ionisation Losses, Synchrotron Radiation, Interstellar gas interactions and the various cases of **death of stars**
- Acquired fundamental knowledge of related domains such as the Special Theory of Relativity, Study of Cosmic Rays, **Stellar Evolution** and the Study of Galaxies

Constructing a Synthetic Analemma [*May'20-Aug'20*]

Krittika Summer Projects, Krittika - The Astronomy Club, Institute Technical Project, III Bombay

- Studied the complex orbital motions of heavenly bodies from the earth's frame of reference giving rise to Analemmas as part of a group of eight
- Derived the equation of motion of bodies in the frame of reference of an observer on earth, and analysed the effect of each observational and orbital parameter on the properties of the analemma

Hertzsprung-Russell Diagrams [*Nov'19-Jan'20*]

Krittika Winter Projects, Krittika - The Astronomy Club, Institute Technical Project, IIT Bombay

- Analysed extensively HR Diagrams and their uses in Astronomy in a group of 4 members
- Built a strong base of Astronomy and main sequence stellar evolution, used **isochrone fitting on Python** to plot HR Diagrams and estimated factors like age, distance and others of globular clusters whose data was obtained from the Hubble UV Globular-Cluster Survey - **HUGS Catalogue**

Positions of Responsibility

Institute Astronomy Secretary | **Krittika** [*Apr'21-Apr'22*]

Convener | **Krittika** [*Jun'20-Apr'21*]

Krittika: The Astronomy Club, Institute Technical Council *IIT Bombay*

- Managed a team of 40+ astronomy enthusiasts from across the country belonging to various institutes for the Krittika Summer Projects on topics such as photometry of supernovae, analysing eclipsing binaries and simulating Kirkwood gaps
- Organised an extensive lecture series on various aspects of astronomy by involving professors from IIT Bombay and TIFR.
- Headed a review panel and supervised the Institute Technical Summer Projects for over 50 teams and mentors working on projects involving ML, coding, web and app development and 3D Modelling.
- Part of team of 10 conveners, responsible for organising several **Institute-Wide Events** such as lectures, workshops, group discussions, projects, stargazing sessions and interactive online activities including quizzes and trivia.
- Processed images taken by the 0.7m GROWTH-India telescope at Hanle-Ladakh for Astrophotography
- Moderated a three-day long Astrophysics workshop with **over 200 attendees** covering theoretical and coding experience for topics like EM Transients, Grav. Wave Analysis and their EM Counterparts

Key Courses

Physics	Supervised Learning Project, Quantum Information and Computing, Quantum Mechanics 1 and 2, General Theory of Relativity, Non-Linear Dynamics, Introduction to Condensed Matter Physics, Statistical Physics, Electromagnetic Theory, Photonics, Waves and Oscillations and Optics, Introduction to Special Theory of Relativity, Classical Mechanics, Data Analysis and Interpretation, Quantum Physics and Application, Basics of Electricity and Magnetism, Physics Lab 1, 2 and 3
Mathematics	Numerical Analysis, Complex Analysis, Differential Equations I and II, Calculus, Linear Algebra
Miscellaneous	Electronics Labs I, II, III and IV, Introduction to Renewable Energy Technologies, Reading Literature, Digital Systems, Economics, Introduction to Electronics, Organic and Inorganic Chemistry, Engineering Graphics and Drawing, Biology

Skills

Programming	C++, Python (Numpy, Astropy, Matplotlib, Pandas), Java, Root
Softwares	LaTeX, LTSpice, AutoCAD, Fusion 360, DS9