Kasi Reddy Sreeman Reddy

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I am interested in doing research in the fields of High Energy Physics(HEP) and Cosmology. Particularly I want to do research at scenarios where the quantum effects of gravity cannot be ignored.

Education

2019–Present **Bachelor of Technology in Engineering Physics**.
Indian Institute of Technology, Bombay (IIT Bombay), Mumbai, India
CPI-9.08/10
Pursuing an **Honors** in Engineering Physics and a **Minor** in Mathematics.

Academic Achievements

2019 Achieved **All India Rank 100** in IIT **JEE Advanced** among 200,000+ candidates.

2019 Achieved **All India Rank 236** in IIT **JEE Mains** among 200,000+ candidates.

2018 Was selected to the **Vijyoshi camp 2018** at IISc Bangalore through the Kishore Vaigyanik Protsahan Yojana (KVPY-2017) exam conducted by the Department of Science and Technology.

2017, 2018 Amongst the National top 1% in National Standard Examination in Astronomy (NSEA-2017) and National Standard Examination in Chemistry (NSEC-2018) and was selected for INAO-2018 and INChO-2019 conducted by HBCSE.

Projects

Nov-Dec 2020 **Category theory applications in physics**.
URL *Guide: Prof. Vikram Rentala, Dept. of Physics*
- Studied basic concepts of category theory like Functors, Natural transformations, Monoidal categories.
- Analysed axiomatization of physical systems using strict monoidal categories.
- Researched **FdHilb** category and studied **no-cloning, no-deleting theorems** in categorical quantum mechanics.

Nov-Dec 2020 **Covid-19 analysis using a modified SEIR model**.
URL *Guide: Prof. Amitabha Nandi, Dept. of Physics* Course Project
- Studied the normal Susceptible-Exposed-Infected-Recovered (SEIR) model. Later used a modified model to incorporates the fact that asymptomatic or mildly symptomatic individuals play a significant role in the transmission of Covid-19.
- Generated different projections for India under different intervention parameters.
- By varying intervention parameters in the modified model we concluded that testing-quarantining is more efficient in controlling the pandemic than lockdowns.

April 2020 **Special and General Relativity**.
URL *Guide: Summer of Science mentor under Maths and Physics Club, IIT Bombay*
- Read and understood the principles of relativity. I started with Special Relativity and then read the mathematical prerequisites for General Relativity
- Then I read General Relativity till Schwarzschild metric and analyzed the properties of Schwarzschild black holes in Schwarzschild coordinates and Eddington–Finkelstein coordinates.
- Made a 50 page report on GR which contains the solution for Schwarzschild metric.

July 2020 **Orbit Determination**.
Guide:Krittika summer projects mentor under Krittika Astronomy club of IIT Bombay
- Learnt basic numerical computing, converting between Altazimuth, Equatorial and Ecliptic Coordinates.
- Wrote a code in Python which takes the right accession and declination at 3 points of an orbit as inputs and outputs the orbital elements and ephemeris for the required time interval.

Autumn 2019 **Power Inverter**.

Guide: Prof. Joseph John, Dept. of Electrical Engineering Course Project

- Implemented a modified 555 timer based astable multivibrator circuit to get equal high and low time.
- Integrated the circuit with BC457 (BJT) to obtain full cycle of 50Hz. The pulse high is obtained from 555 timer output and pulse low from inverted output (using BJT inverter)
- Generated time varying currents using IRFZ44 n-channel power MOSFETs and obtained ac voltage by passing time varying currents through 150-0-15 transformer.

Other Projects

Autumn 2019 **Digital counter and object detector**.

Constructed a proximity censor using LED-IR detector pair. Interfaced 7490 BCD counter to 7447A BCD-to-seven-segment decoder and LT-542 Common-anode Seven segment display to create a manual clock.

Technical Skills

Languages C++, Python, HTML, Markdown

Packages Root, Numpy, Scipy, Matplotlib

Other LaTeX,Git, Jekyll, SolidWorks, AutoCAD

Key courses

Physics General Relativity*,Optics, Waves and Oscillations*, Quantum Physics, Electricity & Magnetism, Special Relativity, Classical Mechanics, Data Analysis & Interpretation, Nonlinear Dynamics, Thermal Physics.

Maths Calculus, Linear Algebra, Real Analysis, Complex Analysis.

Other Introduction to Electrical Engineering Practice, Power Engineering - I,Digital Systems, Computer Programming and Utilization.

** Courses to be completed by the end of Spring 2021*

Positions of Responsibility

Teaching Assistant.

Nov 2020-Jan 2021 URL

MA 109 - Calculus I, Dept. of Mathematics

- Responsible for conducting tutorial sessions every week for a batch of 40 students throughout the course and helping them clear conceptual doubts.
- Corrected all their answer sheets. Made solutions to questions every week for students. Apart from the tutorial sessions solved all their doubts throughout the course through online messaging.

June 2020–Present **Convener**, *Krittika, The Astronomy club of IIT Bombay, Institute Tech Council*.

- Part of a team of 10, responsible for organising several institute-wide events such as lectures, workshops, group discussions, projects, interactive online activities including quizzes and trivia to foster enthusiasm in Astronomy and Cosmology in the institute.
- Helped in conducting the Krittika Python Tutorials, a novel initiative through which nearly 2000 students got an opportunity to learn basic astronomy and coding.
- Worked as a facilitator for the project Orbit Determination in Krittika Summer Projects. Helped 6 students to complete their project.