

# MOHAMMED SAMEED HUSSAIN

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## Education

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### Indian Institute of Technology Hyderabad

*Bachelor of Technology, Engineering Physics, CGPA: 8.99/10*

**Nov 2021 - May 2025**

*Sangareddy, India*

### MS Junior College

*Senior High School, Percentage: 94.5%*

**Jun 2018 - May 2020**

*Hyderabad, India*

### Nasr Boys School

*High School, Percentage: 93.2%*

**Jun 2010 - Apr 2018**

*Hyderabad, India*

## Projects

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### Neutrino Oscillations and DUNE

**May 2023 - Present**

*Mentor: Prof. Narendra Sahu (IIT Hyderabad)*

- Studied Neutrino Oscillations with Matter Effects, focusing on both two and three-flavor oscillations.
- Explored the fundamentals of Weak Interaction.
- Studied the Dirac Equation, Dirac Mass, Majorana Mass Mechanism, and the Algebra of Gamma Matrices, with a particular focus on understanding the implications of Mass Hierarchy.
- Analyzed the Conceptual Design Reports of **DUNE** (*Deep Underground Neutrino Experiment*) and **LBNF** (*Long-Baseline Neutrino Facility*), gaining a comprehensive understanding of detector working principles and design.
- I will be engaged in a collaborative effort with a Ph.D. student, focusing on simulating the performance of Neutrino Detectors.

### JWST Pipeline

**Jun 2023 - Present**

*Mentor: Prof. Mayukh Pahari (IIT Hyderabad)*

- Studied the working and implementation of JWST Pipeline for Time Series Observation (TSO).
- Produced the desired Data Products by running JWST Pipeline on simulated data of WASP-34b Transit.
- Will be simulating TSO data of WASP-34b and other targets using **MIRAGE**.

### FFT Implementation and Analysis of Celestial Data

**Dec 2022 - Mar 2023**

*Mentor: Prof. Mayukh Pahari (IIT Hyderabad)*

- Studied and Implemented **FFT** algorithm using proper sampling techniques for the given light curve data of Pulsars.
- Utilised Data Visualisation techniques to create plots of frequency spectrum, and figuring out the Time Period of the Pulsars.

## Technical Skills

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**Programming Languages:** C, C++, Python, MATLAB

**Libraries:** Astropy, JWST, Numpy, Matplotlib, SciPy, Pandas

**Software & Tools:** Mathematica, Git, L<sup>A</sup>T<sub>E</sub>X, Jupyter Notebook, LTspice

## Relevant Coursework

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### Physics

Special Relativity, Classical Mechanics, Quantum Mechanics-I\*, Optics and Photonics, Electrodynamics\*, Fluid Dynamics, Thermodynamics, Statistical Mechanics\*, Advanced Mathematical Physics, Electricity and Magnetism, Non- Linear Dynamics, Electronic Device Physics, Physics Lab

### Mathematics

Ordinary Differential Equations, Transform Techniques, Probability, Introduction to Number Theory, Calculus I and II, Elementary Linear Algebra, Introduction to Statistics

### Computational

Computational Physics (in MATLAB), Data Structures and Applications, Artificial Intelligence, Introduction to Programming(in C)

### Other

Signals and Systems, Digital Circuits, Analog Electronics, Electronics Lab, Basic Electrical Engineering, Basic Electric Circuits

\* *currently doing*

## Achievements

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- **Joint Entrance Examination (JEE) Advanced, 2021** - Achieved an All India Rank of **1897** among more than **140,000** candidates.
- **Joint Entrance Examination (JEE) Mains, 2021** - Scored overall **99.69** percentile among more than **0.93 million** candidates with **99.82** percentile in **Physics**.

## Positions of Responsibility

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### Core Member, Cepheid

**June 2022 - May 2023**

*The Astronomy and Astrophysics Club, IIT Hyderabad*

- Conducted a hands-on workshop on Planetary Image Processing from raw data, using Astro Image Processing Software (PIPP, AutoStakkert, RegiStax).
- Mentored fellow core members, equipping them with comprehensive knowledge and proficiency in operating a diverse range of telescopes.
- Helped in managing various club Workshops, ensuring seamless execution and exceptional learning experiences for all participants.

## Soft Skills

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- Time Management
- Good at Communication
- Team-Work
- Critical Thinking