

SHREYAS RAO

630-923-2511 | rao.shreyas023@gmail.com | www.linkedin.com/in/shreyas-rao23

Education and Skills

University of Illinois at Urbana-Champaign

GPA: 3.6/4.0

B.S. in Physics | **Grainger College of Engineering**

May 2025

Relevant Topics: Quantum Mechanics, Linear Algebra, Differential Equations, Stochastic Processes

B.S. in Statistics | **College of Letters of Arts and Sciences**

May 2025

Relevant Topics: Time Series Analysis, Linear Modeling, Probability Theory, Unsupervised Learning

Minors: Computer Science, Business

Relevant Topics: Data Structures in C++, Optimization in Python, Financial Markets

Technical Skills: Python, C++, R, Java, MongoDB, MATLAB

Work Experience and Projects

ATLAS Research Collaboration

Champaign-Urbana, IL

Cherenkov Radiation Experimental Validation (C++, ROOT, GÉANT)

May 2023 – April 2024

- Developed a Monte-Carlo simulation software to model the scattering factors of Cherenkov radiation light in the Zero-Degree Calorimeter detector for the ATLAS experiment at the Large Hadron Collider.
- Simulated millions of photonic events to generate photon distributions across various detector designs.
- Validated simulation results against experimental data using homogenized light and digitized waveform data from photomultiplier tubes, identifying variances between observed distributions.
- Co-authored a scientific paper on the application of simulation software for particle physics experiments.
- Proposed design improvements to reduce Cherenkov light scattering by 33%, enhancing detector data quality for ATLAS experiment's upcoming Run 4.

Hadronic Jets Clustering Analysis (C++, PYTHIA, ROOT)

May 2024 – August 2024

- Developed jet clustering algorithms, a new member of the sequential recombination jet algorithms, Anti-kT Clustering, providing an infrared and collinear safe method for analyzing data from hadronic collisions.
- Validated the algorithm's effectiveness in applications, including top quark mass reconstruction through Pythia, a program for generating high-energy collision events.
- Enhanced data collection and analysis at the Large Hadron Collider (LHC) by integrating new clustering algorithms, marking the first LHC run to incorporate machine learning algorithms.
- Significantly improved observations of quark-gluon plasma, providing critical insights into conditions of the early universe.

Volatility Time-Series Stock Pricing Model Selection (Project) – Python

2024

- Used Nasdaq data from 3 stocks from three different long term volatility levels: Low-Beta (WMT, PG, VZ), Mid-Beta (MSFT, GOOG, AAPL), High-Beta (TSLA, NVDA, GM).
- Developed a SARIMAX, XGBOOST Hybrid, and LSTM Deep Learning models to determine which time series model performed best at different volatility levels using NASDAQ data from 2014-2023.
- Linear models had parameters adjusted for differencing, heteroscedasticity, and stationarity, while non-linear models were carefully adjusted for fitting, biasing, and learning rate.
- Exogenous variables were added to make binary factors that could affect overall trends such as the Covid-19 Pandemic Economic Effects.
- LSTM performed significantly better than other models with high volatility stocks specifically NVDA and TSLA, while XGBOOST and Linear models performed better with low and medium volatility stocks.

Leadership and Awards

2024 Outstanding Physics Researcher Award:

April 2024

Received the Philip J. and Betty M. Anthony Undergraduate Summer Research Scholarship by the University of Illinois Physics department for research contributions throughout the year

Grainger College of Engineering Campus Tour Guide:

May 2023 - Present

Directed engaging campus exploration tours, tailoring each experience to diverse audiences, while developing informative scripts showcasing groundbreaking innovations within the Grainger College of Engineering

University of Illinois Rising Scholars Tutoring:

Jan 2023 – May 2023

Launched a student-led tutoring initiative dedicated to matching underrepresented high school physics students with their university physics undergraduate students