

Sneha Vireshwar Dixit

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EDUCATION: Washington College (2020-Present) | B.S., Physics + Mathematics | GPA : 4.00 | Phi Beta Kappa

RESEARCH EXPERIENCE:

US ATLAS Student Researcher

October 2022-Present

Advisor : Dr. Suyog Shrestha

- Setting up new particle physics lab suited for computer-based particle physics analysis at Washington College. Setting up and configuring optimal software + hardware for analysis.
- Collaborating with team from Ohio State University to analyse 0-lepton di-Higgs decay channel at ATLAS, CERN.

Exploring Dark Matter Interactions w. SM Particles

March 2022-Present

Advisor : Dr. Digesh Raut

- Exploring properties of WIMP dark matter and its interactions with standard model particles.
- Building a freeze-out model of WIMP dark matter and solving the Boltzmann Equation to calculate dark matter relic abundance using Wolfram Mathematica and the FeynCalc package.
- Won competitive grants from Cater Society of Junior Fellows and John S. Toll Science Fellows Program.
- Links to : [Presentation Slides](#), [Poster](#)

US CMS Student Researcher | Fermilab

May-August 2022

Advisors : Dr. Nick Smith, Dr. Oksana Shadura

- Contributed to CMS Software ver. 10.6.X as a USCMS PURSUE intern at Fermilab.
- Developed computer program to convert CMS OpenData from before 2016 to the new NanoAOD datatype.
- Developed + debugged config files with ROOT, C++ and Python with the Coffea Casa environment.
- Generated output files that make CMS OpenData accessible to researchers without technical difficulties.
- Links to : [GitHub Repository](#), [Pull Request on CMSSW 10.6.X](#), [Presentation Slides](#)

Modelling Top-Quark Background for Di-Higgs search @ LHC

May-July 2021

Advisor : Dr. Suyog Shrestha

- Worked with CERN physicist Dr. Suyog Shrestha as a student contributor to the ATLAS Project @ CERN.
- Simulated top-quark background signals using ROOT and C++ on a Linux system.
- Applied statistical methods to check simulations using real Higgs Boson data from LHC @ CERN, Geneva.

SKILLS:

Programming: Python, ROOT, C++, HTML, CSS, Wolfram Mathematica, Linux, Bash/Shell, Virtual Machines with Docker, Git + Github, Design and Analysis of Algorithms, Coffea, Vim/Emacs.

Research: Literature review, scientific modelling, grant + report writing, data collection + visualization, statistical analysis.

Lab: Circuit design + implementation, bread/protoboard, oscilloscope, soldering, experience with AC and DC currents, capacitors, transistors, oscillators, ICs, optical table, interferometer + lasers, plasma Langmuir probe and vacuum chamber.

TEACHING EXPERIENCE:

Physics+Math tutor | Washington College

October 2021-Present

- Led tutor training as senior tutor at Washington College's Quantitative Skills Center.
- Ideated math bridge course to help students with weak math backgrounds adjust to intro-level STEM courses.
- Prepared teaching materials from scratch + delivered course to 20+ students in the first week of classes.

OUTREACH:

STEM Sisters @ Washington College

February 2022-Present

- Founded interest group for women+gender minorities in STEM at Washington College.
- Conducted weekly python, HTML, and tech literacy classes for women+gender minority students.

Particle physics outreach in Bengaluru, India

August 2022-January 2023

- Extended research at Fermilab to create particle physics outreach program for high school students in Bengaluru, India. Used python instead of ROOT and Linux to avoid technical barriers for low-income students.
- Delivered program in person in January 2023 to high school students in Bengaluru.
- Students analyzed Z boson decay to muon-antimuon pairs and plotted resonance using CMS OpenData and python.
- Links to : [Lecture Slides \(1\)](#), [Lecture Slides \(2\)](#), [Project code+plots generated by students](#)

Improving science education in public schools in Bengaluru, India

July 2022-October 2022

- Working with non-profit Curiouscity to improve science education in public schools in Bengaluru, India.
- Designed cost-effective experiments that can be repeated by students at home to explore scientific concepts.