Sneha Vireshwar Dixit

sdixit2@washcoll.edu | snehavireshwardixit.github.io

EDUCATION: Washington College (August 2020 - May 2023) (Early graduation)
B.S. in Physics, Math | GPA: 4.00 |
Fellow, John S. Toll Science and Mathematics Program
Chapter President, Society of Physics Students
Pi Mu Epsilon | Cater Society of Junior Fellows
Merit Scholar + beneficiary of the G.E. Chairman's Scholarship, Hodson Trust Scholarship.

RESEARCH EXPERIENCE:

Exploring Dark Matter Interactions w. SM Particles | Washington College **March 2022-Present**

Working with Dr. Digesh Raut to explore properties of dark matter and its interactions with standard model particles using the Boltzmann Equation (student-initiated project).

- Using Mathematica to model dark matter interactions with standard model particles.
- Studying relevant literature and particle physics + cosmology research to understand parameters that explain the current abundance of dark matter in the universe.
- Successfully applied for + won competitive grants awarded by Cater Society of Junior Fellows and John S. Toll Fellows Program.
- The outcome of this project will form the basis of my senior year thesis.

US-CMS Research Intern | Fermilab **May-August 2022**

Wrote 2015 NanoAOD era using C++, ROOT and Python to help convert CMSOpenData from before 2016 to the newer, easier to process NanoAOD data type. Compared behaviour of converted file to a 2016 NanoAOD file using Coffea-Casa+Python with Uproot, Awkward and Vector packages.

- Wrote 2015 Era that efficiently converts data for better storage + faster and easier processing.
- Era enables 2015 CMS OpenData to be processed using Python instead of ROOT.
- Debugged and modified config files to generate output files that are more accessible to students/hobbyists working on CMS OpenData.
- Compared behaviour of both files with Coffea-Casa+modified sources of error.
- GitHub Repository + Pull Request on CMSSW 10.6.X

Modelling Top-Quark Background for LHC Di-Higgs Search | Washington College **May-July 2021**

Worked under CERN physicist Dr. Suyog Shrestha as a Washington College John S. Toll Fellow and student contributor to the ATLAS Project @ CERN.

- Assisted Dr. Shrestha with his research on simulating Di-Higgs background signals.
- Ran computer simulations using ROOT and C++ and Higgs Boson data from LHC at CERN, Geneva.
- Plotted and analysed given data using statistical methods using ROOT and C++ on Linux systems.
- Studied Higgs properties, particle interactions and additional mathematical+scientific theory for analysis.

TUTORING:

Hollingsworth Fund Physics + Math tutor | Washington College **August 2022-Present**

- Promoted to senior Hollingsworth tutor for math and physics @ Washington College's Quantitative Skills Centre.

Curriculum Design | Washington College **May 2022-August 2022**

- Ideated student-delivered physics+math course to help bridge gaps in teaching intro-level STEM courses.
- Helps students with weak high school math adjust better to intro-level college courses and helps instructors save time by eliminating the need to repeat high school math in a college classroom.
- Coordinating with Physics and Math faculty+students to understand pain points on both sides.
- Working to design a short course covering algebra, trigonometry and systems of linear equations concepts.
- Course designed to be delivered by student tutors @ Washington College's Quantitative skills centre.

Physics + Math tutor | Washington College **October 2021-May 2022**

- Tutor for math and physics @ Washington College's Quantitative Skills Centre.
- Led doubt and concept clarification for 20+ college students.
- Helped improve physics+math college test performance for tutored students by upto 3 letter grades.

SKILLS/COURSEWORK:

Physics : Thermodynamics and Stat. Mechanics (in progress), Quantum Mechanics, Classical Mechanics, Modern Physics, General Physics (calculus-based), Scientific Modelling and Data Analysis (computer-based modelling and computation of physical problems using Python).

Programming : Mathematica, Python+Machine learning with Python, C++, ROOT, Linux, Bash/Shell, SageMath, LaTex, HTML+CSS, VMs with Docker, Coffea-Casa with Uproot+Awkward+Vector, Git and Github, Design and Analysis of Algorithms (in progress).

Mathematics : Real Analysis (in progress), Statistics, Linear Algebra, Discrete Mathematics, Differential Equations, Multivariable Calculus. Experience with modelling and analysing mathematical situations using Python.

OUTREACH:

Science Education among Public School Students | Curiouscity Bengaluru **July 2022-Present**

- Working with the nonprofit Curiouscity to improve science education+curiosity among public school students in Bengaluru.
- Designed simple, thought provoking, cost-effective experiments that can be repeated by students at home.
- Researched and designed science posters and articles to help students grasp concepts and become curious about science.
