Ansh Desai

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Education

University of Oregon *Sept. 2022 to present*
Physics PhD Candidate
- GPA: 3.97/4.0
- *Thesis Proposal:* Probing dark sectors with small-scale experiments.
- *Advisors*: Prof. Eric Torrence, Prof. Tien-Tien Yu

Stony Brook University *Aug. 2021 to May 2022*
MA in Physics (incomplete, transferred to PhD Program)
- GPA: 3.89/4.0
- *Research:* SENSEI Experiment
- *Advisor*: Prof. Rouven Essig

University of Colorado Boulder *Aug. 2017 to May 2021*
BA in Physics Summa Cum Laude*, Mathematics Minor, Computer Science Minor*
- GPA: 3.7/4.0
- *Thesis Title:* An Analysis of the Efficacy of the CSIM Cubesat for SSI Continuity
- *Advisor*: Dr. Erik Richard

Research Experience

Graduate Research Assistant *OR, USA*
Institute for Fundamental Science, University of Oregon *Jan. 2023 to present*
- *Advisor*: Prof. Eric Torrence – FASER Collaboration
- Working to expand on the previous dark photon search as one of the analysis leads for a new long-lived charged particles in FASER at the LHC, .
- Part of the offline software team at FASER that deals with reconstructing data and generating monte-carlo samples.
- Wrote a new fully parallelized flexible analysis framework for future searches using dask and python.
- Participate in regular offline monitoring shifts for the operations of the FASER experiment.

Graduate Research Assistant *OR, USA*
Institute for Fundamental Science, University of Oregon *Sept. 2022 to present*
- *Advisor*: Prof. Tien-Tien Yu – SENSEI Experiment
- Coded up analysis framework for the SENSEI Dark matter searches, as well as a statistical tool used to set exclusion bounds for standard direct search.
- Rewrote and vectorized software used to calculate expected dark matter rates for different detector materials.
- Major contributor to an analysis team searching for a modulation signal in SENSEI data as a dark matter search.
- Worked on a theory project designed to study and calculate expected dark matter modulation signal for different DM masses and cross-sections
- Working on a machine learning/theory project designed to extract halo independent information from existing DM electron scattering datsets.
- Working to reduce backgrounds by studying spurious charge and charge traps in Skipper-CCDs and their properties with the CCD group at Fermi National Laboratory

Graduate Research Assistant *NY, USA*
C.N. Yang Institute for Theoretical Physics, Stony Brook University *Aug. 2021 to Sept. 2022*
- *Advisor*: Prof. Rouven Essig – SENSEI Experiment
- Developed data quality cuts and statistical analyses that led to world leading constraints on dark matter electron scattering.

Undergraduate Research Assistant *CO, USA*
Laboratory for Atmospheric and Space Physics, University of Colorado Boulder *Aug. 2018 to Nov. 2021*

- *Advisor*: Dr. Erik Richard – SORCE, TSIS, CSIM Experiments
- Worked on analysis of instrument degradation of SIM Instrument on SORCE Satellite.
- Took lead on project and developed a model to quantify the instrument degradation for both SORCE and a new cube satellite called CSIM, which became my thesis work.

Teaching Experience

Teaching Assistant *OR, USA*
University of Oregon, Physics Department *Sept. 2022 to Mar. 2023*

Teaching Assistant *NY, USA*
Stony Brook University, Physics Department *Jan. 2022 to May 2022*

Awards and Fellowships

URA Fellowship *Fermilab, USA*
Sept. 2024

Publications

[1] Prakruth Adari et al. "First Direct-Detection Results on Sub-GeV Dark Matter Using the SENSEI Detector at SNOLAB". In: *Phys. Rev. Lett.* 134.1 (2025), p. 011804. DOI: 10.1103/PhysRevLett.134.011804. arXiv: 2312.13342 [astro-ph.CO].

[2] Henso Abreu et al. "Search for dark photons with the FASER detector at the LHC". In: *Phys. Lett. B* 848 (2024), p. 138378. DOI: 10.1016/j.physletb.2023.138378. arXiv: 2308.05587 [hep-ex].

[3] Itay M. Bloch et al. "SENSEI at SNOLAB: Single-Electron Event Rate and Implications for Dark Matter". In: (Oct. 2024). arXiv: 2410.18716 [astro-ph.CO].

[4] Ansh Desai. "An Analysis of the Efficacy of the CSIM Cubesat for SSI Continuity". Available at https://scholar.colorado.edu/concern/undergraduate_honors_theses/cj82k842p. Bachelor's Thesis. University of Colorado Boulder, May 2017.

You can also find an additional list of publications I am a part of here: https://inspirehep.net/authors/2789549

Presentations

- *New Physics Results from the FASER Experiment*: Parallel Talk at DPF-Pheno Meeting *May 2024*

Technological Competencies

Languages: C++, C, Python, IDL, Java, Javascript, Perl, Bash, Node JS, SQL, Unix/Linux, LaTeX, SDL, HTML, Git, Dask.

Software: Visual Studio, XCode, Mathematica, ROOT, Calypso/Athena, Adobe Photoshop, Adobe Illustrator, Microsoft Office

Software Techniques/Packages: Algorithms, Data Structures, PyTorch, Numpy, Scipy, Matplotlib, Pandas, Machine Learning, Neural Nets, Monte-Carlo Algorithms, Ray Tracing, Numerical Computation Techniques, Parallelization

Hardware: Basic circuit design, computer assembly, soldering, CCD testing, vaccuum pumps, hardware monitoring, CCD Packaging, low-level board programming (LTA)