Noah Everett

B.S. Physics and Mathematics Student and Researcher

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EDUCATION

B.S. Physics and Mathematics

Minors: Computer Science and Computational Statistics

South Dakota Mines 2020 – 2024 (expected)

- Relevant Completed Courses: Quantum Mechanics, Nuclear & Particle Physics, Statistical Physics, Thermodynamics, Optics, Classical Mechanics, Vibrations Waves & Optics, Advanced Physics Laboratory, Partial Differential Equations, Linear Algebra, Numerical Analysis, Probability and Statistics II, Data Structures & Algorithms
- GPA: 3.93/4.0

RESEARCH

Beyond the Standard Model (BSM) Theoretical Predictions for ANNIE

Fermi National Accelerator Laboratory **PI:** Patrick Fox, PhD June – Aug 2023

- Investigating models of BSM physics that can be searched for at the LHC, ANNIE, and other experiments

Likelihood-based Charged Lepton Track Reconstruction for ANNIE

South Dakota Mines **PI:** Jingbo Wang, PhD Aug 2022 – Present

- Developed a GEANT4 (G4) simulation to produce data needed to predict detector response, including photon emission, stopping power (dE/dx), and photon transmission distance
- Developing charged lepton PMT and LAPPD detector response prediction for ANNIE

Feasibility Study For Neutrino-Argon Interaction Measurement in ANNIE

South Dakota Mines **PI:** Jingbo Wang, PhD Dec 2021 – June 2022, Aug 2022 – Present

- Restored ANNIE's simulation softwares including GENIE, WCSim (G4-based detector simulation), and ANNIEDirt (G4-based fast particle propagator) after their $\sim$5 year hiatus
- Miscellaneous ANNIE software work including creating Docker images, bash scripts, documentation, and maintaining and contributing to ANNIE's simulation and analysis softwares
- Modified ANNIE's simulation softwares to accuratly simulation proposed detector modifications
- Produced the eitirety of the simulation results used for the study

Feasibility Study of LAPPD-Based Direction-Sensitive Photodetectors (DSPDs)

South Dakota Mines **PI:** Noah Everett (me) Apr 2023 – Present

- Developed analytical lens simulator to determine characteristics of lens configurations
- Predicted performance of a generation II LAPPD-based DSPD as a function of anode board granularity

Isomorphisms for Projective Plane Descriptions

South Dakota Mines **PI:** Patrick Fleming, PhD Aug 2022 – Present

- Found isomorphisms that map between the $\mathbb{R}^2$, $\mathbb{R}^3$ hemisphere (or sphere), and $\mathbb{R}^3$ vector space descriptions of projective planes
- Investigate the use of projective planes in modeling direction-sensitive photodetectors and the holographic principle

Radon Assay for nEXO

SLAC National Accelerator Laboratory **PI:** Brian Mong, PhD June – Aug 2022 (8 weeks)

- Created a Monte Carlo simulation of electrostatic chamber radon assay systems
- Developed an analysis method to determine the initial populations of long-lived radioactive isotopes in assayed materials
- Helped assemble a new electrostatic chamber radon assay system

Radon Assay for LZ and SuperCDMS

South Dakota Mines **PI:** Richard Schnee, PhD Jan – May 2021, Aug – Dec 2021

- Developed an environmental monitoring system for the ultra-low radon cleanroom at South Dakota Mines
- Assisted with material assays for SuperCDMS and LUX-ZEPLIN
- Assisted in assembling the cleanroom tent for the new cold emanation system and started the commissioning of the system

HONORS & AWARDS

†National, *South Dakota Mines

- APS Division of Particles and Fields (DPF) Travel Grant for April Meeting† — Apr 2023
- Outstanding Physics Junior* — Mar 2023
- Leadership Award – Society of Physics Students (SPS)* — (during vice presidency) Mar 2023
- Sigma Pi Sigma Honor Society† — Apr 2022
- Deans List* — (all semesters) 2020–2023

LEADERSHIP

†National, *South Dakota Mines

- Assistant Zone Councilor – Society of Physics Students (SPS)† — Apr 2023 – Present
- Founder and President – Health and Fitness Club* — Feb 2022 – Present
- Vice President – Society of Physics Students (SPS)* — Aug 2022 – Present
- Physics Peer Mentor* — Apr 2022 – Present
- Mathematics Peer Mentor* — Apr 2023 – Present

PRESENTATIONS

- **Everett, N.**, “Projective Planes and Exploring Their Application in Physics,” George F. Duck Math Colloquium, Rapid City, SD, 2023 April 28 (Oral)
- **Everett, N.**, “Projective Planes and Exploring Their Application in Physics,” MAA Rocky Mountain Section Meeting, Spearfish, SD, 2023 April 21-22 (Oral)
- **Everett, N.**, “Likelihood-Based Reconstruction Techniques in ANNIE,” APS April Meeting, Neutrinos IV, Minneapolis, MN, 2023 April 15-18 (Oral)
- **Everett, N.**, “Likelihood-Based Reconstruction Techniques in ANNIE,” South Dakota Mines’ Student Research Symposium, Rapid City, SD, 2023 Apr 4 (Oral)
- **Everett, N.**, “Detector Response Prediction and Likelihood-Based Charged Lepton Reconstruction,” ANNIE Collaboration Meeting, Batavia, IL, 2023 Feb 3 (Oral)
- Wang, J., **Everett, N.**, “Feasibility of Argon Target in ANNIE,” ANNIE Collaboration Meeting, Batavia, IL, 2023 Feb 3 (Oral)
- **Everett, N.**, “Finding Projective Plane Isomorphisms and Exploring Their Applications in Particle Physics Detectors,” Fall 2022 Math Research Symposium, Rapid City, 2022 December 12 (Oral)
- **Everett, N.**, “Likelihood Based Secondary Lepton Reconstruction for ANNIE,” Fall 2022 Physics Experimental Design Research Symposium, Rapid City, SD 2022 December 2 (Oral)
- **Everett, N.**, Mong, B., “Improving Radon Assays for Ultra Sensitive Experiments,” 2022 APS Prairie Section Meeting, Sioux Falls, SD 2022 Oct 14-15 (Poster)
- **Everett, N.**, Wang, J., “Feasibility Study of ν-Ar Interaction Measurement in ANNIE,” 2022 Physics Congress, Washington, DC, 2022 Oct 7-8 (Poster)
- **Everett, N.**, “Radon Assay for nEXO,” SLAC SULI Presentation Seminar, Menlo Park, CA, 2022 Aug 4 (Oral)
- **Everett, N.**, Mong, B., “Radon Emanation for nEXO,” Stanford Physics, Identity, and Equity Workshop, Stanford, CA, 2022 Jul 29-30 (Poster)

- **Everett, N.**, Wang, J., “Feasibility Study For Neutrino-Argon Interaction Measurement in ANNIE,” South Dakota Mines’ Student Research Symposium, Rapid City, SD, 2022 Apr 5 (Poster)

REFERENCES

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