

## EDUCATION

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*Virginia Polytechnic Institute and State University (Virginia Tech), Blacksburg, VA*

**Ph.D. in Physics** **2004**

Dissertation: “Internal Radioactive Source Calibration of the Borexino Solar Neutrino Experiment”

*Indiana University, Bloomington, IN*

**B.S. in Physics** **1997**

Minors: Math and Danish

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## PROFESSIONAL EXPERIENCE

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*Princeton University, Princeton NJ*

*(I am working at Fermilab, Batavia, IL)*

**Associate Research Scholar** **2010-date**

**PRIMARY RESEARCH FIELDS: Direct dark matter WIMP search, liquid argon scintillation and ionization properties for Dark Matter detectors, and large scale gas separation techniques**

- **Darkside Dark Matter Search:** Project manager for all aspects of underground argon collection and purification. This includes the management of the operations of a Vacuum Pressure Swing Adsorption (VPSA) plant for argon gas extraction in Cortez (CO), and the development, construction, commissioning, and operation of all underground argon purification at Fermilab.
- **Accomplishments:**
  - Produced the World’s largest amount of low-radioactive underground argon (>100 kg), starting from a CO<sub>2</sub> stream with 500 ppm argon contamination.
  - Doubled argon concentration & increased overall duty factor of the gas extraction plant by a factor 4.
  - Elected to the Darkside Scientific Steering Committee
- **Scintillation Efficiency of Noble Elements (SCENE):** Scene project leader. Scene has measured the scintillation light production efficiency of liquid argon for nuclear recoil events ( $L_{\text{eff}}$ ) in an electric field, and the free charge from the ionization events. In the next phase of Scene we are performing the same measurements on Xenon.
- **Accomplishments:**
  - Showed that an electric field applied to liquid argon has a strong effect on the scintillation efficiency
  - Led efforts recruit collaborators and to collect and manage resources for Scene to come to fruition.

*North Carolina State University, Raleigh, NC*

**Research Assistant Professor** **2008–2010**

**PRIMARY RESEARCH FIELDS: Neutrinoless double beta decay, High Purity Germanium detector characterization, material assay, and weak interactions**

- **Majorana Double Beta Decay experiment.** Project leader to characterized the World’s only highly enriched highly segmented germanium detector, and repurpose it to create an ultra-low radioactive background, as part of a prototype for the Majorana Experiment.
  - **DUSEL related R&D.** Principal Investigator for R&D involving low-level radioactive contamination determination in materials and radon reduction in air for the Deep Underground Science and Engineering Laboratory (DUSEL), located at the Kimballton Underground Research Facility (KURF) in Virginia. Detailed significance, developed budgets, recruited collaborators, for this project.
  - **Accomplishments:**
    - Characterized the world’s only isotopically enriched, segmented, HPGe detector (SEGA)
    - Grant proposal rated as “Must Fund” by NSF and awarded in full by the U.S. Dept. of Energy. U.S.
    - Elected young member of the Majorana Executive Committee (For Majorana experiment)
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