

Christian Bunker

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EDUCATION

- **University of Florida** Gainesville, FL
Ph.D. in Physics August 2020 -
- **University of Notre Dame** Notre Dame, IN
Bachelor of Science in Physics, magna cum laude August 2016 - December 2019
 - **Concentration:** Advanced Physics.
 - **Relevant Courses:** Computational Methods in Physics, Intro to Solid State Physics, Physical Chemistry, Computational Lab in Quantum Mechanics.
 - **Honors:** Outstanding Undergraduate Research Award.
- **Boston University** Geneva, Switzerland
Study Abroad at University of Geneva January - June 2019
 - **Relevant Courses:** Computation for Experimental Particle Physics.

RESEARCH

- **Research Assistant, University of Notre Dame** Notre Dame, IN
Dr. Badi H. Assaf, Topological Quantum Matter Group January 2020-May 2020
 - Used numerical methods to investigate the energies and dispersion relations of bound states in band gap inverted IV-VI quantum wells. This treatment, rooted in k.p theory, showed the dependence of the topological interface state energy on the physical parameters of the well.
 - Investigated SrBiSe and CuBiSe using x-ray diffraction, Raman spectroscopy, and Fourier-transform infrared spectroscopy.
 - Created Python program to automate data collection and visualization process for low temperature magnetotransport experiments.
 - Performed low temperature magnetotransport experiments on α -Sn thin films to investigate evidence for superconductivity.
 - Developed a simple numerical model for accounting for the exchange effects of introducing paramagnetic ions into lead salts and calculating subsequent band levels.
- **Research Assistant, CERN** Geneva, Switzerland
Dr. Josh Bendavid, CMS W Mass Group January 2019 - June 2019
 - Investigated the effects of applying angular smoothing theory derived from QCD to leptonic W decays.
 - Analyzed lepton and W boson data from millions of Monte Carlo simulated W decay events with independently written Python and ROOT code.
 - Created code to calculate the angular smoothing coefficients from the W decay angular parameters for separate bins of W transverse momentum and pseudorapidity and then use these coefficients to smooth the W decay cross section.
 - Created code to bootstrap the smoothed and unsmoothed W decay cross section data sets in order to rigorously compare the effects of smoothing on the uncertainty of the lepton parameters.
- **Research Assistant, University of North Florida** Jacksonville, FL
Dr. Daniel Santavica, Nanoscale Electronics and Optoelectronics Lab May 2018 - August 2018
 - Performed solid state physics research into potential improvements to superconducting nanowire single photon detectors (SNSPDs) using AWR Design Environment circuit design software and Igor data analysis software.

- Designed various capacitor and inductor geometries in AWR Design Environment in order to investigate SNSPD circuit elements in the regime in which they are no longer ideal.
- Simulated these non-ideal circuit elements using AWR Design Environment in order to determine how nanowire geometry affects the dispersion, resonance, and detection capabilities of SNSPDs.

- **Research Assistant, University of Notre Dame** Notre Dame, IN
Dr. Randall Ruchti, QuarkNet *August 2017 - May 2018*
 - Examined the effects of quartz capillary design features such as waveshifting dye concentration, ruby quartz end capping, and titanium mirroring on their ability to transmit ultraviolet light with minimal attenuation.
 - Investigated the extent to which the attenuation properties of these capillary designs remained consistent under radiation exposure.
 - Collected and analyzed spectrophotometry data on the excitation and emission spectra of various waveshifting dyes and materials.

PRESENTATIONS

- **Notre Dame College of Science Fall Undergraduate Research Fair** October 2019
Analysis of the Statistical Uncertainty on Monte Carlo W Decay Events
- **Notre Dame College of Science Joint Annual Meeting** May 2018
Factors Influencing the Optical Features of Quartz Glass Capillaries

EXPERIENCE

- **Physics Tutor, University of Notre Dame** Notre Dame, IN
Academic Services for Student Athletes *August 2019 - December 2019*
 - Provide support to student athletes in Engineering Physics I and II classes.
- **Physicist Assistant, Ackerman Cancer Center** Jacksonville, FL
Department of Physics and Dosimetry *May 2018 - August 2018*
 - Performed quality assurance checks on the proton therapy machine using myQA software to ensure proper strength and calibration of the beam.
 - Implemented quality assurance checks on beam apertures and range compensators using .decimal software to ensure that each is properly tailored to the dosimetry plan of the specific patient.

SKILLS

- **Programming:** Intermediate Python, Basic ROOT, Basic C++
- **Software:** AWR Design Environment, Mathematica, \LaTeX , Igor