JOSHUA A. APANAVICIUS

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EDUCATION

Indiana University Bloomington *August 2021 - Present*
M.S. in Quantum Information Science Expected Graduation: August 2022

Indiana University Bloomington *August 2015 - May 2019*
B.S. in Physics *with Honors & Distinction*
B.S. in Mathematics *with Distinction*

COMPUTER SKILLS

Programming Languages Python, C++, Java, bash
Software & Tools HPC, Qiskit, TensorFlow, Keras, scikit-learn, Mathematica, LabVIEW, COMSOL, LaTeX, Linux, Git, LAMMPS, NumPy

EXPERIENCE

National Security Innovation Network June 1 - August 13, 2021
Quantum Computing *X-Force Fellowship*

- Aided in the design and construction of a portable ion trap.
- Goal is to gain a better understanding of the effects radiation has on trapped ion qubits by being able to place an ion trap in a radiation source as well as other harsh environments.
- Gained experience in AMO physics techniques such as laser control, electronics (RF), DAQ

Brookhaven National Laboratory January - April 2020
Quantum Computing *Science Undergraduate Laboratory Internships (SULI)*

- Used the hierarchy of Hamiltonian approach along with the Quantum Information Software Kit (QISKit) from IBM to implement the Variational Quantum Eigensolver (VQE) algorithm to calculate bound energy states of the Morse potential on a quantum computer.
- Gained experience in computational physics, quantum computing, & software development.

Los Alamos National Laboratory August - December 2019
Magnetic Impurity Detection for nEDM Experiments *SULI*

- Aided in design, fabrication, & construction of an apparatus capable of detecting magnetic impurities in copper on the order of femtotesla.

Center for Exploration of Energy and Matter May - August 2019
Axion Resonant InterAction Detection Experiment (ARIADNE) *Post-Undergraduate Research*

- Collaborative effort to search for the QCD Axion using techniques based on Nuclear Magnetic Resonance.
- Designed & built insulation for helium three cryostat.
- Adapted resonating circuit to achieve meta-stable helium three plasma.
- Performed simulations in COMSOL to model thermodynamic variations in a glass tube placed in a Helium three cryostat.

SRI International May 2018 - July 2018
Ultra-Fast PCR *Research Experience for Undergraduates (REU)*

· Aided in the development and testing of a device that performs ultra-fast quantitative real time PCR.
· Gained experience with wet chemistry, instrumentation, and running/debugging LabVIEW virtual instruments.

Center for Exploration of Energy and Matter May 2015 - April 2019
Short Range Exotic Gravity *Undergraduate Research*

· Aided in the planning, design, development, and construction of a scientific apparatus used in a search for short range exotic gravity as well as other exotic forces.
· Provided experience working in a professional physics lab, as well as an extensive introduction to CAD software such as Autodesk Inventor and Fusion 360.

Center for Exploration of Energy and Matter May 2015 - April 2019
Gravity Refractometry *Undergraduate Research*

· Used previously measured neutron scattering lengths for heavy nuclei to try and show small effects of short range Yukawa Interactions consistent with short range exotic gravity.
· Provided me with a lot of experience in neutron optics, as well as various software tools such as Python & Mathematica.

PUBLICATIONS

arXiv:2102.05102 [Link] 2021

"Morse Potential on a Quantum Computer for Molecules and Supersymmetric Quantum Mechanics"

Phys. Rev. D 101, 062004 [Link] 2020

"Internal Consistency of Neutron Coherent Scattering Length Measurements from Neutron Interferometry and from Neutron Gravity Reflectometry for Exotic Yukawa Analyses"

Proceedings of the 7th Meeting on CPT & Lorentz Symmetry (CPT'16) [Link] 2016

"An Angstrom-Scale Short-Range Yukawa-Interaction Search using Neutron Interferometry and the Neutron Fizeau Effect"

AWARDS

Founders Scholar *2017*

Jesse H. & Beulah Chanley Cox Engagement Scholarship *2015*

POSITION OF RESPONSIBILITY

Advocate for Community Engagement (ACE) August 2015 - May 2019
Community Outreach *Indiana University Bloomington*

· Served as a liaison between Indiana University & local non-profit organization People and Animal Learning Services (PALS)
· In charge of multiple administrative tasks such as tracking & recording volunteer hours
· Worked 8 to 10 hours a week organizing and facilitating service learning partnerships between PALS and students in service learning courses offered at IU.