

JOSHUA A. APANAVICIUS

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japanavi.github.io

EDUCATION

Indiana University Bloomington

August 2015 - May 2019

B.S. in Physics *with Honors & Distinction*

B.S. in Mathematics *with Distinction*

COMPUTER SKILLS

Computer Skills

Python, ROOT, bash

Software & Tools

TensorFlow, Keras, scikit-learn, NumPy, matplotlib, LaTeX, Excel,
Mathematica, LabVIEW, Linux, Git, Jupyter, COMSOL

EXPERIENCE

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 n EDM 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*Short Range Exotic Gravity*

May 2015 - April 2019

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*Gravity Refractometry*

May 2015 - April 2019

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

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

RELEVANT PHYSICS & MATH COURSES

Physics Courses

Intro. to Newtonian Mechanics & EM
Modern Physics
Statistical Mechanics & Thermodynamics
Theory of Electricity & Magnetism I & II
Analytical Mechanics I & II
Quantum Mechanics I & II
Modern Optics
Applied Physics Instrumentation Lab

Math Courses

Calculus I, II, III, & IV
Ordinary Differential Equations I & II
Linear Algebra
Numerical Analysis
Real Analysis
Complex Variables
Probability Theory

POSITION OF RESPONSIBILITY

Advocate for Community Engagement (ACE)*Community Outreach*

August 2015 - May 2019

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.