Jacob Grayson

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EDUCATION

Vanderbilt University Aug 2021 – Present

- PhD in Physics — Expected May 2026
  - Area of Specialization: Experimental Condensed Matter & Optics
  - Research Advisor: Dr. Richard Haglund
  - GPA: 4.0

University of Chicago, Cum Laude — Sep 2015 – Jun 2019

- Degrees: B.A. in Physics, B.S. in Mathematics
  - GPA: 3.3
  - Weighted GPA: 4.3
  - Unweighted GPA: 3.9

RESEARCH EXPERIENCE

Applied Optical Physics Group, Vanderbilt University — Aug 2021 – Present

- PhD Candidate
  - Investigating topological insulators in the context of photonic crystals; working to realize reconfigurable topological devices for use in integrated photonic circuits by leveraging optical phase change materials
  - Working to extract time-resolved electron microscopy images of VO_2 nanoparticles heated through the phase change to observe how crystal structure transforms across the autocorrelation region
  - Fabricated and characterized VO2 based thermochromic thin film devices for passive temperature regulation in spacecraft in collaboration with NASA and Triton Systems
  - Designed and constructed an experimental apparatus for capturing temperature-dependent reflectance measurements for thin film materials

ATLAS Experiment, European Organization for Nuclear Research (CERN) — Jun 2019 – Jun 2020

- Charge Injection System Technologist
  - Maintained and calibrated the ATLAS Hadronic Colorimeter's Charge Injection System as well as the diagnostics and repair of the calorimeter's front-end electronics
  - Responsible for the diagnostics, repair, and upgrade of the calorimeter's front-end electronics
  - Built Python and C++ based software for detector monitoring and the analysis of low-level physics data

Human Computer Integration Lab, University of Chicago — Apr – Jun 2019

- Research Assistant
  - Designed and fabricated small prototype electronic devices for the purpose of electrically stimulating the trigeminal nerve to provide expanded sensory feedback in virtual reality experiences

Zhong Lab, University of Chicago — Mar 2018 – Jun 2019

- Research Assistant
  - Designed and assembled an optical-electronic apparatus for the purpose of performing high-resolution spectroscopy on experimental quantum memory materials
  - Designed and assembled an apparatus for tapering single mode optical fibers to sub-micron diameters for efficient optomechanical coupling to quantum devices

David Freedman Laboratory, University of Chicago — Sep – Dec 2017

- Research Assistant
  - Assisted in the implementation of recurrent neural networks to accurately model cognitive tasks as carried out by monkeys in the lab

Neal Stewart Plant Genetics Laboratory, University of Tennessee, Knoxville — Jun – Aug 2017

- Research Assistant
  - Conducted research on the spectral properties of genetically engineered plants exhibiting a green fluorescent protein transgene and used results to develop an imaging system for field use

Spallation Neutron Source, Oak Ridge National Laboratory — Jun – Aug 2016

- Research Assistant
  - While working on a Dynamic Nuclear Polarization experiment, helped implement an apparatus for measuring the polarization of a crystalline sample, fabricated several superconducting magnets, aided in the assembly of a vacuum transfer system, and built a rack-mounted power supply for existing experimental hardware

WORK EXPERIENCE

Department of Physics and Astronomy, Vanderbilt University — Aug 2021-Present

- Teaching Assistant, Introductory Electricity and Magnetism
  - Instruct a laboratory-based class focused on introductory concepts of electricity and magnetism
  - Conduct office hours and met with students outside of class to address concerns and questions related to class
  - Grade and provide feedback on student assignments in a timely manner

Media Arts, Data, and Design Center, University of Chicago — Dec 2018–Jun 2019

- Student Staff Member
  - Served as technical support for the many resources offered by the center (such as 3D printers and laser cutters), aided in hands-on workshops aimed at developing skills in engineering and design processes, compiled tutorials for various design and fabrication methods, and provided consultation for projects carried out in the MADD Center makerspace

Hack Arts Lab, University of Chicago — Sep 2017 – Dec 2018

- Student Staff Member
  - Provided technical assistance for projects involving 3D design and fabrication, mixed signal electronics, virtual reality development, laser cutting, and other creative technologies

Department of Mathematics, University of Chicago — Dec 2017– Mar 2018

- Vigre Course Assistant, Intermediate Multivariable Calculus
  - Responsible for grading homework assignments, writing up solutions, hosting office hours each week, and meeting with students on an individual basis when needed

PRESENTATIONS

ATLAS Tile Calorimeter Upgrade Week — Oct 2019

- Oral Presentation on Charge Injection System Calibration
- Oral Presentation on Hardware and Maintenance Status

LEADERSHIP POSITIONS & ACTIVITIES

University of Chicago Engineering Society — Oct 2016 – Jun 2019

- Vice President of Projects — Mar 2018 – Jun 2019
- Project Leader — Jan 2018 – Jun 2019
- Academic Outreach Coordinator — Sep 2017– Mar 2018

AWARDS & SCHOLARSHIPS

Russel G. Hamilton Graduate Fellowship — Aug 2021

University of Chicago Dean's List — Jun 2019

UCISTEM Summer Research Grant — May 2018

Jeff Metcalf Fellowsip Grant — Apr 2016

Comcast Leaders and Achievers Scholarship — Apr 2015

University of Chicago Odyssey Scholarship — Feb 2015

TECHNICAL SKILLS

Scripting Languages & Tools: Python, C++, Linux Shell, Bash, Git, MATLAB, Mathematica, Machine Learning, Data Analysis, Java, G-code, HTML, CSS, LaTeX

Modeling Software & Techniques: Ansys Lumerical, COMSOL Multiphysics, SolidWorks, AutoCAD, EAGLE, FDTD, FEM

Laboratory & Hardware Skills: RF Magnetron Sputtering, Photolithography, Electron Beam Lithography, Scanning Electron Microscopy, Transmission Electron Microscopy, Atomic Force Microscopy, Scanning Near-field Optical Microscopy, Raman Spectroscopy, Tube Furnace Operation, Profilometry, Wafer Dicing, Cleanroom Workflows, Laser Optics, PCB Design, 3D Printing, Cryogenics, Vacuum Transfer Systems, Soldering, Machining, CNC, Agar, Tissue Culture, PCR