Benjamin Michael Hardy

Vanderbilt Department of Physics and Astronomy
6301 Stevenson Science Center
6403 C
Nashville, Tennessee 37212

benjamin.m.hardy@vanderbilt.edu

Ph: 517-817-6322

Education

Vanderbilt University — 2017 – Present
PhD candidate, Research Assistant

Bowling Green State University — BS Physics, BS Mathematics 2017
Magna cum laude, with Honors

Research Experience

Vanderbilt University Institute of Imaging Science (VUIIS) — 2019-Present
Currently designing and simulating Radio Frequency coils to be used in High Field Magnetic Resonance Imaging (MRI). The structural designs conceived will be 3D printed using state of the art 3D printers via SolidWorks software design. Advanced simulation techniques relying on the Finite Difference Time Domain Method will be implemented to test electrical design and magnetic field distribution across voxel based human models.

2018
Worked a year in an MRI diffusion lab reviewing relevant and recent literature in structural MRI topics of research and clinical applications. Using MATLAB, processed cell size measurements with image segmentation in order to confirm cell size distributions for a paper in preparation. Aided in developing software integration of a custom image processing MATLAB application for a clinical 3T scanner.

Thomas Jefferson National Accelerator Facility (JLab) — 2016
Ten-week Research Experience for Undergraduates (REU) program funded by the National Science Foundation. Researched, developed, and calibrated a magnetic field diagnostic for a magnetized electron source. The diagnostic would prove valuable for the grand project of a beam "cooling" technique for the Electron Ion Collider (EIC) at Jefferson Lab.

Bowling Green State University — 2015-2016
Studied and reported on properties of Neutron Irradiated Zinc Oxide. Studied and investigated characterization techniques such as X-Ray Diffraction, Hall Effect measurements, and Positron Annihilation Lifetime Spectroscopy.

Teaching Experience

Vanderbilt University - TA — Aug 2017-Dec 2018
Taught two sections per semester of an introductory physics lab. Prepared ten to twenty-minute lectures given biweekly elaborating on concepts and lab activities. Played an active role in guiding students to conceptual connections between equations and the physical phenomena of the lab. Graded weekly labs and quizzes.

Bowling Green State University – TRIO program tutor
Tutored financially underprivileged, first generation college students, one-on-one on a biweekly basis in STEM subjects. The tutoring model hinged on helping the students establish personal study skills while fostering independence in thinking towards problem solving. Aug 2014-Dec 2015

Scholarships and Awards

McMinn Physics Award	2018
James Robert and Gretchen Overman Scholarship	2015, 2016
Bowman Research Award	2016
George S. John Memorial Scholarship	2014

Skills and Experience

Proficient in C++, MATLAB, Remcom XFdtd, and JavaScript.

Presentations

1. **Course Presentation** Parallel Excitation With an Array of RF coils. Vanderbilt University department of Biomedical Engineering. April 22nd, 2019.
2. **Course Presentation** Understanding Magnetic Resonance Imaging through the lens of Boltzmann Statistics. Presented at an auxiliary min-conference through the Vanderbilt University department of Physics and Astronomy. April 21st, 2018.
3. **Conference Presentation** Magneto-Optic Kerr Effect in a Magnetized Electron Gun. Benjamin Hardy, Joseph Grames. Presented at the Annual Fall Meeting of the Division of Nuclear Physics of the American Physical Society in Vancouver, British Columbia. October 13th-16th, 2015.
4. **Conference Presentation** Magneto-Optic Kerr Effect in a Magnetized Electron Gun. Benjamin Hardy, Joseph Grames. Presented at the Fall Meeting of the APS Ohio-Region Section in Bowling Green, Ohio. October 7th-8th, 2016.
5. **Department Colloquium** Invited to present research on Magneto-Optic Kerr Effect in a Magnetized Electron Gun. Benjamin Hardy, Joseph Grames Presented to Department of Physics and Astronomy at Bowling Green State University, Bowling Green Ohio. September 1st, 2016.
6. **Conference Presentation** Silver Nanoparticles as a Potential Solar Absorber. Benjamin Hardy, F. A. Selim. Presented at the Colloquium for the Center for Undergraduate Research and Scholarship Symposium at Bowling Green State University, Bowling Green Ohio. April 23rd, 2016.
7. **Conference Presentation** Silver Nanoparticles as a Potential Solar Absorber. Benjamin Hardy, F. A. Selim. Presented at the Ohio - Region American Physical Society at the University of Dayton, Dayton Ohio. April 9th, 2016.

Manuscripts in Preparation

J Xu, X Jiang, H Li, LR Arlinghaus, ET McKinley, SP Devan, **BM Hardy,** J Xie, H Kang, AB Chakravarthy, JC Gore. **Magnetic resonance imaging of mean cell size and density of human breast tumors.** Submitted to Magnetic Resonance in Medicine.