Benjamin Safvati

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Education

2019-PRESENT | **Stanford University**
PhD Candidate in Physics
◇ Advisor: Hari Manoharan, Associate Professor of Physics

2015-2019 | **University of California, Berkeley**
B.A. Physics with minor in Mathematics (GPA: 3.82)

◇ Senior Honors Thesis: *Topological Phases and the Negative Sign Problem in Neural-Network Quantum State Simulation*
◇ Advisor: Joel Moore, Professor of Physics

2011-2015 | Palisades Charter High School
High School Diploma

Work Experience

SEP 2019-PRESENT | **Graduate Research Assistant - Manoharan Lab**

◇ Leading the use of two low temperature, ultra-high vacuum (UHV) scanning tunneling microscopes (STMs) for condensed matter physics.

◇ Developing ways to use STM with atomic manipulation to study quantum phases of matter and design atomic scale systems with novel behavior.

◇ Maintaining a helium purification and liquefaction facility for the recovery of gaseous helium that boils off during experiments.

◇ Writing programs for processing and analysis of STM data, as well as simulations of the surface electronic states in artificial nanostructures.

◇ Handling and preparation of various electronic materials, including monolayer materials, for STM experiments.

JAN 2017-JUN 2019 | **Undergraduate Research Assistant - Pines Lab**

◇ Explored new methods of ^{13}C hyperpolarization in NMR experiments using simultaneous optical and microwave excitation of diamond samples.

◇ Devised experimental techniques for dynamic nuclear polarization of ^{13}C in diamond using nitrogen-vacancy centers in single crystals as well as nanodiamond powders, attempting to create excess polarization in liquids at room temperature through spin diffusion.

◇ Constructed portable room temperature hyperpolarizing devices for enhanced signal sensitivity in NMR detection, and field tested the device on various NMR systems.

◇ Aided in the production and synchronization of a field cycling shuttler apparatus within an NMR magnet to access both low field and high field spin coupling regimes with sub-second travel times.

◇ Created methods to efficiently estimate ^{13}C spin-lattice relaxation (T_1) times over wide field ranges for various diamond samples in the presence of paramagnetic defects.

MAY 2016-DEC 2016 | **Programming Assistant - Magnetic Sensor Systems**

◇ Configured the firmware for various microchips to control the dynamics of 3-dimensional motion actuator technology, including implementation of PID control for smoother motion profiles.

◇ Analyzed electro-mechanical components used in electromagnets, solenoids, etc. before production, identifying measurement standards to assure finished products are highly functional.

MAY 2013-DEC 2014 **AP Tutor - Titanium Tutors**

◇ Taught Chemistry and Mathematics to high school students individually in preparation for AP exams.

PUBLICATIONS

1. C. Z. Zerger, L. K. Rodenbach, Y. Chen, **B. Safvati**, M. Z. Brubaker, S. Tran, T. Chen, M. Li, L. Li, D. Goldhaber-Gordon, and H. C. Manoharan. "Nanoscale Electronic Transparency of Wafer-Scale Hexagonal Boron Nitride." Nano Lett. 2022, 22, 11, 46084615. [arXiv:2109.01522]
2. A. Ajoy, **B. Safvati**, R. Nazaryan, J. T. Oon, B. Han, P. Raghavan, R. Nirodi, A. Aguilar, K. Liu, X. Cai, X. Lv, E. Druga, C. Ramanathan, J. A. Reimer, C. A. Meriles, D. Suter, and A. Pines. Hyperpolarized Relaxometry Based Nuclear T1 Noise Spectroscopy in Diamond. Nature Communications, vol. 10, no. 1, 2019. [arXiv:1902.06204]
3. A. Ajoy, K. Liu, R. Nazaryan, X. Lv, **B. Safvati**, G. Wang, D Arnold, G. Li, A. Lin, P. Raghavan, E. Druga, D. Pagliero, J. Reimer, D. Suter, C. Meriles and A. Pines, Orientation Independent Room-temperature Optical ^{13}C Hyperpolarization in Powdered Diamond, Science Advances, 4, eaar5492, 2018. [arXiv:1806.09812]
4. A. Ajoy, R. Nazaryan, K. Liu, X. Lv, **B. Safvati**, G. Wang, E. Druga, J. A. Reimer, D. Suter, C. Ramanathan, C. A. Meriles and A. Pines, Enhanced Dynamic Nuclear Polarization via Swept Microwave Frequency Combs, Proceedings of the National Academy of Sciences, 1807125115 (2018). [arXiv:1807.07664]
5. A. Ajoy, X. Lv, E. Druga, K. Liu, **B. Safvati**, A. Morabe, M. Fenton, R. Nazaryan, S. Patel, T. Sjolander, J. Reimer, D Sakellariou, C. Meriles and A. Pines, Wide dynamic range magnetic field cycler: Harnessing quantum control at low and high fields, Review of Scientific Instruments 90, 013112 (2019). [arXiv:1808.10579]
6. A. Ajoy, R. Nazaryan, E. Druga, K. Liu, A. Aguilar, B. Han, M. Gierth, J. T. Oon, **B. Safvati**, R. Tsang, J. H. Walton, D. Suter, C.A. Meriles, J. A. Reimer, and A. Pines, "Room temperature Optical Nanodiamond Hyperpolarizer: physics, design and operation," Review of Scientific Instruments 91, 023106 (2020); [arXiv:1811.10218]

TECHNICAL EXPERIENCE

Programming Languages: Experienced with Python and Matlab, proficient in Java, C/C++, LabView.

Other Skills: AutoCAD, GPIB device programming, USART/UART serial communication, Latex, HTML.