Alexander Sirota
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Education

Boston University, Boston, MA
BA, Mathematics and Physics in three years, May 2013 with GPA of 3.41
PH.D at University of Virginia with GPA of 3.76, Graduating May 2018

Summary

- Researching cutting edge condensed matter physics in topological states, found here at https://arxiv.org/abs/1701.08828
- Researching deep convolution neural networks in computer science outside of school
- Well versed in numerous object oriented programming languages and software packages as well as graduate level mathematics and physics.
- Worked in a variety of research positions, creating simulations and models of various physical processes, as well as measuring and taking data in electric systems
- Presented research on a regular basis and am used to following the bleeding edge research
- Teaching, tutoring and grading across astronomy, computer science, math and physics for the past 5 years

Technical Skills

- OO Programming languages: C++, Java , Fortran, Python
- Statistical software: Theano, Numpy, Wolfram Alpha Mathematica, Excel, Tableau, Gnuplot
- Operating systems: Windows, Mac, and Linux, can use shell or DOS
- Other Skills: Github, C#, Javascript, SQL and HTML
- Oscilloscopes and PASCO interfaces with Data Studio or Capstone software

Projects

- 2017: Paper on novel topological phases at https://arxiv.org/abs/1701.08828
- 2016: Created a convolution neural network for a basic image classification program in Python
- 2016: Created a material simulation that accurately reproduced energy levels and excitation locations by solving a large matrix eigenvalue problem.
- 2015: Created a solar energy charge controller with an arduino board.
- 2013: Created a simulation in C++ that found what data to store in real time from a data stream that was to large to use.

Research Experience

- 2015-current: Research Assistant under Dr. Teo in condensed matter theory in topological matter involving band theory computations which are essentially large eigenvalue problems, and modular tensor category theory with some conformal field theory. Two publications are underway.

- 2014-2015: Research Assistant under Dr. Vaman and Dr. Thacker in string theory. Focused on conformal field theory and anomaly inflow into strings. Worked most

problems using calculus of variations.

- 2013: Research Assistant under Dr. Dukes in experimental high energy physics, simulating magnetic monopoles in the NOVA detector with affiliation to Fermilab using monte carlo approaches in C++ and Fortran.

- 2012: Research Assistant under Dr. Zimmerman in experimental condensed matter designing electric amplifiers and oscillators to characterize magnetic properties of superconductors, involving getting voltage and current data to optimize precision as well as java based simulations of josephson junctions.

- 2010-2011: Research Assistant under Dr. Levichev recreating Minkowski space for different space/time manifolds

Teaching Experience
- 2013-current Teaching Assistant for University of Virginia

- 2015: Physics I Discussion (pre-medical students): Mechanics, Fluids, Thermodynamics: algebra based in Summer Session 2016 and in Spring semester

- 2013-2015: Physics II Laboratory (pre-medical and engineering majors)- Electrodynamics: calculus and algebra based, using PASCO Interface systems for 3 semesters

- 2013-2015: Physics I Laboratory (pre-medical, engineering and physics majors)- Mechanics, Fluids, Thermodynamics: calculus and algebra based, using PASCO systems for 3 semesters

- 2015-current: Tutoring for the University Athletic Department
    Thermodynamics: calculus and algebra based
    Introductory Astronomy Courses
    Discrete Mathematics
    Statistics
    Physics- How things work I & II
    Physics II- Electrodynamics: calculus and algebra based
    Physics I- Mechanics, Fluids,
    Computer Science in Python
    General Mathematics

- 2013-current: Private Tutoring
    Undergraduate Physics I,II
    Undergraduate Quantum Mechanics
    Undergraduate Intermediate Electromagnetism
    Undergraduate Physical Chemistry
    Graduate Physics Qualifier Preparation
    Undergraduate Real Analysis

Technical Course Work

Introduction to Topology
Introduction to Algebraic Topology I
Abstract Algebra I & II
Probability Theory
Real Analysis
Differential Geometry
Complex Calculus
Differential Equations
Linear Algebra
Modern Physics
Mathematical Methods for Physicists
Computer Science I & II
Computational Physics
Introduction to Mechanics
Introduction to Statistical Mechanics
Introduction to Electrodynamics I & II
Introduction to Quantum Mechanics I & II

Conferences and Summer Schools

- 2016: Presented work at March Meeting
- 2015: PITP-IAS Summer School on Condensed Matter Physics
- 2013: High Energy Conference at Argonne National Lab