

SARA FREED SUSSMAN

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EDUCATION

Boston University, Physics B.A.

Expected May 2018

Harvard University, Visiting Undergraduate Student

2015-2016

RESEARCH EXPERIENCE

Undergraduate Researcher, Prof. Kearns Group, Boston University

9/2016 - present

Super-Kamiokande (SK) and Hyper-Kamiokande (HK) Collaborations

Senior Research Project: Dinucleon and Nucleon Decay into Two-Body Final States with No Hadrons
Searched for 10 dinucleon and nucleon decay modes using the entire SK dataset.

SK Event Reconstruction Software Developer: APFIT

Located and solved a set of Cherenkov-ring-counting issues.

HK Front-end Electronics Developer: Prototype QTC-TDC Board

Wrote DAQ software, tested QTC/TDC performance, FPGA programming to improve performance.

SK Outer Detector High Voltage Expert

Developed remote control software for new HV crates, integrated and installed new crates in SK.

Undergraduate Researcher, Prof. Franklin Group, Harvard University

12/2015 - 9/2016

ATLAS Collaboration

Website: Find Problematic Muon Spectrometer Detector Elements: <http://cern.ch/muons/>

Users upload eta-phi histograms and learn which elements overlay spatial coordinates in question.

DAQ Software for Prototype Micromegas Apparatus

Wrote and tested geometry and track reconstruction library for ATLAS muon upgrade prototype.

AWARDS

College Prize in Physics, Boston University

2018

International Neutrino Summer School (INSS), Poster Competition, 3rd Prize

Fermilab, 8/2017

INSS Group Tutorial, Oral Presentation Competition, 2nd Prize

Fermilab, 8/2017

Undergraduate Research Opportunities Program Fellowship, Boston University

2017, 2018

RECENT PRESENTATIONS

Dinucleon and Nucleon Decay into Two-Body Final States with No Hadrons

*SK Collab. Meeting
Toyama JA, 11/9/2017*

Prototype Front-End Electronics for Hyper-Kamiokande QTC-TDC Board

*BU Advanced Lab Seminar
Boston MA, 10/15/2017*

Multi-GeV Multi-Ring Event Reconstruction in Super-Kamiokande (Poster)

*INSS, Fermilab
Batavia IL, 8/17/2017*

Side By Side By Side: ν Event Simulation in Super-K, NOvA and ArgoNeuT

*INSS, Fermilab
Batavia IL, 8/17/2017*

Multi-GeV Two-Ring Showering Event Study

*SK Collab. Meeting
Toyama JA, 6/2/2017*

TEACHING/MENTORING EXPERIENCE

Research Mentor (Hardware)

Mentored high school summer intern at Fermilab with Dr. Jin-Yuan Wu.

*Fermilab
Batavia IL, 8/2017*

Math Mentor

Guided female K-8 students in creative mathematical explorations.

*Girls' Angle
Cambridge MA, 2015*

Student-Teacher and Volunteer

Taught high school juniors and seniors calculus and precalculus.

*Charlestown High School
Boston MA, 2015*

Teacher, Junction and Splash!

Taught topics in physics, math and chess to high school students at MIT.

*Educational Studies Program
Cambridge, MA 2014-15*

Corps Member

Tutored and mentored K-8 students in math in a bilingual Dorchester school.

*City Year Boston
Boston MA, 2013-2014*

LEADERSHIP

Director, Junction

Redesigned summer program where 41 high school students do independent research with 1:1 mentoring.

MIT, Cambridge MA, 2015

Director, Spring High School Studies Program (HSSP)

Led six week Saturday program where 500 high school students take courses taught by undergraduates.

MIT, Cambridge MA, 2015

Director, Denney Math

Created a weekly evening inquiry-based algebra class for local teenagers.

Dorchester MA, 2014

Director, The Checkmate Club

Created a weekly math, logic and chess program for local teenagers.

Dorchester MA, 2013-2014

Assistant Crew Leader, The Food Project

Led a diverse group of 15 teenagers in urban/rural farming and discussed social justice issues.

Dorchester & Lincoln, MA, 2012-2013

RELEVANT COURSES COMPLETED (AT BU UNLESS STATED OTHERWISE)

**graduate level*

Physics: Advanced Particle Physics I*; Introduction to Particle Physics*; Cosmology*; Statistical Thermodynamics; Quantum Mechanics I (Harvard) and II

Engineering/Design: Electronics for Scientists*; Advanced Laboratory*; Introduction to Logic Design (month-long projects: Energy Distribution of Cosmic Ray Muons in a Water Cherenkov Detector, The Hall Effect in p-doped Silicon, Chaos and Bifurcation in Water Droplets)

Math: Mathematical Physics*; Algebra I: Theory of Groups and Vector Spaces (Harvard); Sets, Groups and Topology (Harvard); Ordinary and Partial Differential Equations (Harvard); Linear Algebra (Harvard)

SKILLS

Programming: C/C++, Python, FORTRAN, ROOT, Mathematica, MATLAB, Verilog, VHDL, JavaScript, HTML/CSS

Software: Intel Quartus Prime, Xilinx Vivado Design Suite

Hardware: Cherenkov detectors, high voltage systems, gaseous ionization detectors, data acquisition and timing systems, digital and analog circuits, lab equipment such as NIM modules, multichannel analyzers and oscilloscopes, basic machining with mills and laser cutters (plastic and steel)