David A. Simon

Curriculum Vitae

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EDUCATION

University of Oxford, Wolfson College — Expected June 2025

- DPhil in Astrophysics
- *Thesis Adviser:* Michele Cappellari
- *Thesis Title:* Machine Learning Supermassive Blackholes

University of Oxford, Pembroke College — June 2021

- MSc in Mathematical and Theoretical Physics
- *Dissertation Adviser:* Pedro Ferreira
- *Dissertation Title:* Quasi Normal Modes and Black Holes

Boston University: — May 2020

- B.A. in Physics *with honors* and Mathematics
- *Undergraduate Thesis Adviser:* Martin Schmaltz
- *Undergraduate Thesis Title:* Scalar Fields as Dark Matter and Dark Energy

RESEARCH EXPERIENCE

Scalar Fields as Dark Matter and Dark Energy — May 2018 - May 2020

- *Advisor:* Martin Schmaltz
- *Description:* Using the publicly available Pantheon supernova dataset, I have studied an effective fluid description of a scalar field dark matter model with multiple non-degenerate minima, and have determined that it can account for all of the observed dark matter and dark energy in the universe today.

Ultra-sensitive Assaying Techniques for Next-Generation Neutrino and Dark Matter Experiments — January 2018 - August 2018

- *Advisor:* Christopher Grant
- *Description:* I have set up and calibrated a high purity germanium detector and photomultiplier tube to perform coincidence detection of irradiated samples of liquid scintillator in order to better understand the background of the SNO+ experiment.

SNO+ Long Term Test Tank (LT3) — April 2017 - August 2018

- *Advisor:* Christopher Grant
- *Description:* I have helped to design and assemble the acrylic tank and plumbing for a long term stability test of liquid scintillator to be used by SNO+. I've also written and implemented code to automatically take temperature and humidity measurements from LT3 and to upload these measurements to our group's website to allow for remote monitoring of LT3.

PRESENTATIONS

Oral Presentations

- Undergraduate Thesis Defense, *Boston University* — May 2020
  "Scalar Fields as Dark Matter and Dark Energy"

Poster Presentations

- 22nd Annual Undergraduate Research Symposium, *Boston University* October 2019
  "Scalar Fields as Dark Matter and Dark Energy"
- Learning Assistant Poster Session, *Boston University* December 2018
  "Why Students are not Learning in Lab and What to do About It"
- 21st Annual Undergraduate Research Symposium, *Boston University* October 2018
  "Ultra-sensitive Assaying Techniques for Next-Generation Neutrino and Dark Matter Experiments"

WORKSHOPS

Galaxies Near & Far: Bridging Observations and Simulations, *Christ Church College* September 2022

- This workshop brought together simulators and observers over the course of two days to discuss all aspects of galaxy formation and evolution.

CLASS and SONG Workshop, *Center for Computational Astrophysics, New York* July 2019

- This workshop gave an introduction to CLASS, an Einstein-Boltzmann code used to predict cosmological observables. SONG is an extension of CLASS also introduced that solves for quantities to second order in perturbation theory.

AWARDS AND HONORS

Dean's List Fall 2016 - Spring 2018, Spring 2019
UROP Award Recipient Spring 2018, Summer 2018, Fall 2019, Summer 2019

TEACHING EXPERIENCE

Undergraduate Learning Assistant, *Boston University*

- Ran weekly discussion sections with a graduate teaching fellow for 5 undergraduate physics courses
- Wrote weekly discussion worksheets used by ∼40 students
- Hosted weekly office hours and end of term review sessions
  - PY 355: Methods of Theoretical Physics Spring 2020
  - PY 351: Modern Physics I Fall 2019
  - PY 313: Waves and Modern Physics Fall 2019
  - PY 252: Principles of Physics II Spring 2019
  - PY 251: Principles of Physics I Fall 2018

SKILLS

Technical

- Worked with Mathematica, Python, C, Fortran 90, CLASS, MontePython
- Experience using the BU Shared Computing Cluster and Oxford Astrophysics Computing Cluster
- Completed electronics projects utilizing Raspberry Pi and Arduino

Laboratory

- Experience with installing and using vacuum grade plumbing
- Worked in ISO 6 (Class 1000) clean room
- Experience with PMTs and HPGe Detectors

EXTRACURRICULAR EXPERIENCE

Mentoring Experience

- PeeRs for Incoming Student Mentorship (PRISM) September 2018 - Present
  - PRISM is a program in the physics department at Boston University where upperclassmen are paired with 3 - 4 incoming freshman who they meet with several times throughout the academic year.
- Math & Statistics Peer Mentoring Program September 2019 - Present
  - The Math and Statistics peer mentoring program pairs upper level math majors with an incoming freshman who they meet with several times throughout the academic year.