JESSICA FRY

Curriculum Vitae

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EDUCATION

Massachusetts Institute of Technology

Ph.D. Physics Candidate

Stanford University — 2021

B.S. in Physics, Minor in Theater and Performance Studies

AWARDS

2021	NSF Graduate Research Fellowship
2020	Hoefer Prize for Undergraduate Writing
2020	Stanford Major Grant
2016, 2017	Stanford Department of Physics Summer Grant

RESEARCH EXPERIENCE

AI for Rare Event Searches (AIRES) — 2023 - present

Leads inter-institution collaboration for the development of AI data processing in rare event physics searches. Published dataset releases, created benchmarks, and models for dark matter data denoising.

Presented at NeurIPS Machine Learning for Fundamental Sciences Workshop — 2023

DMRadio and ABRACADABRA under Prof. Lindley Winslow — 2021 - present

Performing vibration analysis of DMRadio m^3 copper coaxial pickup in 1T superconducting magnet to characterize noise sources similar to axion signal in the lumped element detector. Operates 10mK dilution refrigerator for ABRACADABRA experiment searching for axion dark matter.

Presented at APS April Meeting — 2024
Presented at CMB Core to Core Conference — 2023
Presented at UCLA Dark Matter Conference — 2023
Presented at TAUP — 2023

HPS Experiment with SIMPS Analysis under Prof. Lauren Tompkins — 2020 - 2021

Performed an analysis on the Heavy Photon Search (HPS) for the Strongly Interacting Massive Particle (SIMP). Conducted analysis on Monte Carlo simulated SIMP data and background to find dark matter signal using phenomenology based cuts. Performed tracking analysis to determine track reconstruction algorithm with highest signal purity and lowest fake rates.

Presented at the HPS Full Collaboration Meeting — 2020

Optimal Quantum Control under Prof. Monika Schleier-Smith — 2020

Conducted research in the Schleier-Smith Lab on the application of machine learning and CRAB optimization techniques to classical and quantum optimization problems. Wrote simulation and optimization scripts in Python to create software for the optimization of cold atom transport with a dipole beam between experimental regions.

Presented at the Symposium of Undergraduate Research and Public Service — 2020
Awarded Hoefer Prize for Grant Writing — 2020

ATLAS Experiment with Emerging Jets Analysis under Prof. Lauren Tompkins — 2017

Performed a preliminary optimization for emerging jets analysis searching for the dark sector in ATLAS data. Wrote scripts in C++ using ATLAS Root software to create a cutflow for Monte Carlo simulated data and background. Optimized discriminating variables to develop analysis techniques to model the emerging jets within the ATLAS data.

Presented at the SLAC ATLAS group meeting at CERN — 2017
Presented at the Stanford Undergraduate Summer Physics Research Grant Poster Session — 2017

SLAC Research with LZ under Dr. Daniel Akerib — 2016

Repaired the SLAC system test detector between circulation runs including reconstruction of the weir reservoir, the purification tower, and additions to the programmable logic computer. Conducted an individual experiment characterizing the cooling power of the LZ thermosyphon system. Designed, built, and ran a detector with thermosyphon lines, vacuum chamber, thermometers, and heaters.

Presented at the Conference for Undergraduate Women in Physics at UCLA— 2017

Presented at the Stanford Undergraduate Summer Physics Research Grant Poster Session — 2016

PUBLICATIONS

TIDMAD: Time Series Dataset for Discovering Dark Matter with AI Denoising

J. T. Fry et. al., Preprint, https://arxiv.org/abs/2406.04378v1

Long Time Series Data Release from Axion Dark Matter Experiment

J. T. Fry et. al., NeurIPS ML4FS, https://ml4physicalsciences.github.io/2023/files/NeurIPS_ML4PS_2023_131.pdf

Projected sensitivity of DMRadio-m³: A search for the QCD axion below 1 μeV

DMRadio Collaboration, APS PRD, https://journals.aps.org/prd/abstract/10.1103/PhysRevD.106.103008

Proposal for a definitive search for GUT-scale QCD axions

DMRadio Collaboration, APS PRD, https://journals.aps.org/prd/abstract/10.1103/PhysRevD.106.112003

Electromagnetic modeling and science reach of DMRadio-m³

DMRadio Collaboration, Preprint, arXiv:2302.14084

EMPLOYMENT

Broadway: M. Butterfly — 2017

Broadway Actor in *M. Butterfly* at The Cort Theater directed by Julie Taymor, written by David Henry Hwang

Charlie and the Chocolate Factory — 2018 - 2019

Broadway Actor on the first broadway national tour directed by Jack O'Brian

The Americans Ep. 605 — 2018

Co-star role on the FX television show directed by Thomas Schlamme

LEADERSHIP

Research Mentor — 2021 - present

Mentored five undergraduates on research projects in the Winslow Lab

GSE Stanford Summer Program Counselor — 2020, 2021

Counselor for underprivileged high school girls teaching programming through STEM applications

Board of Directors: Ram's Head Theatrical Society — 2020 - 2021

Lead Stanford's largest theater group and began both community outreach initiatives and inclusivity protocols