Logan A. Morrison, Ph.D.

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WORK EXPERIENCE

University of California, Santa Cruz January 2022 - Present
Jr. Specialist *Santa Cruz, California*
As a post-doctoral researcher, lead research projects, research novel theories of dark matter, use machine learning to discover new physics, and develop software to explore and constrain dark matter models. My current research projects include:

- **Developing software for accurately computing gamma-ray, positron, and neutrino spectra** from GeV-scale dark matter annihilations and decays using form-factors fit to electron/positron collider data.
- Computing spectra from dark matter annihilations and decays into sterile neutrinos with masses ranging from an eV to the Plank scale.
- **Using machine learning to explore high-dimensional parameter spaces.**
- Determining the effects on the cosmic microwave background from models where dark matter briefly re-enters kinetic equilibrium with the Standard Model bath.

University of California, Santa Cruz September 2015 - December 2021
Teaching Assistant *Santa Cruz, California*
Led discussion sections for groups of 10 to 30 students from undergraduate physics courses ranging from first-year physics to senior-level mathematical physics and quantum mechanics. Held regular office hours where students could come and get help or advice about navigating their undergraduate physics classes.

Western Washington University January 2013 - September 2015
Undergraduate Researcher *Bellingham, Washington*
Research and developement of high-performance organic field-effect transistors.

RESEARCH INTERESTS

- Machine learning: reinforcement learning and using machine learning for discovery
- Developing software tools for machine learning and high-energy physics
- Phenomenology of dark matter

EDUCATION

University of California, Santa Cruz *December 2021*
Ph.D. in Physics

University of California, Santa Cruz *August 2016*
M.S. in Physics

Western Washington University *June 2015*
B.S. in Physics & Mathematics, *Magna Cum Laude*

HONORS AND AWARDS

Chancellor's Dissertation Year Fellowship (UCSC) 2020
Outstanding TA Award (UCSC) 2020
Raymond McLeod Memorial Scholarship (UCSC) 2014
Veit Memorial Scholarship (UCSC) 2014
Research & Creative Opportunities Grant (WWU) 2013
"Characterization of Charge Carrier Mobility in Electrochemically Doped Semiconducting Polymers"

SELECTED PUBLICATIONS

1. Morrison, L. A., Profumo, S., & Tamanas, J. (**2022**). *Simulation based inference for Efficient Theory Space Sampling: An application to supersymmetric explanations of the Anomalous Muon (g-2).* arXiv preprint arXiv:2203.13403 (**2022**)
2. Coogan, A., Morrison, L., & Profumo, S. (**2021**). *"Precision gamma-ray constraints for sub-gev dark matter models."* Journal of Cosmology and Astroparticle Physics, 2021(08), 044.
3. Duran, A., Morrison, L., & Profumo, S. (**2021**). *'Sterile neutrino dark matter from generalized cpt -symmetric early-universe cosmologies."* Physical Review D, 104(2).
4. Coogan, A., Moiseev, A., Morrison, L., & Profumo, S.. *"Hunting for Dark Matter and New Physics with (a) GECCO."* arXiv preprint arXiv:2101.10370 (**2021**)
5. Coogan, A., Morrison, L., & Profumo, S. (**2021**). *"Direct detection of Hawking radiation from Asteroid-mass primordial black holes."* Physical Review Letters, 126(17).
6. Morrison, L., Profumo, S., & Robinson, D. J. (**2021**). *"Large N-ightmare dark matter."* Journal of Cosmology and Astroparticle Physics, 2021(05), 058.
7. Morrison, L. A., Patel, H. H., & Ulbricht, J. F. (**2021**). *"Asymptotic analysis of the Boltzmann equation for dark matter relic abundance".* Journal of Cosmology and Astroparticle Physics, 2021(07), 024.
8. Ferreira, P. M., Morrison, L. A., & Profumo, S. (**2020**). *"One-loop charge-breaking minima in the two-Higgs DOUBLET MODEL."* Journal of High Energy Physics, 2020(4).
9. Coogan, A., Morrison, L., & Profumo, S. (**2020**). *"Hazma: A Python toolkit for Studying indirect detection of sub-GeV dark matter."* Journal of Cosmology and Astroparticle Physics, 2020(01), 056–056.

PRESENTATIONS

1. "Probing New Physics with MeV Telescopes", thesis defense **2021**.
2. "Large N-ightmare Dark Matter" given at: **Pheno 2020**, **SCIPP Seminar (2020)** and **Extended ICNFP Session (2020)**.
3. "Indirect Detection of MeV Dark Matter", oral qualification exam **2018**.
4. "Hazma: Python toolkit for MeV Dark Matter" **UCSC Graduate Symposium (2018)**.
5. *"Characterization of charge carrier mobility of OVLS grown tetracene single crystals."* given at: **Western Washington University Physics and Astronomy Undergraduate Research Conference (2015)** and **Western Washington University Poster Sessions (2015)**.

REFERENCES

Stefano Profumo, University of California, Santa Cruz (UCSC) profumo@ucsc.edu
Pedro Ferreira, Instituto Superior de Engenharia de Lisboa (ISEL) pmmferreira@fc.ul.pt
Michael Dine, University of California, Santa Cruz (UCSC) mdine@ucsc.edu