J. LUNA ZAGORAC

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Postdoctoral Researcher ⋄ Perimeter Institute ⋄ Waterloo, ON N2L 2Y5

EMPLOYMENT

Perimeter Institute for Theoretical Physics, Waterloo, ON *Sep 2022 - Aug 2025*
Postdoctoral Fellow

Yale University, New Haven, CT *June 2022 - Aug 2022*
Physics Researcher

EDUCATION

Yale University, New Haven, CT *Aug 2016 - May 2022*
Ph.D. in Physics

Colgate University, Hamilton, NY *Aug 2012 - May 2016*
B.A. with Honors in Astronomy/Physics & Anthropology

SKILLS AND QUALIFICATIONS

Programming Languages	Python, C/C++, MATLAB, Chapel, Pascal
Python Packages	Jupyter, MatPlotlib, Numba, NumPy, SciPy, PyFFTW, AstroPy
Software & Tools	LaTeX, Excel, Mathematica, ImageJ
Communication skills	Science & grant writing, outreach, public speaking, data visualization
Certifications	Yale Poorvu Center Certificate for Public Communication, Certificate of College Teaching Preparation
Languages	English & Serbian (native) French & Italian (proficient), Arabic (conversational) Latin & Middle/Late Egyptian (intermediate)

HONORS & AWARDS

Future Investigator in NASA Earth and Space Science and Technology *May 2020*
NASA Grant for $90k funding two years of doctoral work and independent investigations of ULDM.

Leigh Page Award for Excellence in Graduate Student Teaching *Nov 2021*
Award for $500 which recognizes broad and valuable contributions to physics education at Yale, science communication, and work fostering a welcoming learning environment for students.

Loyde and William C. G. Ortel Fellowship in Physics *Nov 2020*
Awarded to an outstanding student pursuing a Ph.D. in Physics.

Franke Science & Humanities Interdisciplinary Research Award *Sep 2019*
Yale Fellowship for $3000 funding two years of interdisciplinary work on Egyptian constellations.

Colgate Physics and Astronomy Department Founders Award *Apr 2016*
Awarded periodically to a senior who has demonstrated four years of outstanding progress and development of their understanding of physics or astronomy.

Sigma Pi Sigma Physics Honors Society *Apr 2016*
Honorary membership to Sigma Pi Sigma Honors Society.

Alumni Memorial Scholar at Colgate University *Aug 2012*
Scholars are selected at the time of admission to Colgate for their dedication and interest in scholarship and have the opportunity to apply for grants totaling up to $5,000 to fund independent research.

PUBLICATIONS

6. Robles, **Zagorac**, and Padmanabhan. "Scalar Field Dark Matter: Impact of Supernovae-driven blowouts in the central densities of dwarf galaxies." *arXiv: 2308.14691, submitted to MNRAS.*

5. Gosenca, Eberhardt, Wang, Eggemeier, Kendall, **Zagorac**, and Easther. "Multifield Ultralight Dark Matter." *Physical Review D 107.8 (2023): 083014*

4. **Zagorac**, Kendall, Padmanabhan, and Easther. "Soliton Formation and the Core-Halo Mass Relation for Synthetic ULDM Halos: An Eigenstate Perspective." *Physical Review D 107.8 (2023): 083513.*

3. **Zagorac**, Sands, Padmanabhan, and Easther. "Schrödinger-Poisson Solitons: Perturbation Theory." *Physical Review D 105.10 (2022): 103506.*

2. Padmanabhan, Ronaghan, **Zagorac**, and Easther. "Simulating Ultralight Dark Matter with Chapel: An Experience Report." (2019). *2020 IEEE International Parallel and Distributed Processing Symposium Workshops (IPDPSW)*

1. **Zagorac**, Easther, and Padmanabhan. "GUT-scale primordial black holes: mergers and gravitational waves." *Journal of Cosmology and Astroparticle Physics 2019.06 (2019): 052.*

PRESENTATIONS

† = Invited Speaker

30. **APS April Meeting** — Apr 2023
Ultralight Dark Matter in the Language of Eigenstates — *Minneapolis, MN*

29. **SciComm Collider** — Apr 2023
A Bestiary of Dark Matter Candidates — *Perimeter Institute*

28. **Testing Gravity 2023** — Jan 2023
UltraLight Dark Matter Dynamics in the Language of Eigenstates — *Simon Fraser University*

28. †**Cosmology Group Meeting** — Oct 2022
A Light in the Dark: UltraLight Dark Matter Phenomenology in Simulations — *Yale*

28. †**The Yale Summer Program in Astrophysics** — Jul 2022
Comparing Cosmologies: the History of the Cosmos from Pyramids to Space Telescopes — *Yale*

27. **240th Meeting of the American Astronomical Society** — Jun 2022
A Light in the Dark: UltraLight Dark Matter Phenomenology in Simulations — *Virtual*

26. **Chapel Implementers and Users Workshop** — Jun 2022
UltraLight Dark Matter in Simulations: A Chapel-Powered Eigenstate Perspective — *Virtual*

25. †**Colgate University Physics & Astronomy Seminar** — Apr 2022
UltraLight Dark Matter Dynamics in the Language of Eigenstates — *Colgate University*

24. †**Stockholm University** — Jan 2022
UltraLight Dark Matter Dynamics in the Language of Eigenstates — *Virtual*

23. †**Perimeter Institute** — Dec 2021
UltraLight Dark Matter Dynamics in the Language of Eigenstates — *Virtual*

22. †**Stony Brook University** — Nov 2021
UltraLight Dark Matter Dynamics in the Language of Eigenstates — *Virtual*

21. †**University College London** — Oct 2021
UltraLight Dark Matter Dynamics in the Language of Eigenstates — *Virtual*

20. †**Carnegie Observatories** — Oct 2021
UltraLight Dark Matter Dynamics in the Language of Eigenstates — *Virtual*

19. †**University of Hawaii Institute of Astronomy** Oct 2021
UltraLight Dark Matter Dynamics in the Language of Eigenstates *Virtual*

18. †**Northwestern University CIERA Science Happy Hour** Oct 2021
UltraLight Dark Matter Dynamics in the Language of Eigenstates *Virtual*

17. †**Newcastle University Cosmology Journal Club** Sep 2021
Schrödinger-Poisson Solitons: Perturbation Theory. *Virtual*

16. **Weak Interaction Discussion Group at Yale** May 2021
Linear Approximations to UltraLight Dark Matter Stationary States *Virtual*

15. **American Research Center in Egypt Annual Meeting** Apr 2021
In Search of Lost Time: An Astronomical View of Ancient Egyptian Star Clocks *Virtual*

14. **Aspen Winter Conference, A Rainbow of Dark Sectors** Mar 2021
UltraLight Dark Matter & Its Eigenstates *Virtual*

13. †**Yale Institute of Sacred Music** Mar 2021
Cosmogonies, Cosmologies, & Time *Virtual*

12. †**Connecticut Digital Humanities** Feb 2021
In Search of Lost Time: An Astronomical View of Ancient Egyptian Star Clocks *Virtual*

11. †**Bay Area Science Festival Science Cafe Mini-Talks in Astronomy** Oct 2020
Cosmic Archaeology, or: How Do We Know the Things We Know? *Virtual*

10. **236th Meeting of the American Astronomical Society** Jun 2020
Parametrizing UltraLight Dark Matter Haloes Through Binary Soliton Core Mergers *Virtual*

9. †**Center for Computational Astrophysics** May 2020
Parametrizing UltraLight Dark Matter Haloes Through Binary Soliton Core Mergers *Virtual*

8. **Weak Interaction Discussion Group at Yale** May 2020
Parametrizing UltraLight Dark Matter Haloes Through Binary Soliton Core Mergers *Virtual*

7. **235th Meeting of the American Astronomical Society** Jan 2020
A Light in the Dark: Ultra Light Dark Matter in Theory and Simulation *Hawaii Convention Center*

6. **Great Lakes Cosmology Workshop** Aug 2019
Pseudo-Spectral Solvers for Fuzzy Dark Matter *Rochester Institute of Technology*

5. **Tri-Institute Summer School on Elementary Particles** Jul 2018
Gravitational Wave Spectrum of Ultralight Primordial Black Holes *Perimeter Institute*

4. **Colgate University Honors Thesis Defense** Apr 2016
Saving Tokyo: Constraining WIMPzilla Production in the Early Universe *Colgate University*

3. **Syracuse University Undergraduate Research Day** Dec 2015
Constraining WIMPzilla Production in the Early Universe *Syracuse University*

2. **Keck Northeastern Astronomy Consortium** Nov 2014
The Optical and Radio Variability of the Blazar 3C 454.3 *Swarthmore College*

1. **Colgate Physics & Astronomy Welcome Seminar** Sep 2014
The Variability of Blazar 3C 454.3 *Colgate University*

TEACHING EXPERIENCE

Certificate of College Teaching Preparation (CCTP) May 2022
Yale Poorvu Center for Teaching and Learning

A record of participation in teaching activities and reflections on those experiences. Earning the CCTP, also meets requirements for the Center for Integration of Research, Teaching and Learning Associate.

Curriculum Development & Lecturing June 2023
TRISEP 2023

Lecture at Tri-Institute Summer School on Elementary Particles (TRISEP) on Axion-Like Particles.

Yale Bootcamp on Physics Fundamentals *Summer 2019 - 2021*

Co-developed a curriculum for 20 hours of Classical Mechanics instruction, met weekly with staff supervisor to polish lectures and example problems. Delivered 10 hours of lecture at the Bootcamp. Developed a Mathematica tutorial for incoming graduate students. Re-vamped the curriculum and moved it online for Summer 2020 and Summer 2021.

Head Teaching Fellow Positions Aug 2017 - May 2018
PHYS170/171 - University Physics for the Life Sciences

Organized other teaching fellows, staffed weekly help sessions and office hours, held review sessions on material before exams, graded weekly homework, proctored and graded exams.

Teaching Fellow Positions

S&DS176 - YData: Humanities Data Mining	*Spring 2022*
PHYS/ASTR600 - Cosmology	*Fall 2020*
PHYS442 - Introduction to Nuclear and Elementary Particle Physics	*Spring 2020*
PHYS410 - Classical Mechanics	*Fall 2019*
ASTR343 - Gravity, Astrophysics, and Cosmology	*Spring 2019*
PHYS165/166 - General Physics Laboratory	*Fall 2016 - Spring 2017*

SCIENCE COMMUNICATION

Public Communication Certificate Oct 2021
Yale Poorvu Center for Teaching and Learning

Certification in public communication through extensive preparation for the 3MT Competition. Areas: Text, Speech, and Visual Design; Feedback and Revision; Peer and Interdisciplinary Collaboration.

Popular Science Presentations

SciComm Collider: *A Bestiary of Dark Matter Candidates*	*Apr 2023*
David Dunlap Observatory Speaker's Night: *What we Can't See in the Universe (and Why it Might Be Fuzzy)*	*Dec 2022*
Bay Area Science Festival "Astro Coffee": *Cosmic Archaeology*	*Oct 2020*
"Ask a Scientist" Webinar: *Dark Matter*	*May 2020*
"Astronomy on Tap": *Cosmic Archaeology*	*Aug 2019*
"3 Minute Thesis" Yale Finalist: *How Small Black Holes Teach Us about the Big Bang*	*Apr 2019*

Writing

Astrobites Media Intern at AAS238	*Jun 2021*
Astrobites Contributing Author (>15 articles and interviews)	*Dec 2019 - Dec 2021*
ComSciCon at AIP Participant	*Sep 2019*

SERVICE & LEADERSHIP

University Positions

Yale Digital Humanities Lab Consultant — *Sep 2020 - May 2022*
McDougal Graduate Student Life Fellow at Yale — *Aug 2018 - May 2019*
Graduate Affiliate, Pauli Murray College at Yale — *Fall 2017 - Spring 2022*

Committee Work

Perimeter Institute Anti-Racism Working Group Member — *Sep 2022 - Present*
Astrobites Diversity, Equity, and Inclusion Committee Member — *Mar 2020 - Dec 2021*
Physics Climate and Diversity Committee Member — *Jan 2018 - May 2020*

Conference & Seminar Organization

Co-organizer: Black in Physics Week at Yale Event Series — 2020
Volunteer: Conference for Undergraduate Women in Physics — 2019-2020
Co-organizer: Equity in the Job Search Symposium — 2018-2019

Outreach Volunteering

Volunteer, Dark Matter Night at Perimeter Institute — *Oct 2022*
Astronomy Ambassador, American Astronomical Society — *Jan 2020 - Present*
Volunteer, Yale Pathways to Science — *Fall 2018 - Spring 2019*
Activity Leader, CT Students Exploring Engineering Day — *Spring 2018*
Activity Leader, Girls Science Investigations — *Sep 2016 - Mar 2020*

MENTORSHIP

Perimeter Institute Postoc-PhD Mentoring

Maxence Corman, Ramiro Cayuso — 2022-2023

Undergraduates Researchers Supervised

Claire Recamier, Yale University: — *Jun 2021 - May 2023*
Stellar Streams in UltraLight Dark Matter Halos

Isabel Sands, now Ph.D. student at Caltech: — *Jan 2020 - Jun 2021*
Constructing a Binary Soliton Merger Library
Linear Approximations to UltraLight Dark Matter Stationary States

Formalized Mentoring Activities

Perimeter Institute Winter School Masters Student Supervision — *Spring 2023*
Title: *Dynamical Heating in Early Fuzzy Galaxies*
Perimeter Institute Postdoc/PhD Mentoring — *Fall 2022*
SU(5) Group Mentor — *Fall 2020*
Científico Latino Graduate Student Mentoring Initiative (GSMI) Mentor — *Fall 2019*
Women in Science at Yale (WISAY) Mentor — *2016-2019*