Rachel Houtz

Curriculum Vitae

Assistant Professor	Office: NPB 2043
Department of Physics	(352) 392-5702
University of Florida	rachel.houtz@ufl.edu
Gainesville, Florida	INSPIRE profile

Academic Experience:

Assistant Professor	University of Florida	2023-present
CERN Theory Fellow	CERN Department of Theoretical Physics	2024
Postdoctoral Research Associate	Institute for Particle Physics Phenomenology (IPPP), Durham University	2020-2023
Postdoctoral Researcher	Instituto de Física Teórica (IFT), Universidad Autónoma de Madrid	2017-2020

Education:

Ph.D. in Physics, University of California, Davis,"Higgs Naturalness and Associated Phenomenology," advisor: Professor John Terning, 2017.

Research Interests:

Theoretical Particle Physics – Beyond the Standard Model Phenomenology:

- Hamiltonian Truncation effective theory
- Dark matter and baryogenesis
- Axion phenomenology
- Gravitational wave phenomenology
- Geometry of effective field theory

Teaching Experience:

University of Florida:

- PHY3221 – Mechanics I (Fall 2023, Spring 2025, Spring 2026)
- PHY2048 – Physics I with Calculus (Spring 2024)

Advanced Schools:

- Lecturer "Dark Matter Models Beyond WIMPS," YETI 2022: Phenomenology in the sky. July 2022.
- Tutor, "Theory of Light Particles and Fields," school on Quantum Sensors for Fundamental Physics, Durham University, September 2021.
- Tutor, Invisible21 School: SM & Higgs (recorded tutorial session), April 2021.

UC Davis:

- Physics 7A – General Physics. Spring 2014, Summer 2016.
- Teaching Assistant. Courses: General Physics (Lead Teaching Assistant), Statistical Mechanics, Quantum Mechanics, Classical Mechanics, Honors Physics, Electricity and Magnetism (graduate level), Quantum Field Theory (graduate level), Econophysics (graduate level). Led discussion/lab for General Physics using new pedagogical methods.

Talks:

2026 Invited Talks:
(planned) Invisibles26 plenary talk, Spain; Princeton Center for Theoretical Science/IAS workshop From Analyticity to Phenomenology; University of Alabama seminar; University of Alabama colloquium.

2025 Invited Talks:
Carnegie Mellon University seminar; University of Minnesota workshop Frontiers Beyond the Standard Model IV; University of Illinois Urbana-Champaign seminar; UC Santa Barbara KITP program What is Particle Theory? (recording).

2024 Invited Talks:
9th Symposium on Prospects in the Physics of Discrete Symmetries, DISCRETE 2024 (plenary), Slovenia; University of Geneva seminar, Switzerland; CERN seminar, Switzerland; ETH Zürich and University of Zürich joint seminar, Switzerland; Mainz Institute for Theoretical Physics (MITP) Effective Theories for Nonperturbative Physics (slides), Germany; Cornell University Laboratory for Elementary Particle Physics (LEPP) seminar; Oklahoma State University seminar.

2023 Invited Talks:
Miami 2023 Physics Conference; SuperCDMS Collaboration Meeting, University of Florida; The 5th New Physics @ Korea Institute (NPKI) Workshop, South Korea; UC Davis seminar; King's College London seminar, UK; Dark Matter beyond the Weak Scale, UK; Institut de Physique Théorique (IPhT, Saclay) seminar, France; DESY seminar Germany; University of Florida (seminar and colloquium); Asia Pacific Center for Theoretical Physics (APCTP) Workshop Dark Matter as a portal to New Physics, South Korea.

2022:
Invited Talks. The 2nd Asian-European-Institutes (AEI) Workshop for BSM (slides), South Korea; Eotvos University seminar, Hungary; The 8th Symposium on Prospects in the Physics of Discrete Symmetries, DISCRETE 2022 (plenary), Germany; CERN FCC BSM Physics Programme Workshop (slides), Switzerland; CERN seminar, Switzerland; Higgs

and Effective Field Theory, HEFT 2022 (plenary), Spain; University of Minnesota, Duluth colloquium; Johannes Gutenberg Universitüt Mainz virtual seminar, Germany.

Talks. Galileo Galilei Institute for Theoretical Physics workshop Phase Transitions in Particle Physics, virtual talk (recording, slides), Italy.

2021:

Invited Talks. UC Santa Cruz seminar; University of Illinois Urbana-Champaign virtual seminar; Brookhaven National Lab virtual seminar; MIT & Havard's Cambridge High Energy Workshop 2021: Axion Physics, virtual talk (slides and recording); UCLA virtual seminar; University of Winnipeg virtual colloquium, Canada; Brown University virtual seminar (recording).

Talks. Durham University internal seminar, UK; Brookhaven Forum 2021, virtual talk (slides); PPC 2021: XIV International Workshop on Interconnections between Particle Physics and Cosmology, virtual talk (slides).

2020 Talks. Durham University internal seminar, UK; Universidad Autónoma de Madrid internal seminar, Spain.

2019:

Invited Talks, Universitat de Barcelona seminar, Spain; UC Irvine seminar; UC Santa Cruz seminar; TRIUMF Seminar, Canada; Fermilab seminar; UC Berkeley Symposium for Mary K Gaillard (slides); Invisibles19 Workshop (plenary), Spain; Universitat Autònoma de Barcelona seminar, Spain; University of Valencia Instituto de Física Corpuscular seminar, Spain; University of Barcelona seminar, Spain.

Talks. Harvard University In-House Luncheon Seminar.

2018:

Invited Talks. Central European Institute of Cosmology and Fundamental Physics (CEICO) seminar, Czech Republic; Invisibles18 Workshop (plenary), Germany; UC Santa Cruz seminar; UC Davis seminar (recording); UC Riverside seminar; UC Berkeley seminar; University of Tokyo Kavli Institute for the Physics and Mathematics of the Universe (IPMU) seminar, Japan.

Talks. University of Zurich, Switzerland; 26th International Conference on Supersymmetry and Unification of Fundamental Interactions (SUSY 2018) (slides), Spain; University of Zurich UZH seminar, Switzerland; Elusives-InvisiblesPlus Virtual Institute Webinar.

2017:

Invited Talks. Central European Institute of Cosmology and Fundamental Physics (CEICO) seminar, Czech Republic; UC Berkeley seminar; Syracuse University seminar; UC Irvine seminar; San Jose State University colloquium.

Talks. Elusives-InvisiblesPlus Virtual Institute Webinar; Universidad Autónoma de Madrid seminar, Spain; Invisibles17 Workshop (slides), Switzerland.

2016:

Invited Talks. Fermilab seminar.

Talks. American Physical Society (APS) 2016 Annual Meeting of the Far West Section; International Conference of High Energy Physics (ICHEP); APS April Meeting; UC Davis LHC Lunch Seminar.

Supervision:

University of Florida postdoctoral researchers:

- Mia West (2024-present)

University of Florida graduate students:

- Cristofer Caballeros (2024-present)
- Ekrem Demiray (2024-2025), transferred to Durham University
- Martha Ulloa (2023-present)

Master's students:

- Co-supervisor of the master's student Benjamin Fox (2022).
- Co-director of the master's thesis for Jorge Luis Dasilva Golán (2018).

Professional Duties:

Grant Reviewer for the U. S. Department of Energy, 2024-current. Grants reviewed: 2.

Grant Reviewer for the ST2 Panel (Fundamental constituants of matter), National Science Centre Poland, 2024-current.

Referee for *Journal for High Energy Physics (JHEP)*, 2023-current.

Referee for *European Physical Journal C: Particles and Fields*, 2022-current.

Professional Community Service:

University of Florida:

Conference Organizer for Effective Field Theories for Nonperturbative Physics, CERN (TH Institute), August, 2025.

Conference Organizer for Evolving Beyond the Standard Model, CERN (TH Institute), July, 2025.

Conference Organizer for Navigating New Horizons: Defining the Next Era of Particle Physics, Munich Institute for Astro-, Particle and BioPhysics (MIAPbP), June, 2025.

Durham University:

Member of the Seminar Organizing Committee at the IPPP, 2022-2023.

Member of the Organizing Committee for the 23rd International Conference From the Planck scale to the Electroweak scale (Planck 2021), June 2021.

Member of Physics Department Developing Talent Award panel, Durham University Research Staff Consultative Committee, 2021.

IPPP and Research Staff Consultative Committee representative on the Physics Department Equity, Diversity, and Inclusion Committee at Durham University, 2020-2023.

IPPP representative on the Physics Department Research Staff Consultative Committee at Durham University, 2020-2023.

Universidad Autónoma de Madrid:

Coordinator of the Junior Organizing Committee for the Baryon and Lepton Number Violation 2019 conference at IFT Madrid, October 2019.

Organizer for the Pheno Coffee journal club, 2017- 2019.

UC Davis:

Member of the University of California, Davis Graduate Curriculum Committee, 2016-2017.

Mentor in Graduate Academic Achievement and Advocacy Program Mentoring Program, 2016.

Volunteer panelist at the Women in Science and Engineering Panel, February 2016.

Founder, Principle Organizer, and volunteer teaching assistant for the H-Bar, 2015-2017. H-Bar is a drop-in tutoring center for undergraduate physics students.

Member of the Women in Science and Engineering mentoring program, 2015-2017.

Member of Diversity and Inclusion in Physics, 2015-2017.

Graduate Student Association Assembly Representative, 2013-2015.

Member of Empowering Women in Physics, 2014-2015.

Graduate Student Position to assist the Research Experience for Undergraduates program, summer session 2013.

Thesis Committees:

- Martha Ulloa (chair), PhD, current
- Christos Litos, PhD, current
- Qiushi Wei, PhD, current
- Castaly Fan, PhD, current
- Matthew Dittrich, PhD, current
- Boran Yesilyurt, PhD, current
- Collin O'Conner, PhD, current
- Eyup Unlu, PhD, 2025

University of Florida Physics Department Committees:

- Broadening Impacts in Physics Committee (2025)
- Preliminary Exam Committee (2024, 2025)
- High Energy Seminar Committee (2024, 2025)
- Undergraduate Student Awards Committee (2023, 2024, 2025)
- Graduate Student Affairs Committee (2023, 2024, 2025)
- Colloquium committee (2023-2024)

Academic Memberships:

Member of the Marie Curie Alumni Association, 2019-present.

Member of the CMS collaboration, 2011-2014.

Grants and Fellowships:

International Conference of High Energy Physics Travel Grant Award, August 2016.

Ryan Couch Memorial Travel Award, 2016.

Division of Particles and Fields Travel Award for the April APS meeting, 2016.

Paul Brady-Charles Soderquist Graduate Fellowship, winter quarter 2016.

University of California, Davis Physics Department Fellowships: summer session 2013, summer session 2014, fall quarter 2014, summer session 2015.

University of California, Davis Travel Award, spring quarter 2015.

Federal Work-Study award for Graduate Student Researchers, fall quarter 2014.

Pittsburgh Particle Physics, Astrophysics, Cosmology Center Travel Award for Phenomenology 2013 Symposium.

University of California, Davis Graduate Program Fellowship, spring quarter 2013.

Honors and Awards:

University of California, Davis Physics Department nomination for the Mathematical and Physical Sciences Dean's Graduate Prize, May 2017.

Ford Foundation Fellowship Program competition Honorable Mention, 2016.

Accepted into Sigma Alpha Lambda Honors Society, University of California, Berkeley chapter, 2007.

Non-Academic Publications:

R. Houtz, "When dark photons are probed by falling atoms." Spanish version: "Átomos en 'caída libre' para rastrear los fotones oscuros." Article published in both the Ciencia section and English Edition of *El País*. elpais.com. April 18, 2018.

Outreach:

Invited panelist, "Faculty Life at R1 Institutions," for the Preparing Future Faculty program at the University of Florida, November 2025.

"Navigating Particle Theory," invited talk for the Navigating Academia Series in the Department of Physics at the University of Florida, March 2025.

Session Chair and volunteer scientist, Teacher's Conference: This is Particle Theory, Kavli Institute for Theoretical Physics (KITP), University of California, Santa Barbara. This event gave high school teachers the opportunity to interact with particle physicists, ask questions, and discuss obstacles and opportunities for their STEM students.

"Hunting for Particles Predicted by Symmetry," invited talk for the Simple Words Seminar in the Department of Mathematics at the University of Florida, March 2024.

Organizer for International Women and Girls in Science Day at the University of Florida Department of Physics. The event included physics demos and a public talk by Dr. Azra Bihorac, February 2024.

"Hunting for Particles Predicted by Symmetry," invited talk for the Association for Women in Mathematics at the University of Florida, November 2023.

"Axions and the Strong CP Problem." This talk was an introduction to my research area for visiting high school students as part of the Nuffield Research Placements program at Durham University, July 2022.

"Introduction to Axions," Outreach talk for students in the Inclusivity Initiative at the Non-perturbative Methods in Quantum Field Theory conference, CERN, May 2022.

"My Career Path," Equity, Diversity, and Inclusion (EDI) Session, Durham University, April 2021.

R. Houtz, S. Witte, "Probing the Microscopic Gravitational Interactions of Dark Matter," Outreach article summarizing a recent contribution to our field as part of the Elusives *Paper of the Month* series. www.elusives.eu, March 2019.

"What's the matter with antimatter?" Outreach video on the IFT YouTube Channel, 14k views. www.youtube.com/IFTMadrid, February 2019.

Participated in a live "Ask Me Anything" session on Reddit sponsored by Elusives, "We're scientists who study neutrinos and dark matter. Ask us anything!" www.reddit.com/r/IamA, September 2018.

J. Gehrlein, R. Houtz, "LHC observes decay of the Higgs boson to b-quarks for the first time." www.elusives.eu, September 2018.

"The Physics of Elementary Particles: Infinities, Symmetries, and Matters of Matter," Outreach talk for high school students at Archbishop Mitty High School, May 2018.

"Little Conformal Symmetry," Outreach talk for engineering professionals. Hamamatsu Photonics, February 2018.

"Left-handed and right-handed particles," Outreach video on the IFT YouTube Channel, 14k views. www.youtube.com/IFTMadrid, February 2018.

"What is the smallest particle?" Outreach video on the IFT YouTube Channel, 33k views. www.youtube.com/IFTMadrid, December 2017.

J. García, R. Houtz, "Imprints of the Dark Sector in Gravitational Waves," Outreach article summarizing a recent contribution to our field as part of the Elusives *Paper of the Month* series. www.elusives.eu, November 2017.

Interviewed for a profile on Women in STEM at the University of California, Davis, "Building Community to Benefit Physics Students."
www.ucdavis.edu, April 2017.

"Theoretical Particle Physics," Research talk aimed for undergraduate students. Physics Graduate School Admission Boot Camp, August 2016.

"Forces and Motion," Volunteer physics demonstration for elementary-school aged children. Hosted through ICHEP, Fermilab, and Chicago Public Library, August 2016.

Volunteer for STEM for Girls Day, 2014.

Publications

Rachel Houtz

Under Review:

R. Houtz, M. Ulloa and M. West "Gravitational Waves from Confining Dark Sectors with Self-Consistent Effective Potentials," arXiv:2511.23467 [hep-ph].

R. Houtz and J. Ingoldby, "Hamiltonian Truncation Framework for Gauge Theories on the Interval," arXiv:2509.17890 [hep-th].

E. Demiray, K. Farnsworth and R. Houtz, "Systematic Improvement of Hamiltonian Truncation Effective Theory," arXiv:2507.15941 [hep-th].

Published:

G. Elor, R. Houtz, S. Ipek and M. Ulloa, "Standard model CP violation is enough," Phys. Rev. D **112**, no.1, L011701 (2025), arXiv:2408.12647 [hep-ph].

R. Alonso, J. C. Criado, R. Houtz and M. West, "Walls, bubbles and doom — the cosmology of HEFT," JHEP **05**, 049 (2024), arXiv:2312.00881 [hep-ph].

V. Enguita-Vileta, B. Gavela, R. Houtz and P. Quilez, "On Discrete Goldstone Bosons," PoS **DISCRETE2022**, 073 (2024), arXiv:2303.13600 [hep-ph].

G. Aarts, J. Aichelin, C. Allton, A. Athenodorou, D. Bachtis, C. Bonanno, N. Brambilla, E. Bratkovskaya, M. Bruno and M. Caselle, *et al.* "Phase Transitions in Particle Physics: Results and Perspectives from Lattice Quantum Chromo-Dynamics," Prog. Part. Nucl. Phys. **133**, 104070 (2023), arXiv:2301.04382 [hep-lat].

V. E. Vileta, B. Gavela, R. Houtz and P. Quilez, "Discrete Goldstone Bosons," Phys. Rev. D **107**, no.3, 035009 (2023), arXiv:2205.09131 [hep-ph].

D. Croon, H. Davoudiasl and R. Houtz, "Leptogenesis enabled by dark matter," Phys. Rev. D **106**, L035006 (2022), arXiv:2204.07584 [hep-ph].

R. Houtz, J. Pagès and S. Trifinopoulos, "Radiative effects in the scalar sector of vector leptoquark models," JHEP **08** (2022), 208, arXiv:2204.06440 [hep-ph].

S. Craven, D. Croon, D. Cutting and R. Houtz, "Machine learning a manifold," Phys. Rev. D **105**, no.9, 9 (2022), arXiv:2112.07673 [hep-ph].

T. Cohen, K. Farnsworth, R. Houtz and M. A. Luty, "Hamiltonian Truncation Effective Theory," SciPost Phys. **13**, 011 (2022), arXiv:2110.08273 [hep-th].

D. Croon, G. Elor, R. Houtz, H. Murayama and G. White, "Light Dark Matter through Resonance Scanning," Phys. Rev. D **105**, no.6, L061303 (2022), arXiv:2012.15284 [hep-ph].

D. Croon, R. Houtz and V. Sanz, "Dynamical Axions and Gravitational Waves," JHEP **07**, 146 (2019), arXiv:1904:10967 [hep-ph].

M. B. Gavela, R. Houtz, P. Quílez, R. Del Rey and O. Sumensari, "Flavor constraints on electroweak ALP couplings," Eur. Phys. J. C **79**, no.5, 369 (2019), arXiv:1901.0231 [hep-ph].

M. K. Gaillard, M. B. Gavela, R. Houtz, P. Quìlez and R. Del Rey, "Color unified dynamical axion," Eur. Phys. J. C **78**, no.11, 972 (2018), arXiv:1805.06465 [hep-ph].

F. Abu-Ajamieh, R. Houtz and R. Zheng, "Phenomenology of bulk scalar singlets in the Randall–Sundrum model," Int. J. Mod. Phys. A **32**, no.18, 1750113 (2017), arXiv:1607.01464 [hep-ph].

R. Houtz, K. Colwell and J. Terning, "Little Conformal Symmetry," JHEP **09**, 149 (2016), arXiv:1603.00030 [hep-ph].

M. Hohensee, S. Y. Lan, R. Houtz, C. Chan, B. Estey, G. Kim, P. C. Kuan and H. Muller, "Sources and technology for an atomic gravitational wave interferometric sensor," Gen. Rel. Grav. **43**, 1905-1930 (2011), arXiv:1001.4821 [gr-qc].

R. Houtz, C. Chan and H. Mueller, "Wideband, Efficient Optical Serrodyne Frequency Shifting with a Phase Modulator and Nonlinear Transmission Line," Optics Express vol 17. 19325 (2009), arXiv:0909.3066 [optics].

199 publications as a member of the CMS Collaboration from 2011-2014.