

Cara Pesciotta

225 Olin Hall, 3400 N. Charles St., Baltimore, MD 21218

cpescio1@jhu.edu ♦ carapesciotta.com

EDUCATION

Johns Hopkins University, Baltimore, MD

Expected 2027

Ph.D. in Earth and Planetary Sciences

♦ Advisor: Sarah M. Hörst, Ph.D.

♦ Relevant Coursework: Physics and Chemistry of Aerosols, Spectroscopic Methods of Organic Structure Determination, Exoplanets and their Atmospheres, Planetary Atmospheres, Surfaces, and Interiors

Northeastern University, Boston, MA

May 2022

B.S. in Physics, Minor in Mathematics

♦ Summa Cum Laude

♦ Relevant Coursework: Advanced Astrophysical Topics, General Relativity & Cosmology, Quantum Mechanics, Thermodynamics, Modern Physics, Electricity & Magnetism, Fourier Series & PDEs, Differential Equations, Linear Algebra, Multivariable Calculus, General Chemistry with Lab

RESEARCH EXPERIENCE

Johns Hopkins University, Baltimore, MD

August 2022 – Present

Graduate Researcher, PHAZER Lab

♦ Generate photochemical haze analogs for my dissertation research as well as collaborations across universities, research institutions, and NASA missions

♦ Investigate haze chemistry in water-rich exoplanet atmospheres by studying water's role in photochemistry, the evolution of hazes in their environment, and linking laboratory measurements to exoplanet observations

Harvard-Smithsonian Center for Astrophysics, Cambridge, MA

July 2021 – October 2024

Undergraduate Researcher, Öberg Astrochemistry Group

♦ Led project to understand entrapment of CO in thick H₂O and CO₂ ices by analyzing infrared and mass spectrometry data during temperature-programmed desorption

♦ Assisted in building novel experimental setup designed to transport icy grain samples, problem-solving complications and making precise alignments

CERN CMS Experiment, Geneva, Switzerland

July – December 2020

Particle Physics Research Co-op, Advisor Louise Skinnari

♦ Upgraded the particle identification algorithm in the CMS L1 Track Trigger to increase efficiency and prepare for the High-Luminosity LHC

♦ Wrote and edited scripts in Python and C++ to conduct performance studies and generate plots for proton and muon collision Monte Carlo simulations

MIT and Harvard University, Cambridge, MA

October 2019 – May 2022

Junior Researcher, Advisor Clara Sousa-Silva

♦ Compiled the most accurate high-temperature spectra of phosphine to use in the detection of life on other planets utilizing wavenumber and quantum number data from over 20 research papers

◆ Worked extensively with MARVEL, a program to calibrate theoretical spectra to yield high-accuracy cross-sections, Excel, and Python to analyze and standardize large data sets

PUBLICATIONS

Pesciotta, C., Hörst, S.M., Radke, M.J., Moran, S.E., Blakley, B.P., He, C., Vuitton, V., Flandinet, L., Dubuc, K. (2026). Hydrolyzed Hazes on Water-rich Exoplanets: Composition and Prebiotic Chemistry. *In preparation*.

Li, H., He, C., Wang, S., Yang, Z., Wang, Y., Luo, X., Moran, S.E., **Pesciotta, C.**, Hörst, S.M., Vuitton, V. (2026). Laboratory-derived haze properties reveal spectral differences and interpretation degeneracies in terrestrial exoplanets. *Nature Astronomy*, submitted.

Austin, E., Yu, X., He, C., **Pesciotta, C.**, Sciamma-O'Brien, E., Sebree, J.A., Montes-Bojorquez, J.R., Husic, A., White, E., Bond, C.R., Hörst, S.M., Salama, F., McGuiggan, P. (2026). A Cross-Laboratory Comparison Study of Titan Haze Analogs: Surface Energy II. *Planetary Science Journal*, submitted.

Matuszewski, F., Vuitton, V., Vacher, L., Flandinet, L., Bonal, L., Boduch, P., Domaracka, A., Rothard, H., Hörst, S.M., **Pesciotta, C.**, He, C. (2026). Oxygen ion irradiation of tholins: Implications for the incorporation of oxygen into aerosols in Titan's atmosphere. *Planetary Science Journal*, submitted.

Huseby, L., Moran, S.E., Kataria, T., Marley, M.S., He, C., **Pesciotta, C.**, Hörst, S.M., Pearson, N., Reddy, V., Lewis, N.K., Vuitton, V. (2026). Ultraviolet Radiation Effects on the Optical Properties of Water-Dominated Exoplanet Hazes. *Astrophysical Journal*, in press.

Pesciotta, C., Hörst, S.M., Radke, M.J., Moran, S.E., He, C., Vuitton, V. (2026). Hydrolyzed Hazes on Water-rich Exoplanets: Optical Constants and Detectability. *Astrophysical Journal*, 1002(2), 13.

Li, H., He, C., Wang, S., Yang, Z., Liu, Y., Wang, Y., Luo, X., Moran, S.E., **Pesciotta, C.**, Hörst, S.M., Moses, J.I., Vuitton, V. (2025). The Impact of Organic Hazes and Graphite on the Observation of CO₂-rich Sub-Neptune Atmospheres. *Astrophysical Journal Letters*, 990(2), 10.

Wang, S., Yang, Z., He, C., Li, H., Liu, Y., Wang, Y., Luo, X., Moran, S.E., **Pesciotta, C.**, Hörst, S.M., Moses, J.I., Vuitton, V., Flandinet, L. (2025). Formation of Organic Hazes in CO₂-rich Sub-Neptune Atmospheres within the Graphite Stability Regime. *Astrophysical Journal*, 990(2), 11.

Huseby, L., Moran, S.E., Pearson, N., Kataria, T., He, C., **Pesciotta, C.**, Hörst, S.M., Haenecour, P., Barman, T., Reddy, V., Lewis, N.K., Vuitton, V. (2025). Effects of Ultraviolet Radiation on Sub-Neptune Exoplanet Hazes through Laboratory Experiments. *Planetary Science Journal*, 6(6), 14.

Pesciotta, C., Simon, A., Rajappan, M., Öberg, K.I. (2024). Entrapment in CO₂ and H₂O Ices: Impact of Ice Matrix Thickness. *Astrophysical Journal*, 973(2), 166.

Pearce, B.K.D., Hörst, S.M., Cline, C.J., Cintala, M.J., He, C., Sebree, J.A., MacKenzie, S.M., Daly, R.T., Pontefract, A.J., **Pesciotta, C.** (2024). Towards Prebiotic Chemistry on Titan: Impact experiments on organic haze particles. *Planetary Science Journal*, 5(3), 68.

SELECTED CONFERENCE PRESENTATIONS

STSci/JHU Exojamboree, Space Telescope Science Institute, Baltimore, MD November 2025
From Lab to Telescope: Bridging Experiments with Astronomical Observations, Contributed Talk

Exoclimates VII, Université de Montréal, Montreal, QC, CA July 2025
Hazes & Habitability: The Interaction Between Atmospheric Haze & Liquid Water, Contributed Talk
Selected to participate in Exoslam Summer School

AbGradCon 2024, Cornell University, Ithaca, NY June 2024
Hazes & Habitability: The Interaction Between Atmospheric Haze & Liquid Water, Contributed Talk
Selected to participate in Proposal Writing Retreat, coauthor on winning proposal in mock NASA panel

TEACHING EXPERIENCE

Planetary Atmospheres, AS.270.423, Johns Hopkins University Spring 2026
Guest Lecturer, Exoplanet Atmospheres

Planetary Seminar, AS.270.662, Johns Hopkins University Fall 2023
Teaching Assistant

GRANTS AND AWARDS

NASA FINESST, Astrophysics Division 2025 – 2028
Future Investigator
Awarded \$150k for proposal titled “Prebiotic Chemistry in Exoplanet Atmospheres: Composition and Detection of Hydrolyzed Hazes”

Journal Club Presentation Award, Johns Hopkins University May 2026
Awarded \$2k for the best research talk of the year among graduate students in the Earth & Planetary Sciences department

ACADEMIC SERVICE AND LEADERSHIP

NASA Solar System Science Panel, virtual April 2026
Executive Secretary

JHU EPS Graduate Organizing Committee, Baltimore, MD October 2025 – Present
Member and co-founder

AbGradCon 2025, University of Colorado Boulder, Boulder, CO July 2024 – June 2025
Co-organizer

◆ Contributed to a successful NASA TWSC proposal, planned venue and funding logistics, and designed & evaluated applications

◆ Led an Astrobiology on Tap Trivia for conference attendees and the general public

NASA Dragonfly Mission, APL, Laurel, MD & NASA Goddard, Greenbelt, MD Nov. 2023 – Present
Collaborator

◆ Attend annual team meetings as a guest observer

◆ Assisted with DraGMet sensor testing and generated analog materials for DraMS/DragonCam testing

JHU EPS Outreach Committee, Baltimore, MD August 2022 – September 2026
Member

JHU EPS Social Events Committee, Baltimore, MD August 2022 – Present
Member and chair

OUTREACH AND VOLUNTEER WORK

NUSci Magazine, Boston, MA July 2019 – May 2022
Writer & Editor (nuscimagazine.com/author/cara-pesciotta)

PROFESSIONAL AFFILIATIONS

American Geophysical Union
Division for Planetary Sciences of the American Astronomical Society

TECHNICAL SKILLS

- ◆ **Computer Programming:** Familiar with Python, IDL, Fortran, C++, Java, MATLAB, Mathematica, LaTeX, ROOT, Linux, MARVEL, Microsoft Excel
- ◆ **Laboratory Skills:** IR spectrometry, quadrupole mass spectrometry, high-resolution mass spectrometry, high vacuum systems