

Paul William Hess

“Paul”



Graduate Institution: Harvard University

Location: Cambridge, MA

Graduate Discipline: Atomic, Molecular, and Optical Physics

Hometown: Simsbury, CT

Research Interests:

My current interests lie in using atomic and molecular systems to explore the fundamental symmetries in nature. Currently, I am searching for the signals of a permanent electron electric dipole moment (eEDM) in the molecule thorium oxide (ThO). eEDM measurements provide stringent constraints on new theories of particle physics and can help answer profound questions, including the origin of the universe's matter/anti-matter asymmetry. Our method, which uses molecules rather than atoms to observe the eEDM, provides new possibilities for error cancellation that should yield a new limit in eEDM sensitivity.

I am also interested in using the expertise gained on this project to explore more applied research involving cold polar molecules. One potential application is in precisely controlling molecular collision rates, thus allowing optimization of chemical reactions on a molecule-by-molecule level. In addition, polar molecules, with their deep trapping potential and large interacting dipoles, hold promise as qubits in a quantum computer. The elegance, power, and utility of many quantum algorithms excite me about contributing to this growing field.

About me:

As an undergraduate at Williams College, I received a B.A. in Astrophysics and received highest honors on a precision measurement thesis with Professor Tiku Majumder in the physics department. At Harvard, I am currently working with Professor Gerald Gabrielse on the Advanced Cold Molecule EDM (ACME) experiment, a collaboration between the Professors Gabrielse and John Doyle at Harvard, and Professor David DeMille at Yale. I attend meetings of the Harvard Energy Journal Club (HEJC), where we discuss energy technology and its environmental impact, and I have led several sessions on transportation technology. I am excited about combining what I learn in my research and the HEJC in a future career. While not in lab, I play ultimate Frisbee with various leagues in the Boston area and tend my small, but still easily overgrown, garden.



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