CSU PHYSICS COLLOQUIUM

"Precision Spectroscopy of Simple Atoms"

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Colorado State University

Monday, Sept. 16th at 4:00pm

120 Engineering (Hammond Auditorium)

Abstract

Hydrogen is the most abundant element in the universe, and the most important element for the development of modern physics – an attribute that can be traced back to its simplicity as an effective two-body system. Currently, precision hydrogen spectroscopy remains an exciting field which determines the Rydberg constant, stringently tests QED, and measures the RMS charge radius of the proton and deuteron. In addition, the techniques used to study hydrogen can often be transferred to other simple (i.e. two-body) atomic systems such as muonium or anti-hydrogen, which provide important tests for Beyond-Standard-Model physics. Unfortunately, precision spectroscopy of simple atoms, while compelling, is also notoriously difficult due to the short-wavelength and high-power lasers required.

In this talk, I will present our novel laser infrastructure developed at CSU, which allows for high precision spectroscopy of hydrogen and other simple atoms. In addition, I will discuss our measurement of the hydrogen 2S-8D transition (a crucial transition for the proton radius puzzle), and our ongoing efforts to laser cool/slow hydrogen. Finally, I will present several future directions of our lab aimed at precision tests of fundamental physics.

Biography

Dylan Yost's research is in the fields of precision spectroscopy, frequency combs, and short wavelength lasers. He received his PhD from the University of Colorado in 2011 under the guidance of Jun Ye. Following graduation, he was awarded a Humboldt Fellowship to study at the Max Planck Institute for Quantum Optics in the group of Ted Hänsch. He has been an assistant professor of physics at Colorado State University since 2015.