CSU PHYSICS COLLOQUIUM

"Laser Slowing and Precision Spectroscopy of Atomic Hydrogen"

Dylan Yost

Colorado State University

Monday January 24th at 4:00pm

120 Engineering (Hammond Auditorium)

Abstract

Because of atomic hydrogen's simplicity, its energy levels can be precisely described by theory. This has made spectroscopy of hydrogen a favorite testbed for bound-stated quantum electrodynamics (QED). In addition, assuming the QED calculations are correct, one can use such measurements to determine the Rydberg constant and the proton-charge radius. A discrepancy of these constants determined through different transitions can indicate new physics. Unfortunately, spectroscopy of hydrogen is often limited by the temperature of the atomic sample, and laser cooling is very challenging since the wavelength of the radiation required is well into the vacuum ultraviolet (121.57 nm). In this talk, I will present new results where we load a metastable hydrogen beam into a moving optical lattice, which we then decelerate to control the motion of the atoms. This technique offers a robust means to slow atomic hydrogen with visible lasers, which could provide a platform for increased precision. In addition, I will discuss a new measurement of the hydrogen 2S1/2-8D5/2 two-photon transition performed in our group, which produces additional tension within the global dataset of precision hydrogen spectroscopy.

Biography

Dylan Yost is an associate professor in the Physics Department at Colorado State University. His 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 and was a Humboldt Fellow at the Max Planck Institute for Quantum Optics from 2012-2014. He has been at Colorado State University since 2015.