CSU AMO PHYSICS SEMINAR

"Atomic Clocks and Laser-cooling Cadmium with UVA Triplet Excitations"

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121 Engineering (Interaction Space)

Thursday, May 4th at 11:00 AM

Abstract

Cadmium has attractive properties for optical lattice clocks, ultracold atomic gases, and searches for Dark Matter and beyond-Standard-Model physics via isotope shift measurements. In addition to some of our broader work on atomic clocks, including microwave fountain clocks that keep International Atomic Time, I will describe our recent work to laser-cool cadmium. Cadmium is a alkaline-earth like atom with two valence electrons, with a broad UVB singlet resonance line at 229 nm and a narrow 67 kHz wide UVA intercombination line at 326 nm. Without using 229 nm light, we trap ~10^7 atoms using only the intercombination line and UVA excitations to higher triplet states with sum-frequency generated laser light. Cadmium's 8 stable isotopes, 6 spin 0 bosonic isotopes, in addition to 2 spin ½ fermionic isotopes, along with its moderate nuclear mass, make its isotope shifts attractive for tests of fundamental physics. I will also discuss our recent measurements of isotope shifts of three cadmium transitions.

Biography

Kurt Gibble is in the Department of Physics at Penn State. He obtained a BS in Engineering Physics at Lehigh University in 1986 and a Ph.D. in Physics from JILA at the University of Colorado in 1990. Following a post-doc at Stanford University with Steven Chu, he was an Assistant and Associate Professor of Physics at Yale University before joining Penn State in 2001. He researches a broad range of topics related to ultracold atomic scattering and optical and microwave atomic clocks. He was a recipient of the European Frequency and Time Award and a National Science Foundation National Young Investigator award. He is a Fellow of the AAAS, the APS (DAMOP), and the IEEE (UFFC-S).