



**College of Natural Sciences  
& Mathematics**

UNIVERSITY OF DENVER

## **Physics & Astronomy Colloquium**

**April 15, 4:00pm, Olin 105**



### **James K. Thompson**

JILA and Dept. of Physics,  
University of Colorado, Boulder

#### **Quantum Simulation and Sensing with Photon-Mediated Interactions**

Photons bouncing back and forth many times between highly reflecting mirrors provides a novel way mediate interactions between laser-cooled atoms held between the mirrors. Such cavity-mediated interactions provide a unique set of tools for both quantum sensing and simulation. In this talk, I will discuss our efforts to sculpt these interactions in order to expand the palette of cavity-mediated interactions that can be realized. We have now harnessed these interactions to realize entanglement-enhanced sensitivity in two leading quantum sensing platforms, matterwave interferometers and optical clocks, with future applications in new-physics searches as well as for practical timing and navigation technologies. As time permits, I will also discuss quantum simulations of dynamical phases of BCS superconductors resulting from the competition of disorder and interactions following a quench.

