Abstract Submitted
for the DAMOP17 Meeting of
The American Physical Society

Theoretical Investigations in Support of a Cold-Atom Based UHV Pressure Sensor CONSTANTINOS MAKRIDES, EITE TIESINGA, University of Maryland Department of Physics, Joint Quantum Institute, and National Institute of Standards and Technology, Gaithersburg, MD — Recent efforts are underway in the development of a prototype cold-atom vacuum sensor, which make use of cold atoms to measure pressures in the Ultra-High Vacuum (UHV) and Extreme-High Vacuum (XHV) regimes where modern sensors cannot function or produce accurate measurements. These cold-atom devices would correlate loss of atoms in a cold atomic gas to the pressure of the room-temperature environment in which it is placed. Essential in making this connection is having the best understanding of the various collision processes that can lead to losses from both the background gasses, typically the H_2 molecule, as well as the collisions among the cold atoms. Here, we present our investigations into these collisional processes using Lithium atoms as the cold constituent. For a complete description, we determine collisional phase shifts and elastic cross sections for collision energies that spans several times room temperature. We compare various semiclassical approximations with full quantum simulations where possible.

Constantinos Makrides
University of Maryland and NIST

Date submitted: 07 Feb 2017 Electronic form version 1.4