

DAMOP15-2015-001014

Abstract for an Invited Paper
for the DAMOP15 Meeting of
the American Physical Society

Fundamental Constants and Tests with Simple Atoms

JOSEPH TAN, NIST - Natl Inst of Stds & Tech

Precise measurements with simple atoms provide stringent tests of physical laws, improving the accuracy of fundamental constants—a set of which will be selected to fully define the proposed New International System of Units. This talk focuses on the atomic constants (namely, the Rydberg constant, the fine-structure constant, and the proton charge radius), discussing the impact of the proton radius obtained from the Lamb-shift measurements in muonic hydrogen [A. Antognini, *et al.*, *Science* **339**, 417 (2013)]. Significant discrepancies persist despite years of careful examination: the slightly smaller proton radius obtained from muonic hydrogen requires the Rydberg constant and the fine-structure constant to have values that disagree significantly with the CODATA recommendations. After giving a general overview, I will discuss our effort to produce one-electron ions in Rydberg states, to enable a different test of theory and measurement of the Rydberg constant.