Abstract Submitted
for the DAMOP12 Meeting of
The American Physical Society

Precision Atomic Masses of Calcium, Strontium and Ytterbium[1]

EDMUND MYERS, RAMAN RANA, Florida State University, MARTIN HOECKER, MPI-K, Heidelberg — Currently the second most precise value for the fine structure constant is derived from "photon-recoil" measurements of h/M(Rb) combined with the Rydberg constant, atomic transition frequencies, and the atomic masses of the electron and rubidium. An improved photon-recoil value for alpha will enable the combination of theory and experiment for the g-factor of the electron, which produces the most precise value for alpha, to provide an improved test of QED. Besides the alkalis, isotopes of the alkaline-earths and ytterbium can make promising candidates for precise photon-recoil measurements of h/M(atom). In addition, the mass of 40Ca is required for obtaining the g-factor of hydrogen-like calcium from measurements of electron spin-flip and cyclotron frequencies of Ca19+, which would provide a test of bound-state QED theory. For these and other applications, we have now measured cyclotron frequency ratios of pairs of ions in a cryogenic Penning trap that should yield the atomic masses of 40Ca, 86,87,88Sr, and 170,171,172,173,174,176Yb to a precision of ∼0.2 ppb.

[1]Work supported in part by NSF PHY-0968889.

Edmund Myers
Florida State University

Date submitted: 31 Jan 2012 Electronic form version 1.4