

Abstract Submitted
for the DAMOP11 Meeting of
The American Physical Society

Magic-zero wavelengths of alkali-metal atoms and their applications BINDIYA ARORA, IISER Mohali, India, M. S. SAFRONOVA, University of Delaware, CHARLES W. CLARK, JQI, NIST and the University of Maryland — We identified wavelengths λ_0 where the ground state frequency-dependent polarizabilities in alkali-metal atoms are zero. The calculations were carried out using high-precision relativistic all-order method where all single, double, and partial triple excitations of the Dirac-Fock wave functions are included to all orders of perturbation theory. Several magic-zero wavelengths are determined for alkali-metal atoms from Li to Cs, and their uncertainties are estimated. Applications of these magic-zero wavelengths to sympathetic cooling in two-species mixtures of group-II and other more complicated atoms with alkali are discussed. Special cases where these wavelengths coincide with strong resonance transitions in group-II atoms, Yb, Dy, Ho, and Er are identified. Measurements of the magic-zero wavelength points for benchmark tests of theory and experiment are proposed.

Marianna Safronova
University of Delaware

Date submitted: 04 Feb 2011

Electronic form version 1.4