Abstract Submitted
for the DAMOP10 Meeting of
The American Physical Society

Blackbody radiation shift in ^{87}Rb frequency standard MARIANNA SAFRONOVA, University of Delaware, U.I. SAFRONOVA, University of Nevada, Reno — The operation of atomic clocks is generally carried out at room temperature, whereas the definition of the second refers to the clock transition in an atom at absolute zero. This implies that the clock transition frequency should be corrected in practice for the effect of finite temperature of which the leading contributor is the blackbody radiation (BBR) shift. Experimental measurements of the BBR shifts are difficult. In this work, we have calculated the blackbody radiation shift of the ground-state hyperfine microwave transition in ^{87}Rb using the relativistic all-order method and evaluated the accuracy of our final value. Particular care is taken to accurately account for the contributions from highly-excited states. Various Rb atomic properties, including E1, E2, and E3 ground state polarizabilities, np and nd E1 polarizabilities, and hyperfine constants are also calculated. The results are compared with experiment and other theory where available.

Marianna Safronova
University of Delaware

Date submitted: 25 Jan 2010 Electronic form version 1.4