Abstract Submitted
for the DAMOP12 Meeting of
The American Physical Society

Hyperfine frequency shift and Zeeman relaxation in alkali vapor cells with anti-relaxation alkene coating[1] ERIC CORSINI, University of California, Berkeley, MIKHAIL BALABAS, S. I. Vavilov State Optical Institute, St. Petersburg, Russia, TODOR KARAULANOV, University of California, Berkeley, DMITRY BUDKER, University of California, Berkeley and Nuc. Sc. Div. @ LBNL
— A recently identified alkene based anti-relaxation coating exhibit Zeeman relaxation times in excess of 60 s in alkali vapor cells (two orders of magnitude longer than in paraffin coated cells). The long relaxation times, motivate revisiting the long-standing question of what is the mechanism underlying wall-collision induced relaxation and renew interest in applications of alkali vapor cells to secondary frequency standards. We measure the Zeeman relaxation time, and the width and frequency shift of the clock resonance, in ^{85}Rb and ^{87}Rb vapor cells with alkene anti-relaxation coating. We compare the results with those in paraffin coated cells. We find that the frequency shift is slightly larger than for paraffin coated cells. However we observe that the Zeeman relaxation rate appears to be a linear function of the hyperfine frequency shift, whereas a linear dependence was not observed in paraffin coated cells. To shed light on this result we propose a model describing different Zeeman relaxation mechanisms of alkene and alkane cell-wall coatings.

[1]Funding: NSF + U.S. Dept. of Energy (LBNL Nuc. Sc. Div.)

Eric Corsini
UC Berkeley

Date submitted: 22 Feb 2012 Electronic form version 1.4