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Application of Electric Fields to Alkali Vapor Cells with Alkene-based Antirelaxation Coatings[1] BRANDON GRUIDL, LI WANG, CHENG-KAI CHEN, MARYNA LONGNICKEL, DEREK JACKSON KIMBALL, California State University - East Bay — Recently, a new alkene-based antirelaxation coating has been discovered [Balabas et al., Phys. Rev. Lett. 105, 070801 (2010)] which enables spin-polarized alkali atoms to bounce off vapor cell walls more than a million times before the spin polarization relaxes, yielding electron spin relaxation times on the order of a minute. This new technology may open the possibility of conducting a search for the parity- and time-reversal violating permanent electric dipole moment (EDM) of the electron using a cesium vapor contained in an alkene-coated cell. Previous antirelaxation coatings have demonstrated dramatic vapor density variations upon application and reversal of the large electric fields required for an EDM experiment [Jackson Kimball et al., Phys. Rev. A 79, 032901 (2009)]. We have found that in the new alkene-coated cells these electric-field-induced vapor density variations can be mitigated for particular choices of cell and alkali metal reservoir temperatures. Future work will involve demonstrating the long spin-relaxation times during application and reversal of electric fields and direct measurement of the electric field using the Stark shift of excited states in Cs.

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