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Application of electric fields to alkene-coated cesium vapor cells¹ BRANDON LANGDON, LI WANG, CHENG-KAI CHEN, LAURA LANGDON, DEREK KIMBALL, Cal State Univ 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 remarkable new technology may open the possibility of conducting a new 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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