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Noble Gas Polarimetry Using Rb EPR Frequency Shifts[1] Z.L. MA, K. JEONG, E. HOUGHTBY, T. PASKVAN, M.E. LIMES, B. SAAM, University of Utah — EPR frequency shifts of optically polarized alkali-metal atoms can be exploited for polarimetry of noble-gas nuclei polarized by spin-exchange optical pumping. Our group recently measured the enhancement factor $\kappa_0 = 493$ for Rb-^{129}Xe [1], which characterizes the electron wave-function overlap during collisions and is crucial to the calibration of the frequency-shift for ^{129}Xe polarimetry. This type of polarimetry is useful in several applications involving optically polarized ^{129}Xe; our particular motivation is an *in situ* measurement of absolute ^{129}Xe polarization within the optical pumping cell of a flow-through ^{129}Xe polarizer [2]. This application has some particular challenges, and we have initially observed some unexpected shifts in the ^{87}Rb EPR frequency measurement on board the polarizer. In effort to disentangle these apparent systematic effects, we have constructed a separate experiment to characterize Rb EPR shifts for both ^{3}He and ^{129}Xe in sealed cells. We present results and analysis of these experiments and discuss implications for using this method in flow-through polarizers.

[1] Z. L. Ma, et al., Phys. Rev. Lett., 106, 193005 (2011).
[2] I. Ruset et. al., Phys. Rev. Lett., 96. 053002 (2006).

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