

Abstract Submitted  
for the DAMOP15 Meeting of  
The American Physical Society

**Progress on a  $^3\text{He}$ - $^{129}\text{Xe}$  co-magnetometer** MARK LIMES, DONG SHENG, MICHAEL ROMALIS, Princeton University — We report our recent progress on a  $^3\text{He}$ - $^{129}\text{Xe}$  co-magnetometer using Rb read-out. Previous iterations employed a Ramsey scheme with Rb used for initial spin polarization and for detection of only the initial and final phases of the two noble gas species that precess “in-the-dark.” Our current scheme attempts a continuous detection of the noble gas nuclei, which we’ve shown to increase shot-to-shot SNR over the pulsed scheme. Our technique mitigates the large difference of Fermi-contact shifts on the precession frequencies of the noble gases due to polarized Rb by making the average Rb polarization zero with respect to the noble gases. This averaging is accomplished by applying Rb  $\pi$  pulses and simultaneously pumping with  $\sigma_+/\sigma_-$  light with a fast repetition rate. The  $^3\text{He}$ - $^{129}\text{Xe}$  co-magnetometer has many potential applications for precision measurements, including nuclear spin gyroscopes and searches for spin-gravity coupling.

Mark Limes  
Princeton University

Date submitted: 29 Jan 2015

Electronic form version 1.4