

Abstract Submitted
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^3He - ^{129}Xe co-magnetometer shifts from ^{87}Rb decoupling sequences¹ MARK LIMES, MICHAEL ROMALIS, Princeton University — We are developing a ^3He - ^{129}Xe co-magnetometer for use as an NMR gyro and to search for spin-gravity interactions. Our ^3He - ^{129}Xe co-magnetometer has achieved a long-term bias drift of 7.7 nHz at 7 h. For detection of ^3He - ^{129}Xe precession, we use a ^{87}Rb magnetometer with fast magnetic field π pulses and σ_+/σ_- optical pumping, which results in suppression of spin-exchange relaxation. We use a Ramsey scheme that allows the noble gases to precess freely 'in-the-dark'. During this free precession we apply additional decoupling pulses to eliminate Rb-Xe back-polarization along all three axes. The presence of the decoupling magnetic fields causes additional frequency shifts which we can eliminate by rotating the decoupling fields. We are presently studying the absolute accuracy of the co-magnetometer by detecting Earth's rotation. We will describe the procedure to characterize remaining frequency shifts and our progress on mitigating them.

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