

Abstract Submitted  
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**Suppressing Rubidium back-polarization in nuclear spin co-magnetometer by radiation trapping assisted depolarization pumping.** KAIFENG ZHAO, ATTAALLAH ALMASI, MARK LIMES, MICHAEL ROMALIS, Princeton Univ — Back polarization of Rb by noble gases causes a systematic error for determining the ratio of precession frequencies in noble gas  $^3\text{He}$ - $^{129}\text{Xe}$  comagnetometer that is being developed in our group [1]. We investigate a new active depolarization scheme for Rb atoms using a linearly polarized laser tuned to the Rb D2 transition. The depolarization process is assisted by radiation trapping of D2 light in optically-thick Rb vapor in the absence of N2 quenching gas, which is typically used in most optical pumping experiments. Instead we use hybrid optical pumping with optically-thin K vapor to create a large Rb polarization when needed. We show preliminary results demonstrating active control of Rb polarization over a large dynamic range. [1] M. E. Limes, D. Sheng, and M. V. Romalis, Phys. Rev. Lett. 120, 033401, 2018

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