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**$^{87}$Rb-$^{21}$Ne Co-magnetometer with Pulsed Optical Pumping** JINGYAO WANG, JUNYI LEE, HUDSON LOUGHLIN , MORGAN HEDGES, MICHAEL ROMALIS, Princeton University — We are developing a pulsed $^{87}$Rb-$^{21}$Ne Co-magnetometer in order to reduce high 1/f noise that limits performance of previous generations of continuously pumped (CW) alkali-metal-noble-gas co-magnetometers, while retaining their key benefits, namely suppressed sensitivity to magnetic fields, and unsuppressed sensitivity to non-magnetic spin couplings. In this arrangement, we polarize $^{87}$Rb with $\sigma_+$ laser pulses and probe spin dynamics with off-resonant linearly polarized light in the dark time following each pumping pulse. Parameters of interest are extracted by fitting each dark time signal to a functional form characterized by an exponentially damped sinusoid and an exponential decay. Compared to the CW arrangement, where couplings of interest and systematic effects all contribute to one DC signal, the pulsed co-magnetometer's non-DC signal allows separation of various systematic effects from real signal, thus eliminating sources of 1/f noise. The pulsed co-magnetometer has also demonstrated additional advantages including dual-axis sensitivity, and capability for suppressing response to pump beam deflections, which is a major contribution to 1/f noise in the CW case.

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