

Abstract Submitted  
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**Optical Magnetometry using Multipass Cells with overlapping beams**<sup>1</sup> NATHANIEL DAVID MCDONOUGH, VITO GIOVANNI LUCIVERO, NEZIH DURAL, MICHAEL ROMALIS, Princeton Univ — In recent years, multipass cells with cylindrical mirrors have proven to be a successful way of making highly sensitive atomic magnetometers. In such cells a small laser beam makes 40 to 100 passes within the cell without significant overlap with itself. Here we describe a new multi-pass geometry which uses spherical mirrors to reflect the probe beam multiple times over the same cell region. Such geometry reduces the effects of atomic diffusion while preserving the advantages of multi-pass cells over standing-wave cavities, namely a deterministic number of passes and absence of interference. We have fabricated several cells with this geometry and obtained good agreement between the measured and calculated levels of quantum spin noise. We will report on our effort to characterize the diffusion spin-correlation function in these cells and operation of the cell as a magnetometer.

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