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Entanglement Enhanced Matterwave Interferometry[1] MATTHEW N. CHOW, Sandia National Labs, University of New Mexico, BETHANY J. LITTLE, L. PAUL PARAZZOLI, Sandia National Labs, JONATHAN E. BAINBRIDGE, Sandia National Labs, University of New Mexico, BRANDON P. RUZIC, CONSTANTIN BRIF, Sandia National Labs, GRANT BIEDERMANN, University of Oklahoma, Sandia National Labs — Matterwave interferometers have become leading platforms for inertial and gravitational sensing. As these devices compete for ever greater precision, understanding and improving the limits of their sensitivity becomes paramount. We propose exploiting advances in Rydberg-mediated entanglement of neutral atoms to construct a near Heisenberg-scaling interferometer. We report on the experimental progress in extending the capability of our apparatus, which has previously demonstrated two atom entanglement, and discuss the impact of various error sources on the sensitivity of our interferometer.

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