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Advances in Spin Squeezing BAOCHEN WU, KEVIN C. COX, GRAHAM P. GREVE, JAMES K. THOMPSON, JILA, NIST and University of Colorado, Boulder — Joint or collective measurements of many atoms are becoming a promising avenue for creating large amounts of quantum entanglement useful for precision measurement. We review recent results from experiments with large ensembles of laser-cooled Rb atoms where we directly observe up to 59(8) times (17.7(6) dB) improvement in quantum phase variance relative to the standard quantum limit (known as spin squeezing), deterministically steer to an entangled spin state via real-time feedback, and explore prospects for realizing entanglement in free space by means of homogeneous coupling.

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