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Conditional Spin Squeezing Through Cavity-Aided Measurements KEVIN COX, JOSHUA WEINER, MATTHEW NORCIA, ZILONG CHEN, JUSTIN BOHNET, JAMES THOMPSON, JILA, University of Colorado at Boulder — Spin squeezed states of large atomic ensembles exploit inter-particle entanglement to suppress fundamental quantum noise, with applications for precision measurements and tests of fundamental physics. We produce spin squeezed states by performing entanglement-generating measurements of 10^5 ^{87}Rb atoms confined in an optical lattice, collectively probing the ensemble through an optical cavity. Previous demonstrations of conditional spin squeezing have been limited by decoherence due to Raman scattering. Here, we report recent results towards creating squeezed states with greatly reduced decoherence by utilizing the maximal m_F ground states and probing on a closed optical transition.

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