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Toward Unitary Spin Squeezing for Atomic Clocks BORIS BRAVERMAN, Massachusetts Institute of Technology, AKIO KAWASAKI, Stanford University, EDWIN PEDROZO, Massachusetts Institute of Technology, CHI SHU, Harvard University, SIMONE COLOMBO, ZEYANG LI, VLADAN VULETIC, Massachusetts Institute of Technology — Improving the precision of sensors using entanglement is a major goal in quantum metrology. Techniques for producing spin squeezing in atomic systems are often non-unitary, generating more anti-squeezing than the minimum prescribed by the uncertainty principle. We find that non-unitary squeezing significantly impedes the potential improvements from squeezing in atomic clocks and other quantum sensors. I will present the method and realization of near-unitary spin squeezing with ^{171}Yb atoms by off-resonant probing in a high-finesse optical resonator. This technique will allow for the creation of quantum states with metrologically useful entanglement on the clock transition of ^{171}Yb.

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