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Spin squeezing in the XXZ model with power-law interactions
CHUNLEI QU, Stevens Institute of Technology, MICHAEL A. PERLIN, ANA M. REY, JILA, University of Colorado at Boulder — Spin squeezed states are known to be a useful resource for quantum metrology. Although there have been many proposals on how to generate spin squeezing, most of the dynamical generations involve collective Ising interactions via the so-called one axis twisting (OAT) model. In this talk, we will present our recent results on spin squeezing generation in the XXZ model with power-law interactions. Despite the inhomogeneous character of the spin couplings, we find this system can exhibit a level of spin-squeezing similar to that generated by the OAT model. We will report on our systematic investigation of this model and explain the mechanism responsible for the large spin squeezing generation. Our results are useful for state-of-the-art ultracold polar molecular experiments where pinned molecules in an optical lattice can interact with each other by long-range dipolar interactions and for trapped ion crystals featuring long-range interactions mediated by the phonon modes of the crystal.

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