

Abstract Submitted
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Collisional narrowing in a one-dimensional gas of spinor Bose atoms VLADIMIR YUROVSKY, Tel Aviv Univ., NIR DAVIDSON, Weizmann Inst. of Science — Interatomic interactions can lead to the Dicke narrowing [1] and prolong the coherence time in a dense cold-atom 3D gas as observed [2] for the spin-relaxation of Bose atoms with two internal (spin) states. Here this effect is analyzed in the 1D geometry. Many-body eigenstates of this system have a defined total spin S and the eigenenergies become separated due to the two-body interactions. The energy gap is proportional to S and to the interaction strength [3]. As we show here, when the interactions is strong enough, S is conserved and the spin-dynamics become insensitive to the difference of the trap potentials for the two internal states. In this case, the decoherence is caused by the spin-dependence of the interactions. This dependence can be minimized using a Feshbach resonance. The coherence time can exceed several seconds at microkelvin temperatures. A similar effect of self-rephasing, observed in 3D geometry [4], requires nanokelvin temperatures. [1] R. H. Dicke, Phys. Rev. **89**, 472 (1953). [2] Y. Sagi, I. Almog, and N. Davidson, Phys. Rev. Lett. **105**, 093001 (2010). [3] V. A. Yurovsky, Phys. Rev. A **91**, 053601 (2015). [4] C. Deutsch *et al.*, Phys. Rev. Lett. **105**, 020401 (2010).

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