

Abstract Submitted
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Clock Spectroscopy of Interacting Fermions in a Harmonic Trap¹

ANDREW KOLLER, JILA and University of Colorado, Boulder, ANA MARIA REY, JILA, NIST, and University of Colorado, Boulder — We investigate the dynamics during Ramsey interrogation of interacting fermions in a harmonic trap. We consider the effect of both s-wave and p-wave collisions during the dynamics, including processes that change the spatial modes of particles. Prior theoretical treatments utilize the so-called spin model^{2,3,4} which includes processes that change the internal states of atoms, but leave the vibrational modes unchanged. We discuss how the inclusion of these mode-changing processes modifies the predicted density-dependent frequency shifts and contrast of Ramsey fringes, both of which are relevant for the precision of optical lattice clocks using fermionic alkaline-earth atoms. We also discuss how the frequency shifts and contrast depend on the pulse areas, interaction strength, and temperature - and how these dependences are affected by the inclusion of mode-changing collisions in the calculations.

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Andrew Koller
JILA and University of Colorado, Boulder

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