MAR11-2010-005064

Abstract for an Invited Paper
for the MAR11 Meeting of
the American Physical Society

Interacting and Rotating Gases of a Few Trapped Atoms

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I will discuss attempts to generate motionally entangled states in small clusters of repulsively interacting Bosonic atoms at nonzero angular momentum in two-dimensional harmonic traps.[1] By constructing an "array of rotating buckets" from an optical lattice of spinning and precisely controlled on-site potentials, small clusters of interacting atoms can be adiabatically transferred from uncorrelated states at zero angular momentum through a tabulated sequence of ground state level crossings with increasing atomic correlation and total angular momentum. Results will be shown probing these states with both time-of- flight techniques and by directly interrogating atomic correlation via photo-association to excited molecules. Comparison will be made to numeric models with no free parameters. I will discuss extension of these results to future experiments using Feshbach-resonant interactions, and the use of dynamically modulated lattice potentials to generate effective gauge fields.

[1]Gemelke, N., Sarajlic, E., Chu, S., arXiv:1007.2677