
Experiments with two bosonic atoms: Hong-Ou-Mandel effect and spin-exchange entanglement

Cindy Regal*¹

¹JILA – United States

Abstract

With the advent of quantum-gas microscopes degenerate gases can now be probed at the single-atom level. In our work we show that we can also study Bose physics by independently preparing single bosonic atoms in their motional ground state. By using optical tweezers to dynamically bring the atoms together we can study tunnel-coupled bosons with a new level of control. We observe the Hong-Ou-Mandel (HOM) effect with massive particles when we arrange for atom tunneling to play the role of a balanced beamsplitter. In another experiment, we utilize spin exchange to create entanglement, and we then are able to spatially separate the atoms while preserving the entanglement. I will discuss the implication of these experiments for the assembly and control of larger quantum systems.

*Speaker