Quantum model for twin-beam experiment

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Abstract

Creation of correlated atom pairs is a first step towards generation of many-body entangled states. In recent years, correlated atoms were observed in collisions of two Bose-Einstein Condensates (BECs) [1] or in scattering of $m_F = \pm 1$ particles from a single stationary BEC in $m_F = 0$ Zeeman substate [2]. Recently, the group from Vienna [3] produced two beams of strongly correlated atomic wave-packets by shaking the trap of the initial BEC. In this talk, we discuss the quantum Bogoliubov model for the twin-beam scattering. We demonstrate how within this model, two body correlations and atom number-squeezing can be easily calculated. Finally, we argue that the system is strongly entangled and could be useful for sub shot-noise quantum interferometry.

References

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