
An atomic Hong-Ou-Mandel experiment

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Abstract

The celebrated Hong - Ou - Mandel effect is one of the simplest illustrations of two-particle interference, and is unique to the quantum realm. In the original experiment, two photons arriving simultaneously in the input channels of a beam-splitter were observed to always emerge together in one of the output channels. I will discuss the realisation of a closely analogous experiment with atoms instead of photons. This opens the prospect of setting up experiments to violate Bell’s inequalities involving mechanical observables of massive particles, such as momentum, using methods inspired by quantum optics. It may also be of interest to use 2 particle interference effects to characterize various sources of correlated atom pairs ranging from dynamical instabilities in a BEC to acoustic analogs of Hawking radiation.

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