Transfering entanglement from spin to momentum space

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Entanglement has been generated in different atomic systems to improve the sensitivity of phase estimation measurements [1, 2]. However, it is challenging to make use of this entanglement in inertially sensitive atom interferometers.

One approach is to generate the entanglement directly in momentum space using nonlinear interactions in Bose-Einstein condensates [3, 4]. In our approach, we first create highly entangled states in spin states and then transfer this entanglement to momentum states. This technique generates entanglement in well-separated momentum modes and is therefore an appropriate candidate for future entanglement-enhanced quantum sensors [5].

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