

Two-boson correlations in three weakly coupled Bose-Einstein condensates

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Three weakly coupled Bose-Einstein condensates (BECs) are studied with large symmetrical offsets of their chemical potentials. This results in two canonical (Josephson) density and phase modes behaving very differently. The first mode is rapidly oscillating. The second one is a slow mode featuring an effective Josephson effect between one of the BECs and the two others altogether. It involves correlated two-boson fluctuations between the BECs and entails squeezing and two-mode entanglement. The solution of a Bose-Hubbard model is explored both in the classical limit and by exact diagonalization for small atom numbers. The two-boson correlation function is calculated and a representation in terms of coherent states is put forward.