Theoretical Physics Seminars

Impact of the range of the interaction on the Quantum Dynamics of a bosonic Josephson Junction

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From: Kolkata , West Bengal

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Place: Room No. 469

The out-of-equilibrium quantum dynamics of a bosonic Josephson junction (BJJ) with long-range interaction is studied in real space by solving the time-dependent many-body Schrödinger equation numerically accurately using the multiconfigurational time-dependent Hartree for bosons method. Having the many-boson wave-function at hand we can examine the impact of the range of the interaction on well-known features of the BJJ dynamics at both the mean-field and many-body level. We concentrate on the tunnelling frequency,survival probability, depletion and fragmentation, and position variance of the junction, and find competitive effect between the interaction and the confining trap. The presence of the tail part of the interaction basically enhances the effective repulsion as the range of the interaction is increased starting from a small value. But as the range becomes comparable with the trap size, the system approaches a situation where all the atoms feel a constant field and the impact of the tail on the dynamics diminishes. There is an optimal range of the interaction in which physical quantities in the junction are attaining their extreme values.

All are welcome