

## Tunneling Dynamics of Two-Species Bose-Einstein Condensates with Feshbach Resonances

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Abstract: We investigate tunneling dynamics of atomic group consisting of three atoms in Bose-Einstein condensates with Feshbach resonance. It is shown that the tunneling of the atom group depends not only on the inter-atomic nonlinear interactions and the initial number of atoms in these condensates, but also on the tunneling coupling between the atomic condensate and the three-atomic molecular condensate. It is found that besides oscillating tunneling current between the atomic condensate and the molecular condensate, the nonlinear atomic group tunneling dynamics sustains a self-maintained population imbalance: a macroscopic quantum self-trapping effect. The influence of de-coherence caused by non-condensate atoms on the tunneling dynamics is studied. It is indicated that de-coherence suppresses the atomic group tunneling.

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Key words: tunneling dynamics, molecular Bose-Einstein condensate, Feshbach resonance, de-coherence

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