

Tunneling Dynamics of Two-Species Molecular Bose-Einstein Condensates

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(Received: 2003-10-28; Revised:)

Abstract: We study tunneling dynamics of atomic group in two-species molecular Bose-Einstein condensates. It is shown that the tunneling of the atom group depends on not only the tunneling coupling constant between the atomic pair molecular condensate and the three-atomic group molecular condensate, but also the inter-molecular nonlinear interactions and the initial number of atoms in these condensates. It is discovered that besides oscillating tunneling current between the atomic pair molecular condensate and the three-atomic group molecular condensate, the nonlinear atomic group tunneling dynamics sustains a self-maintained population imbalance: a macroscopic quantum self-trapping effect.

PACS: 03.75.Lm, 74.50.+r, 05.30.Jp

Key words: tunneling dynamics, molecular Bose-Einstein condensate, quantum self-trapping effect

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