SFB/TRR 21 - Seminar

11. März 2011, Stuttgart

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A dipolar self-induced bosonic Josephson junction

We propose a new scheme for observing Josephson oscillations and macroscopic quantum self-trapping in a toroidally confined Bose-Einstein condensate: a dipolar self-induced Josephson junction. Polarizing the atoms perpendicularly to the trap symmetry axis, an effective ring-shaped, double-well potential is achieved which is induced by the dipolar interaction. By numerically solving the three-dimensional time-dependent Gross-Pitaevskii equation we show that coherent tunneling phenomena such as Josephson oscillations and quantum self-trapping can take place. The dynamics in the self-induced junction can be qualitatively described by a two-mode model taking into account both s-wave and dipolar interactions.

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