

Interactions in Rabi-coupled two-component Bose-Einstein condensates

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Mixtures of Bose-Einstein condensates offer situations where the usually dominant mean-field energy in weakly interacting systems can be reduced such that higher-order (for example beyond-mean-field) terms may play a dominant role in the equation of state. In this context, the case of coupled two-component ^{39}K Bose-Einstein condensates is specifically addressed. First, large attractive effective three-body interactions can be engineered with striking consequences [1]. Second, the beyond-mean field energy is precisely measured and is shown to be modified as compared to the uncoupled case [2]. It can be used to prepare novel kind of quantum droplets.

[1] A. Hammond, L. Lavoine, T. Bourdel, Tunable 3-body interactions in coherently driven two-component Bose-Einstein condensate, Phys. Rev. Lett. **128**, 083401 (2022).

[2] L. Lavoine, A. Hammond, A. Recati, D.S. Petrov, T. Bourdel, Beyond-mean-field effects in Rabi-coupled two-component Bose-Einstein condensate, Phys. Rev. Lett. **127**, 203402 (2021).

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