Periodic Dynamics in population-imbalanced ultracold fermionic systems

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We investigate a population-imbalanced two-species fermionic system where the resonantly paired fermions combine to form bosonic molecules via Feshbach interaction. We study the dynamics of the intrinsic quantum fluctuations of the system. It is shown that the natural fluctuation of the condensate fraction is periodic if the fermions are trapped in an optical lattice, and consists of a fixed number of periodic components in case of a homogeneous system. These frequency components bear distinct signatures of the nature of pairing present in the system. We propose that this method can be used as an indirect experimental probe for detecting exotic structures like the Fulde–Ferrell–Larkin-Ovchinnikov (FFLO) phase.

References:

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