

Stability and Faraday Wave Production of a Bose-Einstein Condensed Mixture Trapped on a Spherical Bubble

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By considering atom-number oscillations achieved by Rabi coupling, it was investigated the dynamics and stability of homogeneous binary Bose-Einstein condensed mixtures trapped on a spherical bubble. Exact analytical solutions are developed for population dynamics, followed by stability analyses considering Bogoliubov-de Gennes (BdG) and Floquet methods, which are compared with the corresponding full numerical solutions. In the stability analyses, we first examine the role of Rabi coupling on stationary solutions by applying the BdG method. This is followed by a more detailed analysis of the associated dynamics by using the time-dependent Floquet method. As shown, given the s -wave contact interactions, the Rabi coupling between the species can modulate the interactions leading to parametric resonances, with discrete unstable angular modes driving both phase separations and spatial patterns, with Faraday waves emerging and coexisting with an immiscible phase.

References

- [1] L Brito, L Tomio and A Gammal, Phys. Rev. A **108**, 053315 (2023)