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Effects of Quantum Fluctuations on Quantum Self-Bound Droplets

Abdelaali Boudjemaa
Hassiba Benbouali University of Chlef, Algeria.

Recently, the investigation of self-bound droplet states in Bose mixtures and dipolar ultracold gases has become a burgeoning area of interest. This novel state of matter is stabilized by quantum fluctuations and requires a minimum number of particles. Such an exquisite stabilization mechanism originates from the competition between the attractive mean-field energy and repulsive beyond mean-field effects furnished by the Lee-Huang-Yang corrections, arresting the mean-field collapse, forming ultradilute quantum droplet. This latter has opened a new avenue to explore a broad range of exciting physical phenomena such as supersolid states and polarons. Quantum droplets are also potentially promising for future technologies, including gravitational wave detectors and quantum sensors. This session will explore the current status of quantum droplets and their link with quantum fluctuations and will provide attendees an opportunity to share their perspectives on future directions. Ground-state properties of such a new state of matter and some of the major breakthroughs are also discussed.

Biography

Abdelaali Boudjermaa is professor of physics at Hassiba Benbouali University of Chlef. He received his Ph.D. degrees from Hassiba Benbouali University of Chlef in theoretical physics. He was the Dean of the Faculty of Exact Sciences and Informatics. The A. Boudjemaa Group members currently pursue research in the areas of ultracold gases, quantum droplets, solitons, disordred systems, and quantum gravity. Abdelaali has published more than 50 papers in reputed journals and has been serving as a reviewer for many leading international scientific journals and conferences. He was awarded the prize of the best Young Researcher in Algeria (2011), the 2017 Algerian Paper of the Year Awards, and COMSTECH 2017 Best Research Paper Award in Physics.