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Small droplets made of 3He and 4He atoms

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Helium droplets are weakly bound quantum systems as a consequence of the small atomic mass and the weak van der Waals interaction between helium atoms. They offer the opportunity of studying systems formed by bosons and fermions with different mass interacting through the same potential. These seemingly quite different systems have nevertheless a strong conceptual overlap with atomic nuclei. In this talk I will present some results concerning the structure and properties of these droplets, which have been analyzed borrowing concepts from the nuclear shell model [1], and using the code ANTOINE [2].

It has been predicted that a minimum number of 30 3He atoms are necessary to form a self-bound droplet [3]. The most salient feature of open shell drops is that the 3He valence atoms couple their spins to the maximum value compatible with Pauli's principle, both in isotopically pure or mixed droplets [3,4]. Diffusion Monte Carlo calculations of mixed helium droplets lead to results amenable to a very simple and cogent interpretation in terms of the monopole Hamiltonian [5].

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