Threshold behavior of bosonic two-dimensional few-body systems

DOERTE BLUME, Washington State University — Bosonic two-dimensional self-bound clusters consisting of N atoms interacting through additive van der Waals potentials become unbound at a critical mass $m^*(N)$; $m^*(N)$ has been predicted to be independent of the size of the system. Furthermore, it has been predicted that the binding energy $E(N)$ of the N-atom system varies exponentially as the atomic mass approaches m^*. We report accurate numerical many-body calculations that allow these predictions to be tested. We confirm the existence of a universal critical mass m^* and show that the near-threshold behavior can only be described properly if a previously neglected term is included. We also comment on the universality of the energy ratio $E(N+1)/E(N)$ near threshold. *This work is supported by the NSF and the PRF.

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