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Wave function based treatment of the unitary Bose gas[1]
MICHELLE WYNNE SZE, JOHN CORSON[2], JOSE D' INCAO, Department of Physics, University of Colorado, Boulder; JILA, JOHN BOHN, JILA; NIST: Department of Physics, University of Colorado, Boulder — Understanding many body quantum systems remains a challenging task as recent experiments on ultracold gases extend to unitary regime. We study a system of N identical harmonically-trapped bosons interacting via a contact interaction by starting from a few body system, and employing the adiabatic hyperspherical method and Fadeev decomposition approach. In our formulation, we determine the hyperangular energy eigenstates (and consequently the total energy of the system) from the Bethe-Peierl's boundary condition applied to the symmetrized wavefunction and where the only relevant parameters are the scattering length and the average size of the system given by the hyperradius R. We reproduce the well-understood stationary properties and characteristics of weakly to strongly interacting three-body systems. Results from these are exploited for the study of larger $N > 3$ and the dynamics of three-body systems.

[1]NSF
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