Abstract :

Quantum Boltzmann Liquids

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We study homogeneous normal systems of bosons under the influence of interparticle forces with strongly repulsive components at short relative particle-particle distances. The repulsion prevents short-ranged exchange between the bosonic constituents. As a consequence, the bosons remain distinguishable as they are in a classical fluid although such a many-body system exhibits significant quantum properties. Employing Correlated Density-Matrix (CDM) theory we demonstrate that liquid *para* Hydrogen is a typical quantum Boltzmann liquid. The numerical application of CDM theory concentrates on the structural analysis of the one- and two-body reduced density-matrix elements, the kinetic energy distribution in momentum space, and a comparison of theoretical results with available path-integral Monte-Carlo data and experimental results on liquid H_2.