Thermal instability, evaporation, and thermodynamics of one-dimensional liquids in weakly interacting Bose-Bose mixtures

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Abstract

We study the low-temperature thermodynamics of weakly interacting uniform liquids in one-dimensional attractive Bose-Bose mixtures. The Bogoliubov approach is used to simultaneously describe quantum and thermal fluctuations. First, we investigate in detail two different thermal mechanisms driving the liquid-to-gas transition, the dynamical instability, and the evaporation, and we draw the phase diagram. Then, we compute the main thermodynamic quantities of the liquid, such as the chemical potential, the Tan's contact, the adiabatic sound velocity, and the specific heat at constant volume. The strong dependence of the thermodynamic quantities on the temperature may be used as a precise temperature probe for experiments on quantum liquids.

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