

Abstract Submitted
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Condensate-profile asymmetry of a boson mixture in a disk-shaped harmonic trap¹ HONG MA, TAO PANG, Department of Physics, University of Nevada, Las Vegas — A mixture of two types of hard-sphere bosons in a disk-shaped harmonic trap is studied through path-integral quantum Monte Carlo simulation at low temperature. We find that the system can undergo a phase transition to break the spatial symmetry of the model Hamiltonian when some of the model parameters are varied. The nature of such a phase transition is analyzed through the particle distributions and angular correlation functions. The asymmetry has a strong dependence on the aspect ratio of the axial confinement along the z direction and the radial confinement in the xy plane, the ratio of the interaction ranges a_{11}/a_{22} , and the temperature. Furthermore, the total numbers of particles in the two species and significant difference in the external potentials can also affect the structures of the condensates. Comparisons are made between our calculations and the available mean-field results on similar models. Possible future experiments are suggested to verify our findings.

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