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Temperature effects on superfluid phase transition in Bose-Hubbard model with three-body interaction

We study the combined effects of two and three-body local interactions as well as the finite temperature on the phase diagram of simple lattice bosons model. In order to handle system with strong local interactions we use the resolvent expansion technique, based on the contour integral representation of a partition function, and to find the phase diagram we derive Landau-type expansion for free energy in terms of the superfluid order parameter. Since superfluidity is expected to appear in the QCD phase diagram at large density, presented model and computational techniques may be helpful in development of effective models of dense quark matter.

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