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Role of Bose statistics in crystallization and quantum jamming

The conventional wisdom is that quantum-mechanical exchanges of indistinguishable particles can be neglected in theoretical calculations of low temperature phase diagrams near melting. As it turns out, however, exchanges can play a major role in either destabilizing or stabilizing crystalline order in Bose systems, depending on the type of interactions existing among particles. In this talk I shall discuss the case of hard core systems, such as condensed Helium and purely repulsive dipolar bosons, in which quantum exchanges greatly expand the region of stability of the liquid phase over the crystalline one, and that of soft core bosons, in which the opposite effect takes place. In both cases, calculations neglecting quantum exchanges yield qualitatively incorrect phase diagrams.

8. November 2013, 15:30 Uhr

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