

Coexistence of two kinds of superfluidity in Bose-Hubbard model with density-induced tunneling

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With use of the U(1) quantum rotor method in the path integral effective action formulation, we have confirmed the mathematical similarity of the phase Hamiltonian and of the extended Bose-Hubbard model with density-induced tunneling. Moreover, we have shown that the latter model exhibits two coexisting (single-particle and pair) superfluid phases. Phase separation of the two has also been confirmed, determining that there exists a range of coefficients in which only pair condensation, and not single-particle superfluidity, is present.