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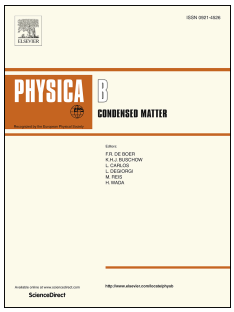

Combining the roles of bose correlations and pairing associations to condensation and its influence on optical conductivity; special superconductors

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Combining the Roles of Bose Correlations and Pairing Associations to Condensation and its Influence on Optical Conductivity; Special Superconductors

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Abstract

Bose correlations (BC) and pairing associations (PA) are known as two distinct origins for condensation. For most known condensates, condensation is only attributed to one of them. Recent developments call for research on combining the roles of the two origins. Therefore, we investigate the pairing and condensation in a boson-like system through a quantum microscopic approach based on correlation functions and order parameter equation (OPE). For the first time, we obtain general expressions for complex optical conductivity of such condensates. We focus on an interesting self-consistent solution of the OPE, i.e. a condensate with spherically symmetric order parameter growing linearly up to a radius in the momentum-space, and extract interesting predictions for it. The appearance of a temperature dependent energy gap in the middle of excitation spectrum and the appearance of a pseudogap in the absorption spectrum (without a counterpart in the excitation spectrum) in addition to the possibility of condensation at room temperature are among our predictions. Also, the paper provides several coherent pieces of evidence for the interest: the roles of BC and PA combine for creating a novel superconductor similar to MgB_2.

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