LOW-FREQUENCY SINGULARITY OF THE PERMITTIVITY OF THE COULOMB MODEL OF SYSTEM WITH BOSE-EINSTEIN CONDENSATE OF NUCLEI

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The second-order singularity is found in the low-frequency region of the permittivity $\varepsilon(\omega)$ of a homogeneous and isotropic system of charged particles consisting of electrons and boson nuclei $\varepsilon(\omega)\,|_{\omega\to 0}\to -\omega^2_{\ BEC}/\omega^2$,where $\omega_{\ BEC} = (4\pi Z^2 e^2 n_{BEC}/m_c)^{1/2}$is the characteristic frequency of the Bose-condensed nuclei with the density n_{BEC} and the mass m_c and charge Z. Above the transition temperature T_c the value n_{BEC} equals zero. This singularity is caused by the existence of a Bose-Einstein condensate for nuclei. The result obtained leads to the existence of the ”nuclei superconductivity”, which can be experimentally verified in superfluid He II [1]. The results of the proposed experiment can be considered as a direct proof of the existence of a Bose-Einstein condensate in superfluid He II.

References

[1] V.B. Bobrov, S.A. Trigger, Frequency depending permittivity of the Coulomb system with Bose-Einstein condensate, arXiv:1511.01336 Quantum Gases (cond-mat.quant-gas)