

TOWARDS THE MICROSCOPIC THEORY OF SUPERFLUIDITY

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S u m m a r y

The theoretical formula for the Landau dispersion curve obtained in the paper agrees with neutronographic data in the wide area of wave numbers from 0.2 up to 2.5 \AA^{-1} . In this theory, a simple interpretation of the physical nature and position of the roton minimum arises. The theory is based on the assumption that helium-II is a quantum liquid with periodic ordering of atoms, having a noticeable probability of the tunneling movement of atoms. It causes a new type of quasiparticles, "helions", with a periodic energy spectrum. The hybridization and superposition of phonon and helion spectra, following from the quantum principle of identity, result in the formula for the Landau curve. The theory predicts the existence of an energy gap in the area of small wave numbers (where neutronographic data still are absent or ambiguous). The area of large wave numbers requires an additional analysis, because vortex excitations may arise there.