Contribution ID: **51** Type: **oral**

Quantum mechanical estimation of dielectric constant values in dielectric materials in a special state with negative dielectric constant

Friday, 13 September 2024 12:05 (20 minutes)

In the proposed model for the anomalous (with negative values for dielectric constant) region of consideration with the assumption of the formation of dipole-domain cells (DDC) in the substance, the state of the substance is characterized by the parameter of the degree of dominant orientational ordering DDC. In the model approximation, matter is considered as a continuous homogeneous medium consisting of weakly interacting identical quantum particles DDC. The frequency dependence of the dielectric constant ε(ω) in the anomalous incommensurate phase in a certain temperature range is considered. At the same time, the microstate of a substance is defined as a superposition of microstates DDC with a corresponding set of natural frequencies. The theory of small perturbations is applied, assuming that the interaction of DDC with an external field is sufficiently weak. In the dipole approximation, the Schrodinger equation is solved to find the wave function DDC with subsequent quantum mechanical assessment of the contribution of a certain microstate to the degree of oscillation in the measured quantity ε(ω) in resonant interaction DDC with an external field. The state with maximum orientational ordering DDC in the dominant direction with the most expected negative value for ε is considered. The Bi2/3Cu3Ti4O12 is considered with specific symmetry and parameters of the elementary cell.

Primary authors: Dr MURADYAN, Armen (Institute of Applied Problems of Physics of NAS RA); ARAMYAN, Artur (IAPP NAS RA); Mr ALEXANYAN, Hovakim (Institute of Applied Problems of Physics of NAS RA); MKRTCHYAN, L. (Institute of Applied Problems of Physics of NAS RA); Dr SARGSYAN, Norik (Institute of Applied Problems of Physics of NAS RA); KIRAKOSYAN, S. (Institute of Applied Problems of Physics of NAS RA); Dr HARUTYUNYAN, Vardan (Institute of Applied Problems of Physics of NAS RA)

Presenter: Dr MURADYAN, Armen (Institute of Applied Problems of Physics of NAS RA)

Session Classification: New Concepts