Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Roton-maxon excitation spectrum for Q2D weakly interacted dipolar excitons[1] ALEKSEY FEDOROV, Russian Quantum Center, IGOR KURBAKOV, YURII LOZOVIK, Institute of Spectroscopy RAS — Remarkable progress was achieved in investigation of collective properties and BEC of quasiparticles, e.g., excitons and polaritons. As it well known their small effective mass provides sufficiently high BEC temperature. However, in reality excitons lifetime is not enough to achieve thermodynamical equilibrium. Spatial separation of electrons and holes in semiconductor layer suppresses recombination process, and exciton lifetime increases sufficiently. Moreover, the separation results in appearance of excitons dipole moments. We predict generation of roton-maxon excitation spectrum for BEC of dipolar excitons in weak correlation regime in Q2D geometry of semiconductor layer. The effect of roton-maxon spectrum is the result of attraction and anisotropy of dipole-dipole interaction in Q2D geometry, and it can be viewed as residual phenomena of phonon collapse for 3D dipoles. According to our estimation effects of BEC and roton-maxon spectrum are principally observable experimentally for excitons in crossed electromagnetic fields in GaAs heterostructures.

[1]The work was supported by the RFBR (14-02-00937, 14-08-00606). A.K.F. is an RQC fellow.

Aleksey Fedorov
Russian Quantum Center

Date submitted: 08 Jan 2014 Electronic form version 1.4