Seminar

PUMP-INDICED PHASE TRANSITION TO A CHARGE-TRANSFER STATE INTERPRETED AND MODELED WITHIN THE EXCITONIC INSULATOR CONCEPT.

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743, Science Complex B

A dynamical phase transition can be provoked by a short optical pumping to excitons. We consider a system prone to a thermodynamic instability towards a charge-ordered state of electrons like in neutral-ionic transitions of donor-acceptor structures. We notice that here the density of pumped excitons contributes additively to the thermodynamic order. To describe both thermodynamic and dynamical effects on equal footing, we adopt for the phase transition a view of the “excitonic insulator” and suggest a formation of the macroscopic quantum state for the pumped excitons. The double nature of the ensemble of excitons leads to an intricate time evolution: the dynamical transition between number–preserved and phase–locked regimes, macroscopic quantum oscillations from interference between the Bose condensate of excitons and the ground state of the excitonic insulator. Modeling of an extended sample shows also stratification in domains of low and high densities which evolve through local dynamical phase transitions and a sequence of domains’ merging.

[1] S. Brazovskii and N. Kirova, “The excitonic insulator rout trough a dynamical phase transition induced by an optical pulse”, JETP, 122, 412 (2016); arxiv.org/abs/1512.06200
[2] same authors, “Dynamical phase transitions and patterns formation induced by pulse pumping of excitons to a system near a thermodynamic instability”, Phys. Rev. B (2016).

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