

Theory of Condensed Matter: Hard Condensed Matter

Jan. 8, 2019 at 2 p.m.
Galilei Room, 01-128 (Staudinger Weg 9)

Anna Pertsova
Nordita Stockholm

Transient excitonic instability in optically-driven Dirac materials

In this talk, I will firstly give a short summary of the research topics I have worked on over the past few years. This will include two main subjects, (i) development of computational methods for the description of atomistic spin dynamics and time-dependent transport, and (ii) investigation of electronic and magnetic properties of Dirac materials (topological insulators, graphene, Dirac/Weyl semimetals) in the presence of external perturbations such as applied magnetic fields, impurity doping and optical excitations. I will then focus on our recent work on transient excitonic condensate in optically-driven Dirac materials, which is referred to in the title of the talk. Motivated by recent pump-probe photoemission experiments which demonstrate the existence of long-lived photo-excited states in Dirac materials such as graphene and three-dimensional topological insulators, we consider an optical pumping scheme which generates non-equilibrium chemical potentials for electrons and holes. Such pumping combined with the Dirac nature of quasiparticles create favorable conditions for excitonic condensation. We identify experimental signatures of these exotic states and provide estimates for the size of excitonic gaps and critical temperatures for few important examples of two- and three-dimensional Dirac materials.

All interested are cordially welcome!