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Energy Colloquium

Non-Equilibrium Dynamics of an Unconventional Insulator

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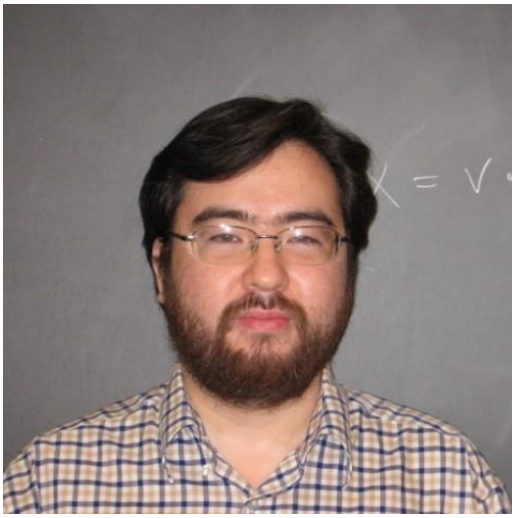

21 March 2017, 16:00

Skolkovo Innovation Center

Technopark, Building 3, Room 402

ABSTRACT:

What happens to electrons when both the spin-orbit coupling (SOC) and Coulomb repulsion between them are very strong? On one hand, we already know that SOC alone can change the topology of the single-particle insulating state (for example, in "topological Insulators"). On the other, even short range on-site repulsion can turn a metal to the so-called "Mott insulator" - one of the most mysterious and thought provoking phases in solid-state physics. In this seminar, I will talk about the behavior of quasiparticles in a Mott insulator in the presence of strong spin-orbit coupling. Using ultrafast optical spectroscopy to study Na2IrO3, we found that the low-energy properties of non-equilibrium charged quasiparticles are almost entirely determined by their interaction with the magnetic background. We observe that the behavior of photo-doped electrons and holes is drastically different in the magnetically ordered and disordered phases. While, in the ordered phase, the spin correlations just renormalize the effective mass of the quasiparticles, in the disordered phase, they give rise to an effective attraction between charged excitations which grows with distance causing them to become trapped within a bound state in a far-going analogy with quark confinement inside hadrons.

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Colloquium schedule and information on how to get to the colloquium can be found at *http://www.skoltech.ru/en/energy-colloquium/*