GOETHE UNIVERSITÄT FRANKFURT AM MAIN
Fachbereich Physik
Institut für Theoretische Physik

CONDENSED MATTER THEORY SEMINAR

Subject: **Coherent quantum phase slips in spatially inhomogeneous Josephson junction chains**

Speaker: **Dr. Denis Basko, LPMMC, Grenoble**

Date & time: **Friday, November 30th, 2018 at 3.15 p.m.**

Venue: **Seminar room 1.114**

The lowest-energy excitations in one-dimensional superconductors, such as thin superconducting wires or Josephson junction chains, are small oscillations of the superconducting phase that can propagate along the chain. The subject of the talk is the effect of a long-range spatial inhomogeneity in the wire/chain on the normal modes of phase oscillations, as well as various consequences of such effect. I will focus on coherent quantum phase slips in a Josephson junction chain whose parameters may vary from junction to junction. We consider a modulation which is periodic in space [1] as well as a random spatial variation [2]. In the random case we include two types of quenched disorder: random spatial modulation of the junction areas and random induced background charges. Usually, the quantum phase-slip amplitude is sensitive to the normal-mode structure of superconducting phase oscillations in the chain (Mooij-Schön modes, which are all localized by the area disorder). However, we show that the modes' contribution to the disorder-induced phase-slip action fluctuations is small, and the fluctuations of the action on different junctions are mainly determined by the local junction parameters. We study the statistics of the total quantum phase-slip amplitude on the chain and show that it can be non-Gaussian if the chain is not sufficiently long.

[1] A. E. Svetogorov, M. Taguchi, Y. Tokura, D. M. Basko, and F. W. J. Hekking, Phys. Rev. B 97, 104514 (2018).
[2] A. E. Svetogorov and D. M. Basko, Phys. Rev. B 98, 054513 (2018).