Seminar

PHENOMENOLOGICAL THEORY OF SWITCHING BY OPTICAL OR VOLTAGE PULSES IN APPLICATION TO 1T-TAS2

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743, Science Complex B

The recent mainstream in strongly correlated electronic systems is a quest for so called “hidden states”. A success came recently from observations of ultrafast (~ps) switching by means of optical [1] and voltage [1,2] pulses, as well by local manipulations by the STM tip [3,1,4]. These observations have been done upon the most popular layered material 1T-TaS2 which is an enigmatic “polaronic Wigner-crystalline Mott insulator”. Our phenomenological theory focuses upon dynamical evolution of electrons and holes as mobile charge carriers, and of crystallized electrons modifiable by intrinsic defects (interstitials, voids and their walls). The dynamical exchange among these reservoirs proceeds by formation of a network of charged domain walls originated by the intrinsic Coulomb instability of the super-lattice of self-trapped electrons.

These theoretical results have been obtained in collaboration with the laboratory by D. Mihailovic in Jozef Stefan Institute, Ljubljana, Slovenia [1].

[1] Nature Phys. 6, (2010) 681; Science, 344, 177 (2014); Science Advances, 1, 1500168 (2015); Nature Comm., 7, 11442 (2016).

[2] Y. Iwasa at Univ. of Tokyo & RIKEN CEMS; I. Inoue at AIST, Tsukuba.

[3] H.W. Yeom lab. CALDES-IBS, Pohang, S. Korea.

[4] Wang Yayu, Wu Jian, et al, Tsinghua University.

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