

第184回エンレイソウの会 日本物理学会北海道支部講演会

場 所： 北海道大学工学部A棟 A1-17

日 時： 2013年1月21日(月曜日) 13:30~15:00

講演者： Prof. Serguei Brazovskii
(LPTMS, CNRS & University Paris-Sud, Orsay, France)

題 目：『Local and non-equilibrium processes
in charge density waves』

要 旨： This seminar will review recent experimental observations and their theoretical modeling in charge density waves (CDW). The results may be relevant to a broad class of low dimensional electronic systems with symmetry broken states – the nearest extension is the ferroelectric charge ordering in organic conductors. The selected observations will be related to strong, topologically nontrivial perturbations of the order parameter under an external impact. The pattern may be static, induced by electric field or dynamic, under the optical pumping – these are the two new trends in solid state physics [1].

Recent optical study of a far-from-equilibrium CDW recovered coherent aperiodic undulations of the order parameter, critical slowing down of the collective mode, and evolution of the particle-hole gap. Numerical modeling allowed interpreting the observations, particularly the spatio-temporal distortions arising from “earthquakes” - annihilation events of topological defects in depth of the sample.

Strong perturbations were also found at the microscopic scale accessed by the STM; there are the amplitude solitons expected to play a role of neutral spin carriers - spinons.

Experiments on nano-junctions in CDWs indicate on the intrinsic reconstruction by creating stationary and transient electronic vortices – dislocations. The modeling shows that vortices are formed stepwise in the junction when the voltage across, or the current through, exceed a threshold. The vortex core concentrates the total voltage drop, working as a self-tuned microscopic tunnelling junction.

[1] <http://lptms.u-psud.fr/impact2012/>

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