Serguei Brazovskii

LPTMS, CNRS & University Paris-Sud, Orsay, France

**New trends in physics of cooperative electronic states in low-dimensional systems.**

Course of 6 lectures, 2016

The course of 6 lectures given in 2016 for students
at the Department of Advanced Materials Science
of the University of Tokyo at Kashiwa campus.

Lecture 1.
Low dimensional correlated electronic systems. Realizations: organic crystals, inorganic chain and layered compounds, interfaces, conducting polymers.
Symmetry broken ground states: charge- spin- and bond density waves; Wigner crystal; charge ordering; electronic ferroelectricity; Mott, Peierls and excitonic insulators; superconductivity.

Lecture 2.
Excitations and carriers in correlated electronic systems: excitons, polarons, solitons, phasons.

Lecture 3.
Electronic ferroelectricity: from realities of organic conductors to perspectives of conjugated polymers. The related physics of solitons and domain walls.

Lecture 4. Theory elements for correlated electronic systems on one and two dimensions.

Lecture 5. Dynamical phase transitions in cooperative electronic systems induced by fast optical pumping or voltage pulses.

Lecture 6.
Story of field-induced rising of the superconductivity or distraction of the insulating state. Transformations of collective electronic states under the electric field or the current.