DAY 5 (27 june): 11:30 – 12:10

# Topological Order and Non-Abelian Statistics in Noncentrosymmetric s-Wave Superconductors

Satoshi Fujimoto (Dept. of Physics, Kyoto University)

In certain classes of topological states realized in quantum many-body systems in 2+1 dimension, quasiparticles obey the non-Abelian statistics which is characterized by noncommutativity of the exchange processes of particles. The possible realization of non-Abelian statistics in real systems has been extensively studied so far in connection with the $\nu = 5/2$ and $\nu = 12/5$ fractional quantum Hall states, and the vortex state of chiral $p_x + ip_y$ superconductors. In this talk, I present another candidate of a topological phase allowing the existence of non-Abelian anyons, which can be realized in strongly noncentrosymmetric $s$-wave superconductors. This topological phase belongs to the same class as those of the Moore-Read Pfaffian fractional quantum Hall state, $p_x + ip_y$ superconductors, and the gapped non-Abelian spin liquid phase of the Kitaev model. In noncentrosymmetric superconductors, the asymmetric spin-orbit interaction which breaks inversion symmetry plays important roles in various exotic superconducting properties. In our proposal, the asymmetric spin-orbit interaction combined with an external magnetic field yields the topological superconducting state for a particular electron filling.