NCTS Lecture Series

Topology & Condensed Matter

March 22-23, 2018

K-theory and T-duality in Topological Phases

March 22 [Thursday]
15:00-16:20
March 23 [Friday]
10:00-11:20

Guo Chuan Thiang
University of Adelaide

Experimental discoveries of topological phases in condensed matter have already led to several Nobel Prizes. The aim of these lectures is to show three ways in which K-theoretic concepts are realised in these physical systems. First, many exotic variants of K-theory are relevant for the classification of topological phases. Second, the bulk-boundary correspondence allowing "invisible" topological invariants of a bulk system to be detected on its boundary, can be formulated in K-theory as an index theorem. Third, the K-theory invariants can be T-dualised to access a geometric and readily generalisable point of view of the phenomenon.

Topological Crystalline Insulators and K-theory

March 22 [Thursday]
16:30-17:50
March 23 [Friday]
12:00-13:20

Kiyonori Gomi
Shinshu University

Topological insulators and superconductors are well described as quantum systems on lattices whose Hamiltonians have energy gap. For their classification, topological K-theory is known to be quite useful. This is also the case in the presence of crystalline symmetry, although equivariant K-theory and its twisted version are needed. In my talks, I will explain the above relationship between topological insulators and K-theory, and then show recent computational results about twisted equivariant K-theory based on joint works with Ken Shiozaki and Masatoshi Sato. I will also talk about possible mathematical approaches to so-called atomic insulator.

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Meeting Room P512
3rd General Building
NTHU