A "Periodic Table" of Topological Orders

by

Dr. Tian LAN (蘭天博士)
Institute for Quantum Computing
University of Waterloo, Canada

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ALL INTERESTED ARE WELCOME
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Abstract

Topology is a mathematical subject studying properties of topological spaces that are invariant under continuous transformations. During recent years, the idea of topology played a more and more important role in the physical study of phases of matter and phase transitions. Instead of drawing phase diagrams, we focus on the "topological invariants" of phases that stay unchanged as long as there is no phase transition. The first kind of topological invariant is the global symmetry, which can explain many classical examples such as the Ising model. There are also phases of matter with more exotic topological invariants; they are said to have "topological order". I will introduce such topological invariants in two dimensional systems and discuss how they can be used to identify and classify topological orders. The exciting final goal is to list topological orders in terms of their topological invariants, in a similar manner like the Periodic Table of chemical elements.

Enquiries: 3943 6303