



# 清华大学高等研究院

Institute for Advanced Study, Tsinghua University

## 学术报告

**Title:** A categorical theory of topological orders of all dimensions ( $d > -1$ )

**Speaker:** Liang Kong  
*IAS at Tsinghua University and University of New Hampshire*

**Time:** 10:00-12:00am, Friday, May 29, 2015

**Venue:** Conference Hall 322, Science Building, Tsinghua University

### Abstract

I will start with the motivation to study the category of topological orders. It is important to distinguish a topological order defined on an open disk, called a local topological order, and that on a closed manifold. By focusing on only local topological order, we naturally obtain the notion of an (unitary)  $n$ -category, in which 1-morphisms are defects of codimension 1, 2-morphisms are defects of codimension 2, so on and so forth. I will discuss some low dimensional cases. For  $n > 2$ , it becomes difficult to discuss explicit examples. It seems that it is very difficult to go further with these abstract nonsense. However, I will argue that if a local topological order allows a gapped boundary, then it is uniquely determined by the boundary. This uniqueness of the bulk has deep consequences. For example, it implies that the unique bulk of a given boundary is given by the mathematical center of the boundary. Moreover, it also leads us to a condensation theory as a theory of "linear algebras" over higher categories. It is a joint work with Xiao-Gang Wen and Hao Zheng.