# Symmetry-protected Topological Orders in Interacting Bosonic Systems

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## <u>Abstract</u>

Symmetry-protected topological (SPT) phases are bulk-gapped quantum phases with symmetries, which have gapless or degenerate boundary states as long as the symmetries are not broken. The SPT phases in free fermion systems, such as topological insulators, have been experimentally discovered and classified; however, it is not known what SPT phases exist in general interacting systems. In this talk, I discuss a systematic way to construct SPT phases in interacting bosonic systems. Just as group theory allows us to construct 230 crystal structures in three-dimensional space, we use group cohomology theory to systematically construct different interacting bosonic SPT phases in any dimension and with any symmetry. We discover one bosonic topological insulator in two dimensions, three kinds in three dimensions and one bosonic topological superconductor in three dimensions.

# About the speaker

Dr Xie Chen obtained her bachelor's degree at Tsinghua University in 2006 and PhD degree in Physics at Massachusetts Institute of Technology with Prof Isaac Chuang and Prof Xiao-Gang Wen in 2012. She has been a Miller fellow at the University of California, Berkeley since September 2012.