

Physics Seminar: Zohar Nussinov
Wednesday, May 29 · 2:00 – 3:00pm

Location:313

Title: “Generalized Symmetries, Dualities, Topological Orders, and Topological Quantum Field Theories”

Abstract: We introduce and discuss aspects of “d-dimensional gauge-like symmetries” (these symmetries encompass both higher and subsystem symmetries). We show how such symmetries relate to dimensional reductions. In particular, we discuss the effects of thermal fluctuations using a generalization of Elitzur’s theorem. We describe how these symmetries may lead to topological orders and illustrate that, depending on the system geometry, there are both quantum and classical systems that have degeneracies that may depend on the system topology or have an entropy that is holographic with a degeneracy that is exponentially large in the boundary area of the system. We will outline the “bond algebraic” approach to dualities and explain why dualities are often conformal. Using this approach, we illustrate that the nearest neighbor “XXZ honeycomb compass” (a two component (i.e., XY) analog of the Kitaev model on the honeycomb lattice) and square lattice Majorana Hubbard model both exhibit exact 3D Ising type transitions. With these dualities, we compute the free energies of the X-cube model and other topologically ordered systems. We will introduce topologically ordered systems that do not readily admit a TQFT description.