MAR13-2012-020486

Genons, twist defects, and projective non-Abelian statistics

MAISSAM BARKESHLI, Stanford University

An intense focus in the condensed matter community currently is the search for Majorana fermions in solid state systems. Defects which localize Majorana zero modes obey the simplest kind of non-Abelian statistics, and are of interest partially for the goal of achieving topological quantum computing. In this talk, I will present recent advances in our understanding of how to synthesize a much more general class of non-abelian defects using conventional topological states. After discussing the new theoretical foundations, I will present an experimental proposal using only conventional bilayer fractional quantum Hall states and a simple geometry of top and bottom gates. I will also discuss how these ideas can be used to perform universal topological quantum computing (TQC) using non-abelian states that by themselves are not universal for TQC.