M. Burrello: *Two-dimensional arrays of Parafermionic zero modes*

It has recently been realized that zero modes with projective non-Abelian statistics, generalizing the notion of Majorana bound states, may exist at the interface between a superconductor and a ferromagnet along the edge of a fractional topological insulator (FTI). Here we study two dimensional architectures of these non-Abelian zero modes, whose interactions are generated by the charging and Josephson energies of the superconductors. We derive low-energy Hamiltonians for two different arrays of FTIs on the plane, revealing an interesting interplay between the real-space geometry of the system and its topological properties. On the one hand, in a geometry where the length of the FTI edges is independent on the system size, the array has a topologically ordered phase, giving rise to a qudit toric code Hamiltonian in perturbation theory. On the other hand, in a geometry where the length of the edges scales with system size, we find an exact duality to an Abelian lattice gauge theory and no topological order