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**A New Kind of Topological Quantum Order: A Dimensional Hierarchy of Quasiparticles Built from Stationary Excitations** S. VIJAY, JEONGWAN HAAH, LIANG FU, Massachusetts Inst of Tech-MIT — We introduce exactly solvable models of interacting (Majorana) fermions in $d \geq 3$ spatial dimensions that realize a new kind of topological quantum order, building on a model presented in ref. [1]. These models have extensive topological ground-state degeneracy and a hierarchy of point-like, topological excitations that are only free to move within sub-manifolds of the lattice. In particular, one of our models has fundamental excitations that are completely stationary. To demonstrate these results, we introduce a powerful polynomial representation of commuting Majorana Hamiltonians. Remarkably, the physical properties of the topologically-ordered state are encoded in an algebraic variety, defined by the common zeros of a set of polynomials over a finite field. This provides a "geometric" framework for the emergence of topological order. [1] S. Vijay, T. H. Hsieh and L. Fu, arXiv:1504.01724 (2015).

Sagar Vijay
Massachusetts Inst of Tech-MIT

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