Fracton topological order via coupled layer construction[1] HAN MA, Physics department and Center for Theory of Quantum Matter, University of Colorado at Boulder , ETHAN LAKE, Department of Physics and Astronomy, University of Utah, XIE CHEN, Department of Physics and Institute for Quantum Information and Matter, California Institute of Technology, MICHAEL HERMELE, Physics department and Center for Theory of Quantum Matter, University of Colorado at Boulder — In this work, we develop a coupled layer construction of exactly solvable models of fracton topological order. These states are characterized by immobile, point-like topological excitations, and sub-extensive topological degeneracy. By coupling 2d toric code layers and double semion models, we are able to realize the recently proposed X-cube model and a semionic version of it. By coupling X-cube models, we propose a new model exhibiting fracton topological order, dubbed the four color cube (FCC) model. The coupling mechanisms can be understood as condensation of strings or membranes built from point particles. This work allows some fracton topological phases to be understood in terms of the degrees of freedom of familiar lower-dimernsional states.

Han Ma
Univ of Colorado - Boulder

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