

Abstract Submitted  
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**Defect-driven phase transitions out of the Coulomb phase** HYEJIN JU, UCSB, SIMON TREBST, Microsoft Station Q, UCSB, CHRISTOPHER HENLEY, Cornell University — Lattice models constrained by a local “conservation law,” such as close-packed dimer models on 3D bipartite lattices, exhibit an emergent “Coulomb phase” with characteristic power-law correlations. We have studied, by Monte Carlo simulations, phase transitions out of the Coulomb phase induced by introducing a finite fugacity of defect excitations in dimer models. We report two cases. (1) In the simple cubic dimer covering, we admit non- bipartite dimers (connecting sites in the same sublattice), which appear as effective charges with Coulomb-like interactions. Non- bipartite defects induce a transition immediately out of the Coulomb phase, exponentially damping the critical correlations via Debye screening. We characterize this transition by extracting the screening length from our numerical calculation of the dimer structure factor.(2) In the diamond lattice, we initially restrict the dimers to a 2D layer forming a (bipartite) honeycomb lattice, and then admit interlayer dimers. These bipartite dimers appear as dipoles and do not destroy the Coulomb phase, but induce an immediate transition from a 2D to 3D Coulomb phase.

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