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Topological phase transition in a bilaer toric code model HONG-CHEN JIANG, Stanford Institute for Materials and Energy Sciences, SLAC National Accelerator Laboratory, YUAN-MING LU, Department of Physics, The Ohio-State University, ASHVIN VISHWANATH, Department of Physics, University of California, Berkeley — We study a bilayer toric-code model in two spatial dimensions by density matrix renormalization group approach. We show that as the interlayer coupling is increased, the system goes through a continuous phase transition from two decoupled copies of Z_2 topological orders (bilayer limit) to a single Z_2 topological order (monolayer limit). This phase transition is revealed by a jump of topological entanglement entropy. Moreover, the two phases are featured by distinct topological properties: in the bilayer limit the system supports symmetry protected gapless edge states, while the edge states are fully gapped in the monolayer limit. The nature of this continuous topological phase transitions is also investigated.

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