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Bulk Entanglement Spectrum Reveals Quantum Criticality within a Topological State[1] TIMOTHY HSIEH, LIANG FU, Massachusetts Inst of Tech-MIT — A quantum phase transition is usually achieved by tuning physical parameters in a Hamiltonian at zero temperature. Here, we demonstrate that the ground state of a topological phase itself encodes critical properties of its transition to a trivial phase. To extract this information, we introduce a partition of the system into two subsystems both of which extend throughout the bulk in all directions. The resulting bulk entanglement spectrum has a low-lying part that resembles the excitation spectrum of a bulk Hamiltonian, which allows us to access a topological phase transition from a single wavefunction by tuning either the geometry of the partition or the entanglement temperature. As an example, this remarkable correspondence between topological phase transition and entanglement criticality is rigorously established for integer quantum Hall states.

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