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Bowen Shi: Homogeneity versus defect: an entanglement bootstrap view

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Defects break homogeneity by definition. To talk about defects, a sense of homogeneity should be established first. We introduce the entanglement bootstrap view of this problem, which takes a many-body vacuum state as the input instead of a Hamiltonian or Lagrangian. In a nutshell, the entanglement bootstrap imposes a set of local axioms on the wave function to guarantee the space is "uniform and smooth" without defects. A sense of homogeneity is established by the isomorphism theorem of convex sets of information, or alternatively, flexible algebras of operators, which indicates the emergence of TQFTs on lattice many-body systems. The axioms are based on entanglement properties of a time slice rather than translations, Lorentz, or other symmetries. Topological defects can be bootstrapped in various ways, including the novel transportation properties detected by immersed regions and the pinching of gapped domain wall partons. We further discuss related thoughts in chiral systems, instantaneous modular flows, gapless setups, and under decoherence.