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Topological Invariants of Gapped States and ʾt Hooft Anomalies

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Recently, an approach to constructing topological invariants of gapped ground-states of lattice systems has been developed in our joint work with N. Sopenko. It applies to arbitrary gapped states of infinite-volume lattice spin systems with rapidly decaying interactions and employs C*-algebraic techniques. In this talk I will explain an interpretation of these invariants as obstructions to gauging, i.e. to promoting a symmetry to a local symmetry. The key observation is that locality on a lattice is an asymptotic notion sensitive only to the large-scale geometry of the support set. Following Kashiwara and Schapira, one can encode locality using a natural Grothendieck topology on a category of semilinear subsets of Eucludean space. Infinitesimal symmetries of a gapped state form a cosheaf over the corresponding site, and the topological invariants are encoded in its Cech complex.

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