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Amorphous topological phases protected by continuous rotation symmetry

Protection of topological surface states protected by spatial symmetries breaks down when the boundary of the sample is misaligned with one of the high symmetry planes of the crystal. We demonstrate that this limitation is removed in amorphous topological materials, where the Hamiltonian is invariant on average under reflection over any axis due to continuous rotation symmetry. While the local disorder caused by the amorphous structure weakens the topological protection, we demonstrate that the edge remains protected from localization. In order to classify such phases, we introduce symmetry indicators and topological invariants that generalize those in crystalline systems. We also extend the notion of obstructed atomic limits to amorphous materials, and investigate the resulting surface states.

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