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Fermion bags, topology and index theorems

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In this talk we argue that the fermion bag formulation extends the concepts of topology and index theorems associated with non-Abelian gauge theories, to simple lattice fermion field theories. Through such a connection we learn that fermion masses can arise in at least two different ways: (1) a conventional way where some lattice symmetry of the action is spontaneously, explicitly or anomalously broken and (2) an unconventional way where all lattice symmetries are preserved. We argue for these two scenarios by considering simple examples of lattice field theories formulated with staggered fermions.

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