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Exotic Quantum Critical Points with Staggered Fermions

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We study two flavors of massless staggered fermions interacting via an on-site four-fermion interaction and argue that the model contains an exotic quantum critical point separating the perturbative massless phase from a massive fermion phase at strong couplings where the fermion bilinear condensate remains zero. We believe that no spontaneous symmetry breaking occurs at the transition. We have extensive calculations in three Euclidian dimensions that are consistent with the existence of a single second order phase transition separating the two phases. Although mean field theory suggests that this transition will turn first order at sufficiently large number of dimensions, preliminary results suggest that the transition remains second order in four-dimensions.

Primary author: Mr AYYAR, Venkit (Duke University)

Presenter: Mr AYYAR, Venkit (Duke University)

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