

Phase structure of strongly interacting four-fermion theory

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We study a four dimensional lattice model comprising four reduced staggered fermions coupled to a scalar field through an $SO(4)$ invariant interaction. Symmetries of the lattice theory prohibit fermion mass terms. If we switch of the kinetic term for the scalar field we obtain a model with a four fermion interaction which has been the focus of several recent lattice investigations. The results of those investigations has revealed that the pure four fermi model possesses both massless and massive $SO(4)$ symmetric phases separated by a very narrow symmetry broken phase. In this work we explore the phase diagram of the more general Yukawa model with a scalar kinetic term and present evidence that one can pass from the massless to massive phases without passing through an intermediate broken phase.

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