

Exact solution of a 2+1 dimensional interacting fermion model

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We present a quantum field theory model describing interacting fermions in 2+1 dimensions that can be solved exactly using bosonization (to our knowledge, this model was first proposed by Mattis). This model gives an effective description of spinless fermions on a square lattice with local hopping and density-density interactions if, close to half filling, the system develops a partial energy gap. We present arguments that, after appropriate renormalizations, all short- and long distance cutoffs in this model can be removed.

If time permits we also present an exactly solvable 2+1 dimensional analogue of the Schwinger model.

(Based on common work with Jonas de Wouf and, in particular, the following paper:

arXiv:math-ph/0606041v3 (to appear in Lett. Math. Phys.)

arXiv:0907.1277v2 [math-ph] (to appear in J. Stat. Phys.)

arXiv:0903.0055v3 [math-ph])