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The Schwinger model in the canonical formulation

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We consider the massive Schwinger model in the canonical formulation using transfer matrices in fixed fermion number sectors. The fermion contributions can be classified according to the discrete, local fermion occupation numbers which define specific fermion states. They can be used to expose the vacuum structure of the theory and the origin of the sign problem at finite fermion number density. We construct observables which can be used to calculate the ground state energy and the spectrum of the theory. Finally, we discuss the relation of the canonical formulation to the fermion loop and fermion bag formulation and comment on possible solutions to the fermion sign problem.

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