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Bosonization for fermionic fRG at weak and strong couplings

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The vertex expansion of the Wetterich equation provides a reliable perturbative approach for purely fermionic systems, already at the 1-loop level. The conventional 1-loop truncation can be improved by means of the multiloop functional renormalization group (fRG) which relies on flow equations derived from self-consistent equations for the flowing vertices (Bethe-Salpeter equation, ...). The heart of this work is a bosonization technique called single-boson exchange (SBE) formalism, which allows for introducing bosonic couplings through an efficient decomposition of the fermionic two-particle vertex. In this talk, I will illustrate how this SBE approach makes the fermionic multiloop fRG scheme more insightful and more tractable by discussing applications to the 2D Hubbard model. Extensions to strong couplings using correlated starting points for the fRG flow will be discussed as well.

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