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Universal and non-universal renormalizations in the Fermi-liquid theory[1] DMITRII MASLOV, University of Florida, ANDREY CHUBUKOV, University of Wisconsin-Madison — We discuss the interplay between the Landau Fermi liquid theory and a direct perturbative approach to a Fermi liquid. In a Fermi liquid theory for Galilean-invariant systems, mass renormalization m^*/m comes exclusively from fermions at the Fermi surface. We show that in the perturbation theory the same m^*/m comes partly from fermions at the Fermi surface and partly from fermions far away from the Fermi surface. We show that there exists a particular relation between the self-energy contributions from high- and low-energy fermions which allows one to reconcile diagrammatics with a Fermi-liquid theory. We argue that extra care has to be exercised in the renormalization group approach to a Fermi liquid in order not to miss high-energy contributions to m^*/m. We present the results for m^*/m and the quasiparticle residue Z for a 2D Fermi gas with short-range interaction and discuss the extension of an $SU(2)$ theory to $SU(N)$.

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