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Precursors of 1D behavior for $D > 1$: evolution of the non-analytic correction to the Fermi-liquid behavior RONOJOY SAHA, Dept. of Physics, University of Florida, Gainesville, Fl-32611-8440, USA, DMITRII MASLOV, Dept. of Physics, University of Florida, Gainesville, Florida 32611-8440, USA — The Fermi-liquid forms of the specific heat ($C(T)$) and static spin susceptibility ($\chi_s$) acquire universal non-analytic corrections[1] and the degree of non-analyticity increase inversely with the dimensionality. This predicts that the strongest non-analyticity in the specific heat should be found in 1D; however, bosonization shows that the $C(T)$ is analytic in 1D. We resolve this paradox by showing that the general argument, for non-analyticity in $D > 1$ at the second order in the interaction, breaks down in 1D due to a subtle cancellation and the non-analytic $T \ln T$ term in the specific heat in 1D occurs at the third order for electrons with spin. We obtain the same result by considering the RG flow of the marginally irrelevant operator in the sine-Gordon theory. For spinless electrons, the non-analyticities in the particle-particle and particle-hole channels cancel out and the resulting $C(T)$ is linear in $T$. The singularity in the particle-hole channel causes non-analyticity in the spin susceptibility $\chi_s \propto \ln \max\{|Q|, |H|, T\}$ present at the second order. [1] A.V. Chubukov and D.L. Maslov, Phys. Rev. B 68, 155113 (2003).

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