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Non-local Representation of n-point Fermi Functions GIRISH SETLUR, Department of Physics, Indian Institute of Technology Guwahati, Guwahati Assam 781039, India — We construct a useful non-local representation of n-point Fermi functions in terms of correlation functions between local currents and densities in one and higher dimensions for a finite density one component Fermi system. We also define rigorously a non-local operator corresponding to particle-hole creation and show how this may be used to compute the momentum distribution of a Fermi liquid in three spatial dimensions leading to Galitskii's well known early result on the quasi-particle residue. The same method may be used to study the momentum distribution of a Luttinger liquid in one and two spatial dimensions, the latter involving long range interactions. The exponents are obtained in both these cases using both the non-local n-point function technique as well as the non-local particle-hole creation operator technique. Other aspects such as anomalous scaling of the polarization function as well as the behavior of the dynamical density of states are addressed in both one and two dimensional Luttinger liquids. A qualitatively favorable comparison is made between these results and those of Bares and Wen and Bartosch and Kopietz.

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