

Abstract Submitted
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Absence of Luttinger's Theorem KIARAN DAVE, Dept. of Physics, MIT, Cambridge, MA. 02139, PHILIP PHILLIPS, Loomis Laboratory of Physics, Univ. of Illinois, Urbana, Il. 61801-3080, CHARLES KANE, Dept. of Physics, Univ. Penn., Philadelphia, PA. 19104 — We show exactly with an $SU(N)$ interacting model that even if the ambiguity associated with the placement of the chemical potential, μ , for a $T = 0$ gapped system is removed by using the unique value $\mu(T \rightarrow 0)$, Luttinger's sum rule is violated. The failure stems from the non-existence of the Luttinger-Ward functional for a system in which the self-energy diverges. Since it is the existence of the Luttinger-Ward functional that is the basis for Luttinger's theorem which relates the charge density to sign changes of the single-particle Green function, no such theorem exists. Experimental data on the cuprates are presented which show a systematic deviation from the Luttinger count, implying a breakdown of the electron quasiparticle picture in strongly correlated electron matter.

Philip phillips
University of Illinois

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