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Non-perturbative renormalization group calculation of the quasiparticle velocity and the dielectric function of graphene. ANAND SHARMA, CARSTEN BAUER, ANDREAS RUECKRIEGEL, PETER KOPIETZ, Univ Frankfurt — We use a nonperturbative functional renormalization group approach to calculate the renormalized quasiparticle velocity $v(k)$ and the static dielectric function $\epsilon(k)$ of suspended graphene as function of an external momentum k. We fit our numerical result for $v(k)$ to $v(k)/v_F = A + B\ln(\Lambda_0/k)$, where v_F is the bare Fermi velocity, Λ_0 is an ultraviolet cutoff, and $A = 1.37$, $B = 0.51$ for the physically relevant value ($e^2/v_F = 2.2$) of the coupling constant. In *stark* contrast to calculations based on the static random-phase approximation, we find that $\epsilon(k)$ approaches unity for $k \to 0$. Our result for $v(k)$ agrees very well with a recent measurement by Elias *et al.* [Nat. Phys. **7**, 701 (2011)]. With in the same approximation, we also explore an alternative scheme in order to understand the true nature of the low energy (momentum) behavior in graphene.

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