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Abstract for an Invited Paper
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On the dynamical and dc conductivity of graphene[1]

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It was only recently shown that a simply-observable quantity as the optical transparency of suspended graphene is defined solely by the fine structure constant [1]. In this talk, I will give the theoretical explanation to this experiment, i.e., show that even in the visible-optics regime the corrections to the Dirac cone approximation are small (a few percent) and the effect of next-nearest neighbor hopping is negligible [2]. I will also discuss the infrared conductivity of graphene on a substrate where electron-phonon and impurity scattering become important [3]. Finally, I will comment on the still unsettled question of dc conductivity in graphene and discuss - apart from Coulomb scattering - an alternative scattering mechanism based on midgap states [4].

[1] R. R. Nair et al., Science 320, 1308 (2008).
[2] T. Stauber et al., Phys. Rev. B 78, 085432 (2008).
[3] T. Stauber et al., Phys. Rev. B 78, 085418 (2008).
[4] T. Stauber et al., Phys. Rev. B 76, 205423 (2007).

[1]POCI 2010 via project PTDC/FIS/64404/2006