Weak localization in networks of diffusive wires.

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The transport properties of a phase coherent network of quasi one-dimensional diffusive wires can be described by a conductance matrix. At a classical level, the network is equivalent to a classical resistance network. Additionally, there exists a small correction coming from the quantum interferences : the weak localization correction. This question has been first addressed theoretically by Douçot & Rammal [Phys. Rev. Lett. **55** (1985) 1148] to describe quantitatively experiments demonstrating Altshuler, Aronov, Spivak oscillations in networks. This approach has been later improved by Pascaud & Montambaux [Phys. Rev. Lett. **82** (1999) 4512]. However, in these two works, the cooperon is integrated uniformly over the network, which does not take into account the nontrivial weights that should be given to the different wires of the network when integrating the cooperon. We show that it may be important for networks whose wires are not all equivalent and provide a formalism allowing a systematic calculation of the weak localization correction to the conductances of networks.