Conductivity and transmission coefficients of ultra-thin disordered metallic films

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The diffusive motion of quasi-two-dimensional electron gas through an ultra-thin system of disordered potentials is considered [1]. In such system the Fermi sphere splits into a set of independent sheets due to the thickness of the system. Each sheet can be seen as an electron sub-band [2]. The electron transport goes through these sub-bands independently. The sum of electrical conductivities over these sub-bands determines the total current which is calculated for ultra-thin films of cesium. We also present the relation between our approach and Landauer formalism based on the notion of the transmission coefficient [3].

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[2] S. Datta, Electronic Transport in Mesoscopic Systems, Cambridge University Press, Cambridge (1999).
[3] R. Landauer, Phil. Mag. **21** (1970) 863.

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