Quantum interference of electrons in disordered metals

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Abstract. Investigation of the galvanomagnetic properties of disordered metals in weak magnetic fields \( r(H) > l \), where \( r(H) \) is the electron trajectory radius and \( l \), the electron free path, proved to be one of the effective experimental methods of studying disordered metals. The phase difference between the interfering electron waves is affected by the presence of magnetic flux in the sample. One of the observable effects is the oscillatory magnetoresistance \( K(H) \) of multiconnected samples predicted by Altshuler et al (1981). The period of \( K(H) \) oscillations for the hollow cylinders, networks or chains with orifices cross-sections areas \( S \) is \( \Delta H = \Phi_0 / 2 S \) [where \( \Phi_0 = hc/e \)]. The amplitude and the phase of the oscillations depend on the spin orbit interaction, the intensity of superconductive fluctuation etc.

It should be noted that in small "mesoscopic" single loops the oscillations with the period \( \Delta H \approx \Phi_0 / S \) were also observed recently (see also Altshuler et al 1987 included in this issue).

Keywords. Electron quantum interference; disordered metals.

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References

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