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CONCERNING THE $\bar{\nu}e$ SCATTERING PROCESS

V.P. Akulov
Physico-technical Institute, Ukrainian Academy of Sciences
Submitted 29 July 1970
ZhETF Pis. Red. 12, No. 8, 403 - 404 (20 October 1970)

At the present time, the theoretical analysis of the $\bar{\nu}e$ scattering process is based on the following models: (a) the model of diagonal interaction [1], (b) the model with a neutrino having a magnetic moment [2], and (c) the usual V - A interaction model [4].

In connection with the planned experiments [5, 6] with antineutrinos from a powerful reactor, it is proposed in [3] to determine the model of $\bar{\nu}e$ scattering from the spectrum of the recoil electrons. We deem it more promising to determine the $\bar{\nu}e$-scattering model by using a ferromagnetic target [7]. The strong dependence of the total cross section on the polarization of the initial electrons in the V - A theory had been pointed out earlier [7, 8]. It turns out that characteristic spin dependences are obtained also for the other models. The differential cross sections for the different model, in the rest system of the initial electron, are given by

$$\text{a)}\quad d\sigma^{d} = d\sigma_0^{d}(1-\zeta), \tag{1}$$

$$\text{в)}\quad d\sigma^{m} = d\sigma_0^{m}, \tag{2}$$

$$\text{c)}\quad d\sigma^{V-A} = d\sigma_0^{V-A}\left[\left(1+\zeta+\zeta\,\frac{m}{E\left(1+\frac{E}{m-\omega}\right)}\right)\right], \tag{3}$$

where

$$d\sigma_0^{d} = \frac{m^3 d\omega}{\pi\lambda^4(m^2+rmE-\mu^2)^2}, \qquad \lambda,\ \mu - \text{parameters of model}$$

$$d\sigma_0^{m} = \frac{4\pi\alpha f^2(E+m-\omega)\,d\omega}{E(\omega-m)}, \qquad \alpha = e^2,\ f - \text{magnetic moment of neutrino}$$

$$d\sigma_0^{V-A} = \frac{2G^2 m(E+m-\omega)^2 d\omega}{\pi E^2}, \qquad G = 10^{-5}M_N^2$$

m is the electron mass, M_N is the nucleon mass, E and ω are the energies of the initial antineutrinos and final electrons, and ζ is double the initial-electron spin projection on the direction of the incident antineutrino beam.

Thus, measurements of the number of recoil electrons at ζ = 1, 0, and -1 will make it possible to choose unambiguously the model of the $\bar{\nu}e$ scattering.

In conclusion, the author is grateful to D.A. Vokov for help and a discussion of the work.

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FLUCTUATION CONDUCTIVITY OF TUNNEL JUNCTIONS

O.D. Cheishvili
Physics Institute, Georgian Academy of Sciences
Submitted 3 August 1970
ZhETF Pis. Red. 12, No. 8, 404 - 406 (20 October 1970)

The influence of fluctuation pairs on the conductivity of a superconductor above the critical temperature in weak fields was first investigated by Aslamazov and Larkin [1]. The nonlinear dependence of the conductivity on the field was investigated by Schmidt [2] and by Gor'kov [3]. The influence of fluctuations on the conductivity in thin films was first observed by Glover [4].

We have investigated the influence of fluctuations on the tunnel current in MIM and SIM junctions. In first order in the fluctuations, the diagram contributing to the tunnel current is shown in the figure (cf. [3]). The solid lines are the Green's functions, the dashed lines represent averaging over the impurities, and the wavy line is the Cooper vertex. The tunnel current is given by the formula (see [5])

$$IR_0 = -\frac{1}{2\pi^2}\int_{-\infty}^{\infty}\left(\mathrm{th}\frac{\epsilon - V}{2T} - \mathrm{th}\frac{\epsilon}{2T}\right)\mathrm{Im}\, G_1^R(\epsilon)\,\mathrm{Im}\, G_2^R(\epsilon - V), \qquad (1)$$

where V is the potential difference on the barrier, R_0 is the resistance of the junction in the normal state, $G^R_{\to}(\epsilon) = \int d\xi G^R(\epsilon p)$ is the Green's function integrated over the energy $\xi = v_0(|p| - p_0)$. Since the current (1) is expressed in terms of retarded Green's functions, we must continue the diagram analytically (see the figure) to real frequencies. The analytic continuation is by the method developed by Keldysh [6]. Without presenting the cumbersome calculations connected with the analytic continuation (they will be presented in a detailed article), we write down the final result for a retarded Green's function