the decay of a pseudoscalar or vector boson into two fermions. In particular, parity is not conserved in the reaction $\pi^{\pm} \to \mu^{\pm} + \nu$. If there are scalar and pseudovector mesons which can decay into two fermions, parity cannot be conserved in this decay.

Since the action coordinate is on equal footing with the other spatial coordinates in five-dimensional theory, simultaneous spatial reflection and change of sign of the action leave the Lagrangian invariant in all product combinations.

Consequently, even a theory which is not invariant under spatial reflection becomes invariant with respect to the combined inversion proposed by Landau,[4] i.e., simultaneous spatial reflection and charge conjugation.

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POLARIZATION IN DOUBLE SCATTERING OF ELECTRONS

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As is well known, β-decay electrons are polarized longitudinally. This effect can be observed in double scattering of β-electrons. The differential cross section for double scattering of a longitudinally polarized beam of electrons is given as follows:[1]

$$I^{(2)} = (|f_1|^2 + |g_1|^2)(|f_2|^2 + |g_2|^2)(1 + \delta_1 \cos\varphi + \delta_2 \sin\varphi), \tag{1}$$

where

$$\delta_1 = (f_1 g_1^* - f_1^* g_1)(f_2^* g_2 - f_2 g_2^*) / (|f_1|^2 + |g_1|^2)(|f_2|^2 + |g_2|^2), \tag{2}$$

$$\frac{\delta_2}{\delta_1} = i\eta \frac{\sin\vartheta_1 (|g_1|^2 - |f_1|^2) + \cos\vartheta_1 (f_1^* g_1 + f_1 g_1^*)}{f_1^* g_1 - g_1^* f_1}, \tag{3}$$

where $f_1 \equiv f(\vartheta_1)$, $f_2 \equiv f(\vartheta_2)$ etc. and the angles ϑ_1 and ϑ_2 are the angles associated with the first and second scattering respectively, φ is the azimuthal angle measured from the plane of the first scattering, and η is the degree of longitudinal electron polarization. In the Born approximation Eqs. (2) and (3) assume the following form:

$$\delta_1 = -\frac{Z_1 Z_2 e^4}{(\hbar c)^2} 4 \frac{v^2}{c^2}\left(1 - \frac{v^2}{c^2}\right) \frac{\sin^4(\vartheta_1/2)\sin^4(\vartheta_2/2)}{\sin\vartheta_1 \cdot \sin\vartheta_2} \frac{\ln \operatorname{cosec}^2(\vartheta_1/2) \cdot \ln \operatorname{cosec}^2(\vartheta_2/2)}{[1-(v/c)^2 \sin^2(\vartheta_1/2)][1-(v/c)^2 \sin^2(\vartheta_2/2)]}; \tag{4}$$

$$\delta_2 / \delta_1 = 2\eta \frac{\hbar c}{Z_1 e^2} \frac{c}{v} \frac{\cot^2(\vartheta_1/2)}{\ln \operatorname{cosec}^2(\vartheta_1/2)}. \tag{5}$$

It is apparent from Eq. (5) that $\delta_2 \gg \delta_1$, so that the effect of azimuthal asymmetry is much greater in double scattering of a polarized electron beam than scattering of a non-polarized beam.[1,2]

If we neglect recoil of the nucleus for a two-component neutrino the β-electron longitudinal polarizations is $\eta = v/c$.

Experiments on double scattering of a polarized beam are difficult because of the relatively low activity of β-active samples. However, experiments of this type are of great interest both for verifying the calculation given above as well as for understanding the phenomenology of β-decay. At the present time attempts are being made to verigy this effect experimentally.

On the other hand, neglect of the azimuthal symmetry in double scattering of decay electrons may lead to its own experimental error. The first scattering is over small angles $(5 - 15°)$ and is likely to be lost in the cover which protects the sample. It should be noted that the factor in the expression for δ_2 which depends on ϑ_1 is changed by only a factor of three as the angle varies from $10 - 90°$ so that even for a first scattering at small angles, δ_2 in Eq. (1) remains large.

It is of interest, in this regard, to point out a possible connection between double scattering and the so-called "anomalous" electron scattering which has been observed by a number of authors.[3,4] These observations refer to a discrepancy between the experimental and theoretical electron distribution over the angle ϑ. It is of interest to note that the "anomalous" scattering has been observed in investigations of β-radiation of radioactive materials while, on the other hand, there has been good agreement with theory in investigations using accelerator beams.[2,5]

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THEORY OF THE PRODUCTION OF ELECTRON-POSITRON PAIRS IN COLLISIONS OF SLOW μ^--MESONS WITH NUCLEI

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In Refs. 1—5 several approximate formulas have been obtained for the cross sections for the production of electron-positron pairs in collisions of non-relativistic heavy charged particles. The most complete analysis of the problem has been given by Okun'[5] who has derived expressions for the pair-production cross sections in Born approximation as well as the quasi-classical approximation. Thus, almost the entire non-relativistic region of heavy-particle energies has been investigated; the only exception is the small region near threshold.

In the present report we present the results of calculations which have been carried out for the threshold region for the production of electron-positron pairs in the collision of negative μ^--mesons with nuclei. The calculations have been carried out in the framework of quantum electrodynamics; two cases have been considered: the first corresponds to the condition:

$$T_0 - 2m < 2m, \tag{1}$$