[3] For details, and earlier references, see for instance L. Michel, thesis, Memorial des Poudres, **35**, annexe p. 77 (1953).

[4] Calculations related to possible observation of the polarization of the electron in μ-meson decay and nuclear β radioactivity, and the direct measurement of the polarization of the μ meson are in progress.

[5] Electromagnetic radiative corrections to this decay are not very small. In a recent paper on this subject, Behrends, Finkelstein, and Sirlin [Phys. Rev. **101**, 866 (1956)] have shown that Eq. (1) is still valid but that the parameters are slowly varying functions of the energy.

[6] For the sake of completeness we give here the explicit dependence of the parameters on the g_i and g_i'. For ease of calculation, we have taken the order $\epsilon\mu\nu\nu$ in the interaction Hamiltonian. When the two emitted neutrinos are distinguishable, we define $a_i^2=g_i\bar{g}_i+g_i'\bar{g}_i'$, $a_{ij}=g_i\bar{g}_j'+g_i'\bar{g}_j$, $c_1^2=a_1^2+a_5^2$, $c_2^2=a_2^2+a_4^2$, $c_3^2=a_3^2$, $b_1c_1^2=a_{15}+a_{51}$, $b_2c_2^2=a_{24}+a_{42}$, and $b_3c_3^2=a_{33}$; we see that, for $k=1$, 2, and 3, $c_k^2\geqslant 0$, $-1\leqslant b_k\leqslant 1$. Then $Q=c_1^2+4c_2^2+6c_3^2$, $\rho Q=3(c_2^2+2c_3^2)$, $\eta Q=a_1^2-2a_2^2+2a_4^2-a_5^2$, $\alpha Q=b_1c_1^2-2b_3c_3^2$, and $\beta Q=b_2c_2^2-2b_3c_3^2$. When the two emitted neutrinos are identical, one has moreover $g_2=g_3=g_3'=g_4'=0$; it follows that $c_3^2=b_3=0$.

[7] See for instance V. Bargmann and E. P. Wigner, Proc. Nat. Acad. Sci. U. S. **34**, 211 (1948).

[8] L. Michel and A. S. Wightman, Phys. Rev. **98**, 1190 (1955).

[9] A. Salam, Nuovo cimento **5**, 299 (1957); T. D. Lee and C. N. Yang, Phys. Rev. **105**, 1671 (1957); L. D. Landau, Nuclear Phys. (to be published). We thank the authors for preprints of their work.

Proton Polarization in (d,p) Reactions

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THE proton polarization in (d,p) reactions was calculated by Cheston[1] under the assumption that the final-state proton scatters in a spin-orbit potential. The transition operator T for the (d,p) reaction was taken to be the neutron-proton central interaction potential $V_{np}(|\mathbf{r}_n-\mathbf{r}_p|)$ in the zero-range approximation.

Recently Hillman[2] compared his data for the $C^{12}(d,p)C^{13}$ reaction with Cheston's numerical results for that reaction. However, it appears that Cheston's paper is in error.

Cheston neglects the proton spin-flip terms. To establish his Eq. (5) he says that with the quantization axis chosen along the vector $\mathbf{K}\times\mathbf{k}$ a proton "produced in a definite state of spin orientation (μ_p) in the original stripping act will maintain this orientation after scattering in the spin-orbit potential." However, if initially the deuteron spin projection $\mu_d=0$, there is no definite orientation of the proton spin along the axis of quantization.

First, his Eq. (5) should read

$$\langle\psi(J,L,M_J)\psi(l,m)\mathrm{X}(\tfrac{1}{2},\mu_n)|T|\phi(L_d,M_d)\times\mathrm{X}(\tfrac{1}{2},\mu_n')\mathrm{X}(\tfrac{1}{2},\mu_p')\rangle$$
$$=\sum_{\mu_p''}C_{L,\frac{1}{2}}(J,M_J;M_J-\mu_p'',\mu_p'')\times\langle\psi(J,L,M_J-\mu_p'')\chi(\tfrac{1}{2},\mu_p'')\psi(l,m)\times|T|\phi(L_d,M_d)\chi(\tfrac{1}{2},\mu_p')\rangle\times\delta(\mu_n,\mu_n'). \quad (1)$$

Consequently, Cheston's Eq. (6) should read

$$\mathfrak{M}(\mu_d\rightarrow\mu_f,\mu_p)=\sum_{L_d,L,J,M_d,M_L}\sum_{\mu_p''}a(L,M_L)b^*(L_d,M_d)$$
$$\times C_{L,\frac{1}{2}}(J,M_L+\mu_p;M_L,\mu_p)$$
$$\times C_{L,\frac{1}{2}}(J,M_L+\mu_p;M_L+\mu_p-\mu_p'',\mu_p'')$$
$$\times C_{l,\frac{1}{2}}(j_f,\mu_f;\mu_f-\mu_d+\mu_p'',\mu_d-\mu_p'')$$
$$\times C_{\frac{1}{2},\frac{1}{2}}(1,\mu_d;\mu_d-\mu_p'',\mu_p'')\langle\psi(J,L,M_L+\mu_p-\mu_p'')$$
$$\times\psi(l,\mu_f-\mu_d+\mu_p'')|T|\phi(L_d,M_d)\rangle. \quad (2)$$

With Cheston's transition operator T, the selection rule $M_d=M_L+\mu_p+\mu_f-\mu_d$, being independent of μ_p'', cannot reduce the sum over μ_p'' to only the term $\mu_p''=\mu_p$ provided $\mu_d=0$. Thus whatever the a's and b's, i.e., independently of the system of reference, both μ_p'' contribute provided $l>0$. The only cases in which only $\mu_p''=\mu_p$ contributes are (1) no spin-orbit coupling in the final-state proton potential, and (2) $l=0$. Unfortunately, Cheston's numerical example involves $l=1$.[3]

Further, Cheston writes for the distortion parameters $\beta(L,J)=\frac{1}{2}\eta(L,J)$. If, however, $\eta(L,J)$ are the usual average reflection coefficients, it should read $\beta(L,J)=\frac{1}{2}[1-\eta(L,J)]$.

Finally, it should be noted, in connection with Cheston's paper, that in the first Letter by the author on the (n,p) polarization problem,[4] Eqs. (4) and (6) held only for $l_f=0$.

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[1] W. B. Cheston, Phys. Rev. **96**, 1590 (1954).

[2] P. Hillman, Phys. Rev. **104**, 176 (1956).

[3] Nevertheless it is probable that the spin-flip contribution is rather small.

[4] J. Sawicki, Nuovo cimento **2**, 1322 (1955).

Singular State in Relativistic Cosmology

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AS is well known, the isotropic cosmological solutions of general relativity start from a singular state in the finite past. In a recent paper Komar[1] has investigated the question as to whether this singularity persists under more general circumstances and has found that such a singularity does occur unless one