it is of interest to obtain information on the dependence of the multiplicity on q^2, which in the case of the purely hadronic mechanism should be proportional to $\sqrt{q^2}$. At large q^2 one should observe in such configurations a transition to a much slower decrease of $d\sigma/dq^2$ as a function of q^2.

The mechanism in question might provide in the future unique information concerning deeply inelastic photoproduction from unstable particles.

It should be borne in mind that all the foregoing ceases to hold if for some reason there is no longer an exponential dependence on q^2 in strong interactions at high energies.

This will occur, for example, in the model of [4], where the strong interaction has at high energies the character of a local interaction of two currents (see also [5]). Then (3) must be considered as a lower limit of the differential cross sections for hadron interactions at large momentum transfers.

In conclusion, we present an expression for $d\sigma/dq^2$, analogous to (3), in the case of a process with one beam X ($p + p \to p + x$):

$$\frac{d\sigma}{dq^2} \approx \frac{4\pi\alpha^2}{q^4} G_M^2(q^2). \tag{4}$$

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CONCERNING THE ROTATION OF THE PLANE OF LINEAR POLARIZATION OF γ QUANTA IN A MAGNETIZED FERROMAGNET

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In a recent paper in this journal [1], Lobashov et al. reported the results of an experimental investigation of the rotation of the plane of linear polarization of 230- and 290-keV γ quanta in magnetized iron. Analogous experiments at 230 and 330 keV are described in a paper by Bock and Luksch [2][2]. The effect of rotation of the γ-quantum polarization plane in a polarized electron target, observed by the authors of [1] and [2], was considered theoretically a few years ago by Baryshevskii and Lyuboshitz [3, 4]. It was shown in these papers that the rotation of the polarization plane of γ quanta with energies from several hundred keV to several MeV is determined completely by the contribution of radiative corrections of order α^2 to the real spin-dependent part of the "forward" Compton scattering amplitude. The method of dispersion relation was used in the calculation of the radiative corrections. The order of magnitude of the rotation angles, indicated in [3, 4], agreed with the data of [1, 2].

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In connection with the latest experiments, it is of interest to compare more accurately the numerical values of the rotation angle, following from the theory of [3, 4], with the experimental data, and to investigate the energy dependence of the effect in question.

According to formulas (8) and (14) of [3], the angle of rotation of the plane of linear polarization of a photon over a length x is described by the expression

$$\phi = - N r_0^2 \psi(\kappa)(p\vec{l})\, x, \tag{1}$$

where p is the electron polarization angle, $\vec{l}$ is a unit vector in the direction of the photon momentum,

$$\psi(\kappa) = 1 + 4\kappa^2 \left[\frac{\ln 4\kappa^2}{(1 - 4\kappa^2)^2} + \frac{1}{1 - 4\kappa^2}\right] + p\int_0^\infty \frac{2y - (1 + y)\ln(1 + 2y)}{y(y^2 - \kappa^2)}\, dy, \tag{2}$$

N is the number of electrons per cm^3, $r_0 = \ell^2/m_b c^2$ is the electromagnetic radius of the electron, $\kappa = E_\gamma/m_e c^2$, and E_γ is the energy of the γ quantum in the l.s.[3] A positive angle ϕ corresponds to right-hand-screw rotation of the plane of linear polarization of the γ quantum (clockwise when viewed along the photon momentum).

Taking into account the equation

$$p\int_0^\infty [dy/(y^2 - \kappa^2)] = 0$$

we can rewrite [2] in the form

$$\psi(\kappa) = \frac{1}{1 - 4\kappa^2} + 4\kappa^2 \frac{\ln 4\kappa^2}{(1 - 4\kappa^2)^2} + \int_0^\infty \left[\frac{(1 + \kappa)\ln(1 + 2\kappa)}{\kappa} - \frac{(1 + y)\ln(1 + 2y)}{y}\right] \frac{dy}{y^2 - \kappa^2}. \tag{3}$$

The values of the function $\psi(\kappa)$ calculated for formula (3) for κ from 0.1 to 4 ($E_\gamma \sim 50 - 2000$ kV) are listed in the table.

It should be noted that the effect of rotation of the plane of linear polarization of the photons is characterized by a broad maximum in the energy region 500 - 700 keV (max $|\psi| \simeq |\psi(1.18)| = 0.3953$). It is interesting that in the region of maximal values of the rotation angles ϕ the spin-dependent part of the total cross section for Compton scattering is close to zero.

With further increase of the γ-quantum energy, the absolute value of the rotational angle begins to decrease gradually. In particular, $\psi(5) = -0.252$, $\psi(10) = -0.161$, and $\psi(100) = -0.023$. It is easy to show that as $\kappa \to \infty$ the following simple asymptotic formula holds:

[3] Formula (14) for $\psi(\kappa)$ in [4] contains misprints absent from the earlier paper [3].

$$\psi(\kappa) \approx -P\int_0^\infty \frac{\ln y\,dy}{y^2-\kappa^2} = -\frac{\pi^2}{4\kappa} \qquad (4)^{4)}$$

We emphasize that the calculations lead to negative values of the function $\psi(\kappa)$. This means that when the directions of the electron spins in the ferromagnet are parallel to the photon momentum (the magnetic induction is directed opposite to the photon momentum) the plane of linear polarization should rotate in the right-hand-screw direction. This conclusion agrees with the experimental results [2] at 230 and 330 keV. We note that in [3, 4], owing to a misunderstanding, the sign of the function $\psi(\kappa)$ and hence the direction of the polarization plane are incorrect.

κ	$-\psi(\kappa)$	κ	$-\psi(\kappa)$	κ	$-\psi(\kappa)$	κ	$-\psi(\kappa)$
0.1	0.075	1.1	0.395	2.1	0.365	3.1	0.319
0.2	0.164	1.2	0.395	2.2	0.360	3.2	0.315
0.3	0.234	1.3	0.394	2.3	0.356	3.3	0.311
0.4	0.285	1.4	0.392	2.4	0.351	3.4	0.307
0.5	0.322	1.5	0.390	2.5	0.346	3.5	0.303
0.6	0.349	1.6	0.386	2.6	0.341	3.6	0.299
0.7	0.367	1.7	0.383	2.7	0.337	3.7	0.295
0.8	0.380	1.8	0.378	2.8	0.332	3.8	0.291
0.9	0.388	1.9	0.374	2.9	0.328	3.9	0.287
1.0	0.392	2.0	0.370	3.0	0.323	4.0	0.284

For iron magnetized to saturation, the degree of electron polarization is $|\vec{p}| = 2/26 \approx 7.85 \times 10^{-2}$. If we assume the specific gravity of iron to be 7.87 g/cm^3 and the atomic weight 55.85, then the theoretical formula for the angle of rotation of the plane of linear polarization per centimeter of length, in the case when the electron spins are parallel to the photon momentum, will take the form

$$\phi_0 = -13.48 \cdot 10^{-3}\,\psi(\kappa)\ \text{rad/cm}. \qquad (5)$$

At energies 230, 290, and 330 keV, the theoretical values of ϕ are 4.12×10^{-3}, 4.61×10^{-3}, and 4.83×10^{-3} rad/cm, respectively. According to [1], the values of $|\phi_0|$ at 230 and 290 keV are $(4.25 \pm 0.06) \times 10^{-3}$ and $(4.7 \pm 0.3) \times 10^{-3}$ rad/cm, respectively. The values of ϕ obtained in [2] for 230 and 330 keV are $(3.2 \pm 0.3) \times 10^{-3}$ and $(4.7 \pm 0.3) \times 10^{-3}$ rad/cm, respectively.

Notice should be taken of the agreement between the theory and the data of Lobashov et al. [1] and the results of Bock and Luksch at 330 keV, within the limits of errors. The maximum value of the angle ϕ_0 for iron magnetized to saturation, calculated from formula (5) is 5.32×10^{-3} rad/cm.

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4) At energies $E_\gamma \gtrsim 1$ GeV, the main contribution to ϕ is made by terms of order α^3, which are not taken into account here.

E R R A T A

The following corrections are to be made in the article by V. G. Baryshevskii et al., Vol. 15, No. 2: 1) On p. 79, in the first line after formula (2), read ... $r_0 = e^2/m_e c^2$ ... instead of ... $r_0 = \ell^2/m_b c^2$... 2) In the two lines above the table on p. 80, read ..."the direction of rotation of the polarization plane"... instead of ..."the direction of the polarization plane"... 3) In the second line below the table on p. 80, read ... $|\vec{p}| = 2/26 \approx 7.69\times10^{-2}$... instead of ... $\approx 7.85\times10^{-2}$... The numerical coefficient in (5) remains unchanged.

In the article by A. A. Chaban, Vol. 15, No. 2, p. 74, line 35 from the top, read ... $\exp[i(kx \pm \omega t)]$... instead of ... $\exp[i(kx + \omega t)]$...

In the article by Ya. B. Zel'dovich et al., Vol. 15, No. 3, p. 111, frames "c" and "d" of Fig. 3 should be interchanged, and the scale in frame "c" should be 5 mrad.