scopy and Nuclear Structure in Minsk, Nauka, 1965.

[2] E. E. Berlovich and Yu. N. Novikov, DAN SSSR, in press.

[3] B. R. Mottelsson and S. G. Nilsson, Mat.-fys. Dan. Vid. Selskab 1, No. 8 (1959).

[4] D. R. Bes and Z. Szymanski, Nucl. Phys. 28, 42 (1961); Z. Szymanski, Nucl. Phys. 28, 63 (1961).

[5] E. E. Berlovich and G. M. Bukat, Izv. AN SSSR ser. fiz. 28, 214 (1964), transl. Bull. Acad. Sci. Phys. Ser. p. 131.

[6] Arima, Horie, and Sano, Progr. Theor. Phys. Japan 17, 567 (1957).

[7] E. E. Berlovich, Izv. AN SSSR ser. fiz. 29, No. 12 (1965), translation in press.

ELECTROMAGNETIC FORM FACTORS OF BARYONS AND SU(6) SYMMETRY

D. V. Volkov

Physico-technical Institute, Ukrainian Academy of Sciences

Submitted 23 July 1965

The breaking of SU(6) symmetry for vertex functions with arbitrary momentum transfer can be formally taken into account by adding to the main SU(6)-symmetry variant additional variants, in which some of the pairs of unit matrices are replaced by γ_5 matrices. Assuming that the relative weight of the different variants is determined by kinematic factors of the type $[q^2 - (m_1 + m_2)^2]^{1/2}$ for the unit matrix and $[q^2 - (m_1 - m_2)^2]^{1/2}$ for the γ_5 matrix, where m_1 and m_2 are the masses of the baryons whose wave functions frame the matrices I and γ_5, we have obtained by means of the standard procedure the following expression for the vertex describing the interaction of the baryon octet b with the electromagnetic field:

$$W = a\{[-q^2(1 + 3q^2)D + (1 + \tfrac{4}{3}q^2 - q^4)F]C + 2(1 + 2q^2)(D + \tfrac{2}{3}F)M\} \tag{1}$$

where F and D are the types of coupling between the baryon octet and the electromagnetic field

$$\begin{aligned} F &= Sp(b^+bQ - b^+Qb) \\ D &= Sp(b^+bQ + b^+Qb) \end{aligned} \tag{2}$$

Q is the charge matrix

$$Q = \frac{1}{3}\begin{pmatrix} 2 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix} \tag{3}$$

C and M are the usual matrix variants of the charge and magnetic-moment type, respectively, while q^2 is the square of the momentum transfer in units of $4m^2$ (m - average mass of the baryon 56-plet).

We note the following consequences of formula (1):

1. Formula (1) duplicates the well known relations for form factors when $q^2 = 0$ and $q^2 = -1$ (cf., e.g., [1]).

2. The magnetic moment of the proton is equal to double the value of the nuclear magneton.

3. The ratio of the charge form factor of the proton to its magnetic form factor (with both form factors normalized to unity at $q^2 = 0$) is given by

$$G_{Ep} : G_{Mp} = 1 - q^2 \qquad (4)$$

It follows from (4) that the charge form factor of the proton decreases somewhat more rapidly than the magnetic one, and goes through zero when $q^2 = 1$ ($q^2 \sim 4\ (\mathrm{BeV/c})^2$).

The experimental data on the form factor of the proton [2] do not contradict relation (4).

4. The ratio of the charge form factor of the neutron to its magnetic form factor is small for small q^2, and increases slowly with increasing q^2. When $q^2 = 1$ the form factors become comparable in absolute magnitude.

5. The ratio of the magnetic form factors of the proton and of the neutron is independent of q^2.

The author is grateful to A. I. Akhiezer for a discussion of the results.

[1] W. Ruhl, Phys. Lett. 15, 99 (1965).

[2] Dunning, Chen, Cone, Hartwing, Ramsey, Walher, and Wilson, Phys. Rev. Lett. 13, 631 (1964).

ON THE POSSIBILITY OF AN OPTICAL SHIFT OF THE MOSSBAUER-SPECTRUM LINES

I. B. Bersuker and V. A. Kovarskii
Institute of Applied Physics, Moldavian Academy of Sciences
Submitted 24 July 1965

We propose to use the Mossbauer spectra (MS) of γ-resonance nuclear absorption to investigate the excited states of the electron shell and to determine certain kinetic parameters of the system by measuring the optical shift - the change induced by sufficiently strong light in the spectrum of a source or an absorber of γ quanta in the optical excitation band. To observe the optical shift it is necessary (a) that the lifetime of the optically-excited state be much longer than the lifetime of the excited state of the nucleus, and (b) that the concentration of the Mossbauer centers affected by the optical excitation be comparable or larger than the concentration of the centers not excited by the light. It can be shown that these conditions are realized in a very large number of real systems, and that different variants are possible in semiconductors with optical impurities. Of particular interest (for example, for the determination of the parameters of laser systems) are cases in which optical population inversion can be realized.

The displacement of the MS lines in the optical shift is determined by the same formula as the chemical shift, and contains the characteristics of the optically excited state of the