It is obvious that the diamagnetic susceptibility term due to the interaction between the carriers and the optical phonons contains resonant peaks at $\Omega(n' - n) \pm \omega = 0$. Since $\beta\Omega > 1$, only small n are important in (8), so that the terms containing $(n' - n)\Omega - \omega$ come into play when $n = 0$. It is obvious that the resonant absorption of the optical phonons leads to peaks also when ω is an integer multiple of Ω. However, owing to the exponential decrease of N_0, for each succeeding peak with increasing $\beta\omega$, the most essential contribution will be made by the resonant absorption of the phonon at the peak $\omega = \Omega$. In the terms corresponding to resonant emission, the singularities will be observed at $n > n'$; the presence of an exponential factor will again separate a peak at $n' = 0$ and $n = 1$. We can thus expect an essential nonmonotonicity to appear in the diamagnetic susceptibility only when $\omega = \Omega$. A complete calculation, with account of attenuation in the carrier spectrum, which determines the shape of the resonance lines, entails no difficulty of principal nature, but is technically very cumbersome. The calculation presented determines correctly the position of the resonant peaks.

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ELECTROPRODUCTION OF ISOBAR $N_{3/2}(1238)$ IN THE SU(6) SYMMETRY SCHEME

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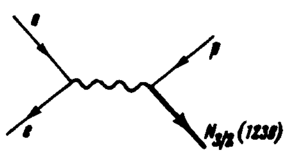
If the magnetic moment of the proton is known, the theory of SU(6) symmetry [1-3] makes it possible to calculate not only the magnetic moments of all terms of the 56-plet, but also the magnetic moments of the transitions between various components of this multiplet. Let us consider the reaction $e + p \rightarrow p + N_{3/2}(1238)$ (see the figure). Since both the proton and the $N_{3/2}(1238)$ belong to a representation with total orbital angular momentum L = 0, the matrix element of the quadrupole moment is equal to zero. Consequently, the transition will be



magnetic-dipole. In SU(6) theory the non-diagonal matrix element of the magnetic moment is equal to [4]

$$\langle \tfrac{3}{2}\, \tfrac{1}{2} | \hat{\gamma}_r | \tfrac{1}{2}\, \tfrac{1}{2} \rangle = \frac{2\sqrt{2}}{3} \gamma_p \qquad (1)$$

(γ_p is the proton magnetic moment).

It is simplest to obtain formula (1) by using the quark model. With the aid of (1) we can readily obtain the reduced matrix element of the magnetic-dipole transition $|Q|^2 = \frac{2}{3\pi}\gamma_p^2$ and a formula for the differential cross section for inelastic electron-proton scattering in the region of isobar production (it is assumed that the main contribution to this region is due to isobar production)

$$\frac{d\sigma}{d\epsilon\, d\Omega} = \frac{\alpha}{3\pi} |Q|^2 \frac{\gamma}{(M - M_0)^2 + \gamma^2} \frac{m + \epsilon_1 - \epsilon_2}{M} \frac{\epsilon_2}{\epsilon_1} \left\{ 1 + \frac{1}{\sin^2(\theta/2)} + \frac{2(\epsilon_1 - \epsilon_2)^2}{q^2} \right\} \qquad (2)$$

Here $\alpha = e^2/4\pi = 1/137$, $M_0 = 1238$ MeV the isobar mass, γ the half-width of the isobar ($2\gamma = 125$ MeV[6]), m the proton mass, ϵ_1 and ϵ_2 the electron energy before and after collision, θ the scattering angle in the laboratory system, q^2 the square of the 4-momentum transfer, $q^2 = 4\epsilon_1\epsilon_2\sin^2(\theta/2)$, and M the mass of the pπ system after collision.

The derivation of (2) is analogous to the derivation of the formula for the cross section for the excitation of nuclei by electrons. In addition, it is assumed that the isobar mass has a Breit-Wigner distribution $f(M) = (1/\pi)\gamma[(M - M_0)^2 + \gamma^2]^{-1}$. We now compare formula (2) with experiment [7,8]. We denote the ratio $(d^2\sigma/d\epsilon_2 d\Omega)_{exp}/(d^2\sigma/d\epsilon_2 d\Omega)_{theor}$ by $G^2_{\Delta p}$. $G_{\Delta p}$ is the form factor of the process under considaration.

$q^2 F^2$	2	5	8	12	16
$G_{\Delta p}$	0.91 ± 0.15	0.62 ± 0.10	0.49 ± 0.05	0.33 ± 0.03	0.21 ± 0.04
G_{Ep}	0.81	0.61	0.48	0.36	0.28

The table lists the values of $G_{\Delta p}$ 1) and the values

$$G_{Ep} = \frac{G_{Mp}}{\gamma_p} = \frac{G_{Mn}}{\gamma_n} = \frac{1}{(1 + q^2/18)^2} \qquad (3)$$

(q^2 is in F^{-2}) of the electromagnetic form factors of the proton and neutron. It is seen from the table that the SU(6) theory predicts correctly the value of the magnetic moment of the transition, and that the form factors are equal, $G_{\Delta p} = G_{Ep}$, with good degree of accuracy when $2\ F^{-2} \leqslant q^2 \leqslant 16\ F^{-2}$.

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1) The value of $G_{\Lambda p}$ listed in the table is determined from the value of $(d^2\sigma/d\epsilon_2 d\Omega)_{exp}/(d^2\sigma/d\epsilon_2 d\Omega)_{theor}$ at $M = M_0$, and the errors are those due to the scatter of $G_{\Lambda p}$ as M varies from $M_0 - \Upsilon$ to $M_0 + \Upsilon$.

SU(3) x SU(3) SYMMETRY AND THE BARYON-MESON COUPLING CONSTANTS

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In this paper we consider the relations between the coupling constants of a unitary octet of baryons with octets of pseudoscalar and singlet vector mesons. The analysis is based on the assumption that the breaking of the SU(6) symmetry for a vertex function with three external lines has a kinematic nature and is due to the presence of two independent four-dimensional energy-momentum vectors in lieu of one, as is the case for the self-energy of the particles when SU(6) symmetry is satisfied.

The requirement that the configuration of the system 4-momenta be invariant leads to the reduction of the SU(6) group to the group SU(3) x SU(3) x U, where the two SU(3) groups correspond to unitary transformations of quarks with different polarization directions along a preferred axis, while the group U corresponds to the usual spatial rotations about this axis. The 35- and 56-plet representations of the group SU(6), corresponding to meson and baryon supermultiplets, contain the following irreducible representations of the group SU(3) x SU(3):

$$(35) \to (3, 3^*);\ (3^*, 3);\ (8, 1);\ (1, 8);\ (1, 1)$$
$$(56) \to (1, 10);\ (10, 1);\ (6, 3);\ (3, 6). \qquad (1)$$

It follows from (1) that the vertex (56*) (56) (35), which is invariant against SU(3) x SU(3) transformations, contains in the general case eight independent parity-conserving interaction constants.

If we confine ourselves to vertices which do not contain the (10, 1) (1, 10), (10, 1), and (10, 1) multiplets, which are classified as baryon resonances because the spin projection in these states is equal to 3/2, then the vertices of the interaction between the baryons