proton beam (Φ_n) on the thickness of the target ($p\ell$) was carried out in Na and Mg vapor and in Ne. It was found that at low energies $\Phi_n(p\ell)$ has a maximum in Na ($T < 30$ keV) and in Mg ($T \leq 60$ keV). For gases, and also in the case of metals at high energies, the plot of $\Phi(p\ell)$ tends monotonically to an equilibrium value. Figure 3 shows the dependences of the equilibrium and maximum values of $n^3\Phi_n$ on the proton energy. In addition, the same Figure shows the calculated values of $n^3\Phi_n$ for Na and Ne from [4]. We see from the Figure that the theory exaggerates the value of Φ. The experimental data obtained in the present work are marked as follows: e - equilibrium target, max - target thickness ensuring maximum yield of highly excited atoms, T - calculated results [4]. It follows from the experimental data that 0.4% of the 15-keV protons undergoing charge exchange in Mg is converted into atoms with $10 \leq n \leq 13$ ($20 \leq E \leq 80$ kV/cm).

The main conclusion that can be drawn from an examination of Figs. 2 and 3 is that vapors of alkaline and alkali-earth metals are more suitable targets for the production of highly excited atoms of hydrogen at energies below 50 keV, and that molecular hydrogen and inert gases are preferable at higher energies.

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ELECTROMAGNETIC PROPERTIES OF MESONS IN BROKEN SU(6) SYMMETRY

Z. R. Babaev, V. S. Zamiralov, and L. D. Solov'ev
Joint Institute of Nuclear Research
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Unitary symmetry broken only by electromagnetic interaction leads to definite relations between the radiative-decay probabilities and the magnetic moments of vector mesons [1]. It is of interest to assess the degree to which these relations change when account is taken of medium-strong interaction that leads to observable mass splitting within unitary multiplets.

Within the framework of SU(3) symmetry, the electromagnetic current describing the radiative decays is a linear combination of octets and singlets, made up of the tensors of vector and pseudoscalar mesons and of the tensor $\delta_B^A + aT_B^A$, where $T_B^A = \delta_3^A\delta_B^3$ corresponds to the medium-strong interaction. In addition to the equations that follow from G-parity conservation

$$g(\rho^{\pm 0} \to \pi^{\pm 0}\gamma) = g(\rho\pi);\ g(K^{*\pm} \to K^{\pm}\gamma) = g(K_c^*K_c);\ g(K^{*0} \to K^0\gamma) = g(\overline{K}^{*0} \to \overline{K}^0\gamma) = g(K_n^*K_n) \quad (1)$$

this current yields in the general case only one relation [2]

$$4g(K^*_n K_n) - g(\rho\pi) = 3[g(\Phi_0 \eta) - (3)^{-1/2} g(\rho\eta) - (3)^{-1/2} g(\Phi_0 \pi)], \tag{2}$$

where Φ_0 is a member of the octet. Φ_0 and the singlet ω_0 are related in a definite way with the physical particles Φ and ω [3].

If we stipulate that the current be an octet, as is assumed when no account is taken of the medium-strong interaction, we obtain two more equations:

$$g(K^*_c K_c) + 2g(K^*_n K_n) = -3g((\rho\pi); \; g(\omega_0 \pi) = \sqrt{3}\, g(\omega_0 \eta). \tag{3}$$

The reasoning within the framework of SU(6) symmetry is analogous. We make up all the possible tensors $I^\alpha_\beta \equiv I^{aA}_{bB}$ of the 35-plet of mesons M and the tensor I + aT, where T corresponds to the medium-strong interaction. We separate the contributions that transform in accordance with representations (8, 3) and (1, 3) of the group SU(3) x SU(2):

$$\begin{aligned} (I^\alpha_\beta)_8 &= I^\alpha_\beta - \frac{1}{2}\, \delta^a_b\, I^{cA}_{cB} - (I^\alpha_\beta)_1, \\ (I^\alpha_\beta)_1 &= \frac{1}{3}\, \delta^A_B\, I^{aC}_{bC} - \frac{1}{6}\, \delta^\alpha_\beta\, I^\gamma_\gamma\,. \end{aligned} \tag{4}$$

For T we use the tensor employed in the derivation of the mass formulas [4], which is a combination of parts of the 35-, 189-, and 405-plets that transform in accordance with the representations (1, 1) and (8, 1):

$$\begin{aligned} &T(35) = 0; \quad T^\alpha_\beta\, (35^8) \equiv T^\alpha_\beta = \delta^a_b\, T^A_B, \\ &T^{\alpha\beta}_{\gamma\delta}\, (I^1) = \delta^a_c\, \delta^B_d\, \delta^A_D\, \delta^B_C \mp \delta^a_d\, \delta^b_c\, \delta^A_C\, \delta^B_D, \\ &T^{\alpha\beta}_{\gamma\delta}\, (I^8) = \delta^a_c\, \delta^b_d\, (\delta^A_D\, T^B_C + \delta^B_C\, T^A_D) \mp \delta^a_d\, \delta^b_c\, (\delta^A_C\, T^B_D + \delta^B_D\, T^A_C), \end{aligned} \tag{5}$$

where I = 189 corresponds to the upper sign and I = 405 to the lower. Expressions (5) are exact, apart from certain contributions, insignificant in our case, which transform in accordance with the lower representations. Taking C-invariance into account, the Lagrangian describing radiative decays and the scattering in a magnetic field $\vec{H}$ is of the form $\vec{H}\vec{\sigma}^a_b\, I^{b1}_{a1}$ where the current is

$$\begin{aligned} I^\alpha_\beta = \sum_{i=8,1} \Big\{ &a_i (M^\alpha_\gamma\, M^\gamma_\beta)_i + b_i (M^\alpha_\gamma\, T^\gamma_\delta\, M^\delta_\beta)_i + c_i\, M^\gamma_\delta\, T^\delta_\gamma\, (M^\alpha_\beta)_i \\ &+ \sum_{I,j} d_i(I^j) [M^\alpha_\gamma\, M^\delta_\epsilon\, T^{\gamma\epsilon}_{\delta\beta}\, (I^i) + T^{\alpha\gamma}_{\delta\epsilon}\, (I^i)\, M^\delta_\gamma\, M^\epsilon_\beta]_i \Big\} \end{aligned} \tag{6}$$

$$(j = 1, 8; \; I = 189, 405).$$

1. In the general case expression (6) leads only to relations (1) and (2) of SU(3) symmetry. The same result is obtained if we leave out the terms corresponding to $T(189^8)$, as is done in mass formulas [4].

2. We assume that the current is an octet. We then obtain in addition to (1) and (2)

$$\begin{aligned} &2g(K_c^* K_c) + g(K_n^* K_n) = -3\mu\,(K^{*0}), \\ &g(\omega\pi) + \sqrt{3}\, g(\eta\rho) = 3g(\rho\pi) + 3\sqrt{3}\, g(\eta\omega) + 2\sqrt{2}\, g(\Phi\pi), \qquad (7) \\ &\mu(\rho^+) - \mu(K^{*+}) = 2\mu(K^{*0}). \end{aligned}$$

If we now leave out the terms with $T(189^8)$, we obtain the additional relation

$$g(K_c^* K_c) + 2g(K_n^* K_n) = \sqrt{2}\, g(\Phi\pi) + g(\omega\pi) - 6g(\rho\pi). \qquad (7a)$$

3. We take into account only that part of the medium-strong interaction, which is a scalar and a 35-plet. We obtain (1), (2), and

$$\begin{aligned} &g(\Phi\pi) = 0; \quad g(\omega\pi) = \mu(\rho^+), \\ &g(\rho\pi) - \mu(\rho^+) = g(K_c^* K_c) - \mu(K^{*+}) = g(K_n^* K_n) - \mu(K^{*0}). \end{aligned} \qquad (8)$$

Finally, if we again assume that the current is an octet, then we obtain the additional equalities given in (7), the first of which is equivalent to

$$g(\omega\pi) = 3g(\rho\pi). \qquad (9)$$

Thus, the broken SU(3) and SU(6) symmetries lead in the general case to the same relations. If we assume that the current is an octet, then both schemes give, generally speaking, different results. It is perfectly feasible to check these relations experimentally.

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INFLUENCE OF INTENSE LASER RADIATION ON THE DISPERSIVE PROPERTIES OF "TRANSPARENT" CRYSTALS

M. S. Brodin, V. N. Batulev, and S. V. Zakrevskii
Institute of Physics, Ukrainian Academy of Sciences
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In a study of the conditions for self-trapping of a laser beam [1], for the generation of harmonics by different means [2], and for similar phenomena, an important role is played by