part, using microscopically charged particles with 2.5 - 250 μ diameter placed in vacuum and suspended in a low-intensity electric field. The instrument consists of a vacuum chamber, in which are located electrodes that produce an electric field with induced balance. Charged droplets of spherical (better - spheroidal) shape are placed in the chamber, in which some of them are captured and suspended in the electric field in such a manner that they occupy an equilibrium position. Any change in their equilibrium position is registered optically. This instrument is used as the basis of an accelerometer that registers any change of an equilibrium position in terms of all three directions of the angular-acceleration vector. The instrument has ideal working characteristics and is immune to the action of any external random factors [2].

The use of such an instrument to observe the helicity of the neutrino is based on an elementary mechanical relation expressing the conservation of angular momentum. If I is the moment of inertia of the drop, equal to $2Ma^2/5$ (M = mass of drop, a = its radius), then the angular acceleration due to rotation induced in it by the spin from all the electrons absorbed in it from radioactive cobalt deposited on the surface of the drop is connected with the number of radioactive decays λN per second (λ = decay constant, N = number of radioactive atoms) by the relation

$$I\dot{\Omega} = \tfrac{1}{2}\hbar\lambda N.$$

The radioactive cobalt can be coated on either side of the droplet surface by evaporation, i.e., condensation from vapor. Such a coating can be made non-uniform with any desired distribution of surface density n. Then

$$\dot{\Omega} = \frac{15\lambda n}{16}\frac{\hbar}{a^3\rho},$$

where ρ is the density of the droplets. In view of the smallness of the droplet radius, observation of the rotation entails no difficulty.

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POSSIBILITY OF DETERMINING THE RELATIVE SIGNS OF THE AMPLITUDES OF HADRON DECAYS OF HYPERONS

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1. The $\Delta T = 1/2$ rule leads, as is well known [1], to the following relations between the amplitudes of the hadron decays of the Λ, Σ, and Ξ hyperons:

$$\Lambda^0_- = -\sqrt{2}\,\Lambda^0_0, \quad (1)$$

$$\Sigma^-_- = \sqrt{2}\,\Sigma^+_0 + \Sigma^+_+, \quad (2)$$

$$\Xi^-_- = -\sqrt{2}\,\Xi^0_0, \quad (3)$$

where the upper index denotes the charge of the decaying hyperon and the lower the charge of the produced pion. We start from the assumption that the existing experimental data agree with (1) - (3).

These data, however, agree likewise with relations obtained from (1) - (3) by reversing any of the signs. The possibility of realizing such relations was considered in several dynamic models of weak hyperon interactions [2-4].

We wish to call attention to the fact that the relative sign of the amplitudes of Λ^0_- and Λ^0_0 or Σ^+_+ and Σ^+_0 can be experimentally determined by measuring the transverse polarization of the proton in the decays $\Lambda \to p\pi^-$ and $\Sigma^+ \to n\pi^+$.

2. Let us consider in detail the Λ-hyperon decay. The relation

$$\Lambda^0_- = \sqrt{2}\ \Lambda^0_0 \tag{4}$$

signifies that the contribution of transitions with $\Delta T = 3/2$ is large ($a_{2/3} = 2\sqrt{2}\ a_{1/2}$), but the ratio of the Λ^0_- and Λ^0_0 decay probabilities is as before 2:1, as in the case (1).

It is clear, however, that the equality (4), unlike (1), can be only approximate, since the amplitudes $a_{3/2}$ and $a_{1/2}$ have different phases, which are equal by virtue of T-invariance to the πN-scattering phases φ_3 and φ_1. If we take into account this phase difference, then (1) and (4) lead to different experimental consequences.

As is well known [1], it is possible to measure in non-lepton hyperon decays, in addition to the total probability, the two independent parameters

$$\alpha = 2\ \mathrm{Re}(a^*b)/(|a|^2 + |b|^2); \quad \beta = 2\ \mathrm{Im}(a^*b)/(|a|^2 + |b|^2),$$

where a and b are the amplitudes of the s- and p-waves, respectively. In particular, the parameter β determines the correlation between the polarization vectors of the initial and final hyperons in the direction of the momentum of the final hyperon ($\vec{\xi}_2 \cdot \vec{\xi}_1 \times \vec{n}$).

The total probability and the parameter α contain only terms with $\cos\varphi_{\pi N}$. Since the πN-scattering phases are small at the energies in question, the predictions that follow from (1) and (4) for these quantities differ little - by an amount of the order of several per cent. Even if such differences become experimentally observable, they can be attributed to violation of the $\Delta T = 1/2$ rule.

On the other hand, the parameter β is proportional to $\sin\varphi_{\pi N}$ and Eqs. (1) and (4) lead to entirely different predictions with respect to the value of β in the decay $\Lambda \to p\pi^-$.

If we denote the ratio β/α by $\tan\varphi$, then in case (1) we get

$$\varphi = (\varphi_{11} - \varphi_1) \approx -8°,$$

and in case (4)

$$\varphi = \tfrac{1}{3}(4\varphi_{31} - \varphi_{11} - \varphi_1 - 2\varphi_3) \approx 0,$$

where φ_{2I} are the πN-scattering phases in the s-wave, and $\varphi_{2I,2J}$ are the πN-scattering phases in the p-waves; we use the following values of the scattering phases: $\varphi_1 = 8°$, $\varphi_3 = -4°$, and $\varphi_{11} \approx \varphi_{31} = 0$. We note that the deviation from the prediction of the $\Delta T = 1/2$ rule in the probabilities amounts in this case to ~1%.

3. As to the Σ hyperon decays, the $\Delta T = 1/2$ rule, as shown in [5], does not lead to an unambiguous prediction of the quantity $\beta(\Sigma_0^+)$. The additional uncertainty is connected with the fact that we do not know at present whether the decay $\Sigma^+ \to n\pi^+$ goes in an s- or in a p-wave. In the former case, when the p-wave is large in the Σ_+^+ decay [5], we have

$$\varphi = \tfrac{1}{3}(\varphi_{11} - 2\varphi_3 - \varphi_1) \approx 6°, \tag{5}$$

and if the s-wave is large in the Σ_+^+ decay, then [5]

$$\varphi = \tfrac{1}{3}(\varphi_{31} + \varphi_{11} - 3\varphi_1) \approx -14° \qquad (\varphi_1 \approx 14°,\ \varphi_3 \approx -8°,\ \varphi_{11} \approx 5°,\ \varphi_{31} \approx -3°). \tag{6}$$

On the other hand, if we assume that relation (7) is valid, then the corresponding formulas take the form

$$\Sigma_-^- = \sqrt{2}\ \Sigma_0^+ - \Sigma_+^+, \tag{7}$$

$$\varphi = \tfrac{1}{3}(4\varphi_{31} - \varphi_{11} - \varphi_1 - 2\varphi_3) \approx -5°, \tag{8}$$

$$\varphi = \tfrac{1}{3}(2\varphi_{31} + \varphi_{11} - 4\varphi_3 + \varphi_1) \approx 15°. \tag{9}$$

We have assumed above that relations (1), (2) or (4), and (7) hold for both the s- and p-waves. We can imagine that for one of the waves the $\Delta T = 1/2$ rule holds, and that the alternate relation holds for the other. The sign of the "up-down" scattering asymmetry should then be different in decays of Λ_-^0 and Λ_0^0. In the case of Σ hyperons, if the relation with the "incorrect" sign is applicable for the description of the wave that is mission in the Σ_+^+ decay, then the result does not differ from the prediction of the $\Delta T = 1/2$ rule, while in the opposite case it coincides with (8) or (9).

We note that since the isotopic spin of the final state is fixed in Ξ_-^-, Ξ_0^0, and Σ_-^- decays independently of the $\Delta T = 1/2$ rule, the method proposed in the present note for determining the relative signs is not applicable for these decays. In this case it is necessary to consider the much more complicated problem of allowance for the interference of the contributions of different diagrams to the probability of the processes $\Xi + N \to N + \Lambda$ and $\Sigma + N \to N + N$ [6].

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ERRATUM

In the article by B. M. Askerov and F. M. Gashimzade, JETP Letters 3, No.9, transl. p. 228 (orig. p. 353), in the 13th line from the bottom, the text should read "Formula (8) can be used also to determine m_0^*" instead of "to determine H_0."