Using the results obtained by investigating the inhomogeneities in the structure of the ionosphere above Khar'kov by the method of vertical sounding during the winter of 1955 — 1956,[2] we have applied the Al'pert formula[1] to calculate the value of δN for ordinary waves.

The size of the inhomogeneities was taken to be 300 m in these calculations. The figure shows the distribution of the values of δN. The observed values of δN run from 0.1×10^{-2} to 2.5×10^{-2}, and the most frequent values are $\delta N = 0.3 - 0.5 \times 10^{-2}$. No noticeable altitude dependence of δN was found for the F-Layer.

In conclusion, the authors express their thanks to Professor Ia. L. Al'pert for giving them the opportunity to familiarize themselves with the theory worked out by him for the scattering of radio waves in the ionosphere prior to publication.

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[2] E. G. Proshkin and B. L. Kaashcheev, Радиотехника и электроника (Radio Engg. and Electronics) **7**, 819 (1957).

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216

PHOTOPRODUCTION OF STRANGE PARTICLES

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IN this note, some questions connected with the photoproduction of strange particles are considered phenomenologically.

Recently, Peaslee[1] proposed a statistical model of the production of strange particles, in which he introduced the relative amplitudes α and β of the sojourn of the nucleon in the dissociated states (Λ, K) and (Σ, K), respectively. This model satisfactorily explains a number of experimental facts connected with the reaction $\pi + N \rightarrow Y + K$, if the value of $|\beta/\alpha|^2$ is taken as $1/3$. The photoproduction of strange particles on nucleons may serve as a verification of this model.

Let us consider, for example, the following reactions on hydrogen:

$$\Lambda^0 + K^+, \quad (1a)$$

$$\gamma + p \rightarrow \Sigma^+ + K^0, \quad (1b)$$

$$\Sigma^0 + K^+. \quad (1c)$$

It is not difficult to see that in the Peaslee model, reaction (1a) will have a cross section proportional to $|\alpha|^2$, and reaction (1c) will have a cross section proportional to $1/3|\beta|^2$. Thus, according to this model, K^+ particles "associated" with the Λ^0-hyperon would be expected to be more prevalent than K^+ particles produced together with the Σ^0 hyperon:

$$\sigma(c)/\sigma(a) = 1/3\,|\beta/\alpha|^2 \approx 1/9. \quad (2)$$

Of course, the energy of the γ-quanta must be above threshold in order to avoid threshold effects.

Since the contribution of the Σ^+ hyperon currents to the cross section is small in comparison with the K^+ meson currents, reaction (1b) must also be considerably repressed with respect to reaction (1c). In the above consideration, we did not take account of the influence of the magnetic moment of the hyperon, which is valid for large energy of the γ-quanta. We note that according to the Peaslee model, a forward directionality of K^+ mesons (in the center of mass system) is expected.

As is well known, a simple classical consideration[2] leads to an excess of π^- mesons over π^+ mesons during their production respectively on neutrons and protons. A similar model is applied to the photoproduction of strange particles.

We will consider in particular the processes:

$$\gamma + p \rightarrow \Sigma^0 + K^+, \tag{3^0}$$

$$\gamma + n \rightarrow \Sigma^- + K^+. \tag{3^-}$$

While these processes are equivalent with regard to the interaction of the γ-quanta fields with the K^+ meson currents, they differ from one another with regard to the interaction of the γ-quanta with the hyperon currents.

Similarly to Ref. 2, the ratio of the cross sections of these processes is (in the laboratory system):

$$\frac{\sigma^0}{\sigma^-} = \frac{|(\mathbf{jA})_K|^2}{|(\mathbf{jA})_{\Sigma^-} + (\mathbf{jA})_K|^2}, \tag{4}$$

where $\mathbf{j}$ is the particle current, and $\mathbf{A}$ is the vector potential of the electromagnetic field. Applying conservation laws, we have (for nonpolarized γ-quanta):

$$\sigma^0/\sigma^- = [1 - (\varepsilon/m)(1 - v\cos\theta)]^2, \tag{5}$$

where ϵ is the total energy of the K^+ meson, v is its velocity, and θ is the angle between the directions of the γ-quantum and the K^+ meson. It is interesting that this equation coincides in form with the equation obtained by Brueckner and Goldberger[2] (m is the nucleon mass, c = 1).

If the magnetic interactions predominate over those of the currents, we obtain for σ^0/σ^- (compare Ref. 3):

$$\frac{\sigma^0}{\sigma^-} = \left(\frac{b}{a}\right)^2 \left[1 + \frac{(a\mu_p - b\mu_n)(\varepsilon/M)(1 - v\cos\theta)}{1 + b\mu_n(\varepsilon/M)(1 - v\cos\theta)}\right]^2, \tag{6}$$

where M is the mass of the Σ hyperon,

$$\frac{1}{a} = \mu_{\Sigma^0} - \frac{m}{M}\mu_p, \quad \frac{1}{b} = \mu_{\Sigma^-} - \frac{m}{M}\mu_n,$$

and μ is the magnetic moment of the respective particle in Bohr magnetons.

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[3] K. A. Brueckner, Phys. Rev. **79**, 641 (1950).

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217

ON THE USE OF TWO AUXILIARY FIELDS TO OBTAIN EMISSION STATES IN QUANTUM MECHANICAL AMPLIFIERS AND GENERATORS

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In order that a system of particles have negative absorption, it is necessary to produce an excess number of particles (active "molecules") in the upper energy level (m) of the given transition (m → q). A number of methods allows one to obtain active molecules by means of an auxiliary high frequency field