$\Lambda\eta$ RESONANCE

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Submitted to JETP editor May 11, 1962

J. Exptl. Theoret. Phys. (U.S.S.R.) **43**, 341-342 (July, 1962)

IN recent experiments [1] the production of the η meson (a resonance in the three pion system with T = 0 and m = 545 MeV) has been observed in the reaction $K^- + p \rightarrow \Lambda + \eta$. The cross section for the production of the η meson amounted to $\sigma_\eta = 0.63 \pm 0.11$ mb when the energy E in the barycentric frame exceeded by 20 MeV the threshold value for this reaction, $m_\Lambda + m_\eta = 1660$ MeV, whereas for $E - (m_\Lambda + m_\eta) = 60$ MeV the cross section was $\sigma_\eta < 0.04$ mb. Such a rapid variation of cross section with energy can be explained only on the assumption that the $\Lambda\eta$ system has a resonance whose mass is approximately 1680 MeV and whose half width is $\Gamma/2 < 10$ MeV. It is obvious that the isotopic spin of this resonant state Y must be equal to zero. Since the mass m_Y is only by 20—30 MeV larger than the threshold for the production of Λ and η it is natural to expect that the orbital angular momentum of Λ and η is zero in the resonant state Y and, consequently, that the parity of Y is the same as the parity of η (the parity of Λ is taken to be +1). According to the existing experimental data [1,2] the η meson is either pseudoscalar (0^-) or vector (1^-). In either case the parity of the Y resonance should be negative.

Beside the decay $Y \rightarrow \Lambda + \eta$ the Y resonance should also decay by other modes: $Y \rightarrow \Lambda + \pi + \pi$, $Y \rightarrow \Sigma + \pi$, $Y \rightarrow \Sigma + \pi + \pi$. (The decay $Y \rightarrow \Sigma + \pi$ is forbidden by isotopic spin selection rules.) At that the decay modes $Y \rightarrow \Lambda + \pi + \pi$ and $Y \rightarrow \Sigma + \pi + \pi$ are improbable in view of the small statistical weight (and, in addition, in the decay $Y \rightarrow \Lambda + \pi + \pi$ the two pions are in a state with $l = 1$ relative to Λ).

The decay $Y \rightarrow \Sigma + \pi$ should, apparently, proceed with appreciable probability, which makes it possible to search for this resonance in the $\Sigma + \pi$ system.1) If the η meson is pseudoscalar, then the pion from the decay $Y \rightarrow \Sigma + \pi$ will be in an s or p state, depending on whether the parities of Σ and Λ are the same or opposite. Unfortunately these two possibilities cannot be distinguished experimentally by studying the angular distribution or polarization of the Σ hyperons because in this case the Y has spin $j = 1/2$. If the η meson is vector then the spin of Y may be either $1/2$ or $3/2$. In the latter case the Y hyperons may turn out to be produced aligned so that an anisotropy could be observed in the angular distribution of the decay pions.

I express gratitude to I. Yu. Kobzarev, S. Ya. Nikitin, and L. B. Okun' for useful discussions.

1)The existing experimental data[3] on the $\Sigma\pi$ interaction in the mass region near 1680 MeV are not sufficient to draw any conclusions about the existence of the Y resonance.

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2 Rosenfeld, Carmony, and Van de Walle, Phys. Rev. Lett. **8**, 293 (1962).

3 Alston, Alvarez, Eberhard, Good, Graziano, Ticho, and Wojcicki, Phys. Rev. Lett. **6**, 698 (1961).

Translated by A. M. Bincer
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IONIZATION LOSSES OF ULTRARELATIVISTIC ELECTRONS

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Submitted to JETP editor May 12, 1962

J. Exptl. Theoret. Phys. (U.S.S.R.) **43**, 342-345 (July, 1962)

THE calculation of the ionization losses of fast charged particles, involving a treatment of the Coulomb scattering on the electrons of the medium, has so far been carried out only in the first approximation of perturbation theory. [1] The general character of the ionization-momentum relation may change appreciably when the second-order approximation of perturbation theory, i.e., radiative corrections, are taken into account. [2,3] The contribution of such corrections may be comparable in magnitude to the effect of the relativistic increase in the ionization losses, which in dense media is strongly reduced by the density effect. [4]

An essential feature of the radiative corrections, calculated according to the diagram of Fig. 1, is that in the given case the virtual photon propagates not in a vacuum but in a medium with refractive