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* The EPR spectra of donor nitrogen in small-crystal samples are considered in [9,10].

SEARCH FOR RESONANCES IN A SYSTEM OF TWO BARYONS WITH s = -1 AND s = 0

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At present the existence of resonances in systems of elementary particles with baryon number greater than unity is not known to be forbidden. This paper is devoted to an investigation of the mass spectrum of dibaryon states of the systems Λp and pp, obtained by reducing the photographic data from the 55-cm propane bubble chamber of the JINR High-energy Laboratory [1], irradiated with neutrons having kinetic energies up to 10 GeV [2]. The neutrons were obtained by interaction of maximum-energy protons with a beryllium target measuring 5 x 5 x 2 cm placed in the vacuum chamber of the accelerator. The neutron beam axis was tangent to the proton trajectory at the point of target location. Steel collimators 1.5 and 2.2 m long produced on the front wall of the chamber a sharp image of the

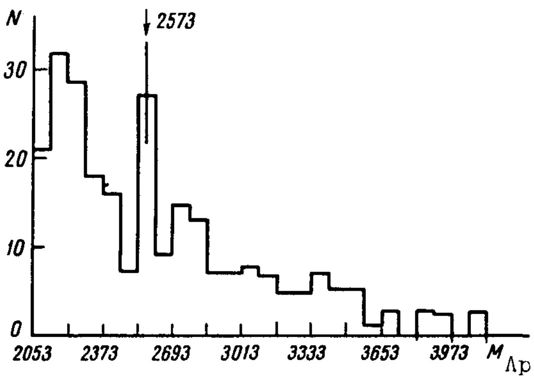

Fig. 1. Effective-mass spectrum of the Λp system, from single- and three-prong events produced on free protons.

target, 14 x 3 cm in cross section. A lead absorber, of thickness 4 cm in the beam direction, was placed in the channel to shield against the gamma and electron backgrounds. The charged-particle background was negligible. The chamber operated in a 15.2 kG magnetic field homogeneous within 2% over the entire chamber. The distance from the chamber to the target was 44 m. The V^0 particles were identified in accordance with the program described in [3]. The geometric efficiency of registration of events with V^0 particles was calculated in accord with [4]. Events produced on free protons were separated from events produced on carbon nuclei by using the so-called limiting kinematics [5]. The separation of the different reaction channels and the identification of the charged particles was in accord with a kinematic program [6] and by measuring the ionization and the δ-electrons. We present here the preliminary results. The effective-mass spectrum of the Λp system, as obtained from single- and three-prong events on free protons, is shown in Fig. 1. A peak located three standard deviations away from the neighboring intervals is observed in the mass interval 2533 - 2612 MeV. The width of the peak, with allowance for the mass resolution, which equals 25 MeV in this region of the spectrum, is about 80 MeV. We were unable to model this peak within the framework of the isobar model, in the most dangerous reactions (from the point of view of imitating the peak)

$$\begin{aligned} np &\to p\,Y^{1688} \\ &\to N^*_{1236}\,Y^{1688} \\ &\to N^*_{1688}\,Y^{1688}\,, \end{aligned} \tag{1}$$

where

$$\begin{aligned} N^*_{1236} &\to p\,\pi \\ N^*_{1688} &\to p\,\pi \\ Y^{1688} &\to \Lambda\,K^{\overset{+}{0}}\,. \end{aligned}$$

In the modeling, the momentum of the primary deuteron was varied from the thresholds of the reactions (1) to the maximum value. The widths of such kinematic peaks, more correctly humps, turned out to equal several hundred MeV. The tops of the humps are displaced when the primary-neutron momentum is varied. In our experiment these humps are integrated over the primary-spectrum neutrons, which can result only in a smooth curve with an even broader maximum. We have subsequently investigated the mass distributions of the systems $\Lambda K^{\overset{+}{0}}$, $\Lambda\pi^{\pm}$, $p\pi^{\pm}$, and $K^{\overset{+}{0}}$. In all these distributions, events comprising a peak in the Λp mass spectrum are not concentrated in regions close to the masses of the known isobars and resonances. If this peak is due to resonance in the Λp system, then its mass is $M_{\Lambda p} = 2573 \pm 8$ MeV, and the total width is about 80 MeV.

Figure 2 shows the effective-mass distribution of the Λp system in events satisfying the conservation laws for the electric and baryon charges, but not satisfying the kinematics of production on free protons. A strongly pronounced peak with maximum at 2062 ± 9 MeV is observed in the mass region 2053 - 2093 MeV. This result agrees with that of [7]. In the region of masses exceeding 2093 MeV, a "shoulder" is observed, and can apparently be associated with the peak obtained in [8].

Figure 3 shows the mass spectrum of the Λp system in events showing a visible disintegration of the carbon nucleus. A peak with a maximum at 2220 MeV and width less than 40 MeV is observed in the mass region 2213 - 2253 MeV and is located more than two standard deviations away from the neighboring intervals. This mass value agrees with that given in [8].

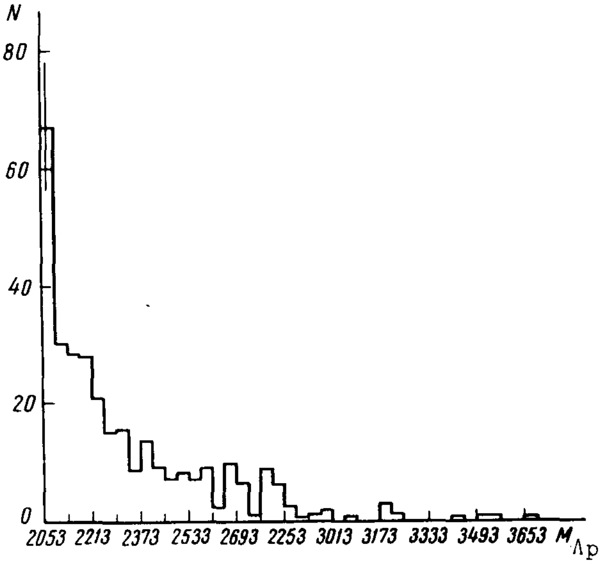

Fig. 2. Effective-mass spectrum of the Λp system, from events satisfying the electric and baryon charge conservation laws, but not satisfying the kinematics of production on a free proton.

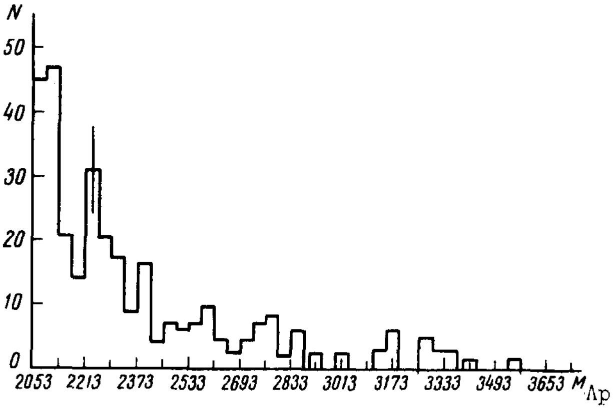

Fig. 3. Effective mass spectrum of the Λp system, from events with visible nuclear disintegration.

No singularities were observed in our experiment in the pp-system mass spectrum from three- and five-prong events without strange particles.

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INFLUENCE OF DISPERSION EFFECTS ON THE STRUCTURE OF A SHOCK WAVE IN A MAGNETIZED PLASMA

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An important manifestation of the dispersion properties of a magnetized plasma are shock waves with an oscillatory profile. The solutions obtained in the theory depend on the inclination of the front to the magnetic field [1]. At angles $\theta \ll \sqrt{m_e/m_i}$ ("straight wave" [1]) the oscillations have a "length" $\delta \sim c/\omega_0$ and lag the main discontinuity on the front; when $\theta \gg \sqrt{m_e/m_i}$ ("oblique wave" [1,2]) the oscillations lead the discontinuity ($\delta \sim \theta(c/\Omega_0)$; m_e and m_i are the electron and ion masses; ω_0 and Ω_0 are the electron and ion plasma frequencies; c is the speed of light). The profile and the characteristic dimensions of the plasma perturbations observed in [3-5] have made it possible to identify them with the oblique [3] and straight [4,5] shock waves. However, in these and similar experiments [6] the inclination angle θ was not measured directly and its role in the wave processes was not investigated. Experiments of this type are described in this paper. We have correctly compared the value of δ for an oblique quasistationary wave with the theoretical value, whereas in the earlier papers [3,6] rather arbitrary estimates of θ were made on the basis of the experimental geometry. Registration of θ has made it possible to investigate the dispersion effects and the structure of the waves at angles $\theta \gtrsim \sqrt{m_e/m_i}$ and $\theta \lesssim \sqrt{m_e/m_i}$, for which there is no analytic description of the phenomenon. The influence of the dispersion was investigated under the conditions of a laminar and turbulent plasma.

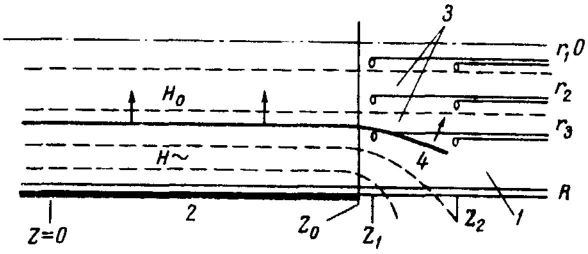

Fig. 1. Diagram showing excitation and registration of the shock waves. 1 - Vacuum volume (glass tube, R = 8 cm); 2 - shock coil (section exciting the field $H_\sim$ (z = 0 is the location of the central section, z_0 = 15 cm corresponds to the edge of the coil); 3 - magnetic probes (r_1 = 0.5 cm, r_2 = 2.9 cm, r_3 = 5.3 cm, $z_2 - z_1$ = 5 cm); 4 - wave front; H_0 = 0 - 2 kOe, $H^0_\sim$ = 1 - 5 kOe.

The experiments were made with the UN-4 setup [4,5]. A plasma placed in a quasistationary magnetic field H_0 was subjected to a fast ($\Delta t \sim 50 - 300$ nsec) compression by an alternating magnetic field $H_\sim$ applied to its boundary (Fig. 1). The space-time evolution of the perturbations was recorded by a system of six magnetic probes. From the relative delays