into a lower triplet and an upper doublet. Fields of lower symmetry acting on the magnetic ion Zr^{3+} as a result of distortions of the octahedron bring about a further splitting of the lower orbital triplet into a singlet and a doublet. For the interpretation of the nature of the width and shape of the Zr^{3+} EPR line we start from the theory Van Vleck[1] proposed for cesium-titanium alums, according to which the spin-lattice relaxation time $\tau \sim \Delta^6$, where Δ is the magnitude of the splitting of the lower orbital triplet. The width of the line at 450 Mc is determined by this relaxation mechanism. The shape and width of the line at 9320 Mc is in addition caused by g-factor anisotropy and by the fact that the oxygen octahedrons have a different degree of distortion.[2,3] Hence, the EPR line we observe at this frequency is a superposition of a large number of lines having different g-factors and can be described by a spin Hamiltonian of the form

$$\hat{H} = \sum_i (g_{xi}\beta H_x \hat{S}_x + g_{yi}\beta H_y \hat{S}_y + g_{zi}\beta H_z \hat{S}_z).$$

Finally, it should be mentioned that hyperfine splitting of the EPR line from the odd isotope Zr^{91} (11.23%) could not be detected. This can be explained by the fact that at 9320 Mc the line width is of the order of the hyperfine splitting constant, and at 450 Mc the strong-field condition is not fulfilled.

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RESONANCES IN THE BARYON SYSTEM WITH STRANGENESS $|S| = 1$

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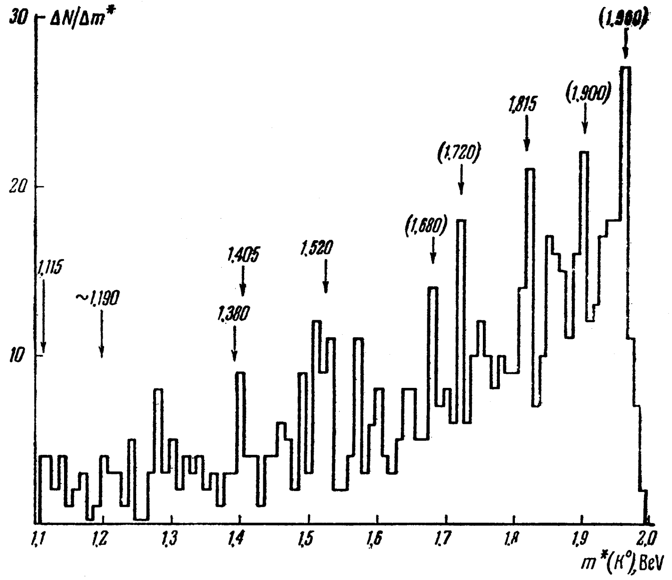
USING xenon[1] and freon[2] bubble chambers we have studied the spectrum of the missing mass, determined by the K_1^0 meson in the reaction

$$\pi^- + N \rightarrow K^0(\bar{K}^0) + Y(K,\ N) + m\pi, \qquad m = 0,1\ldots, \qquad (1)$$

proceeding on bound nucleons of the nuclei of the freon mixture ($C_2F_5Cl_3$) and xenon. The momentum of the incident π^- mesons was equal to 2.8 BeV/c. In the scanning of the photographs those stars were selected that were accompanied by V^0 events correlated with the point of interaction. The K^0 mesons were identified by the angles of emission of the decay products relative to the trajectory of the decaying particle and by measured values of the ionization and range of the decay products. The details of the experimental setup were given in [3,4]. For each event corresponding to reaction (1) the momentum and angle of emission of the K^0 meson relative to the direction of the incident π^- meson in the laboratory system were determined. The momentum of the K^0 mesons was determined accurate to within ±4%, and the angle of emission to within ±1%.

Starting from the value of the momentum of the K^0 meson and the incident π^- meson and assuming that the incident π^- meson collides with a quasi-free nucleon at rest, it is possible to determine the energy and the momentum of the system Y(K, N) + $m\pi$ and, consequently, its effective mass m^* (by the well known relation $m^{*2} = E^{*2} - p^{*2}$). The spectrum of masses m^*, constructed on the basis of ~ 700 events of K_1^0 meson decays, is shown in the figure in which the arrows indicate the masses of presently known hyperons and hyperon resonances.[5-7] New maxima are also observed (shown in brackets) at 1680, 1720, 1900, and 1960 MeV, how-



Number of events versus the effective mass of the system of particles Y(K, N) + $m\pi$ (m = 0, 1, 2).

ever their statistical reliability is not large. At the present time no data are available that either confirm or deny the existence of these maxima.

An indication of the possibility of a resonance in the (KN) system at an energy of 1710 MeV has also been obtained in the work of Barmin et al;[8] the possible existence of a resonance at 1680 MeV in the ($\Lambda\eta$) system has been discussed by Ioffe.[9] Previously[10] it had been discovered that part of the K^0 mesons are secondary, arising from the decays

$$Z^0 \rightarrow K^0 + \Lambda^0 + Q, \qquad (2)$$

where Q, the binding energy, is equal to ~ 40 MeV.

The analysis of the experimental data shows that the K^0 mesons from reaction (2) give values of m^* in the interval 1.8—1.97 BeV and grouped near the maximum possible value $m^* = 1.97$ BeV.

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CURVES OF THE COMMENCEMENT OF SOLIDIFICATION OF HELIUM ISOTOPE SOLUTIONS

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In recent years the thermodynamic properties of solutions of He^3 in He^4 have been investigated in great detail. The exception is the equilibrium diagram of the liquid and solid phases of this solution system for which only limited data are available.[1,2]

To obtain the data necessary for plotting this equilibrium diagram, we carried out experiments to establish the relationship between the solidification pressure and the composition of the liquid phase. Use of the method of thermal analysis allowed us to determine the temperature and pressure at the commencement of solidification of a solution of known composition by recording the kinks on the time dependences of these quantities.

The calorimeter temperature was measured with a carbon resistance thermometer. The pressure inside the calorimeter was found from the elastic deformation of the calorimeter walls. The deformation was deduced from the increase in resistance of a strain gauge in the form of a constantan wire wound on the cylindrical surface of the calorimeter.

Using this method the curves for the initial stage of solidification were obtained for solutions containing 10.3, 24.1, 53.0, and 76.4% He^3, and calibration tests with He^4 were performed at temperatures from 1.5 to 4.2°K at pressures up to 140 atm. The average error in measurement of the temperature did not exceed 0.01 deg K and in determination of the pressure the error was 0.5 atm. The results are given in Fig. 1 which shows that with increase of the light isotope content of the solution the pressure at the commencement of solidification increases monotonically at all test temperatures. For comparison Fig. 1 also includes the solidification curve of pure He^3 obtained by Grilly and Mills.[3]

The results obtained allow us to plot the dependence of the solidification pressure on the composition of the liquid phase for various temperatures (the "liquidus" line) which is shown in Fig. 2.