Onsager-Feynman vortices at the He I—He II transition in rotating helium. From our preliminary data, which still need to be made more precise, this time is on the order of 4 min, for a temperature of 2.15°K.

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SEARCH FOR RESONANCES IN THE $K^0\overline{K}^0$ *PAIR-PRODUCTION REACTION*

V. V. BARMIN, Yu. S. KRESTNIKOV, E. V. KUZNETSOV, A. G. MESHKOVSKIĬ, and V. A. SHEBANOV

Institute of Theoretical and Experimental Physics

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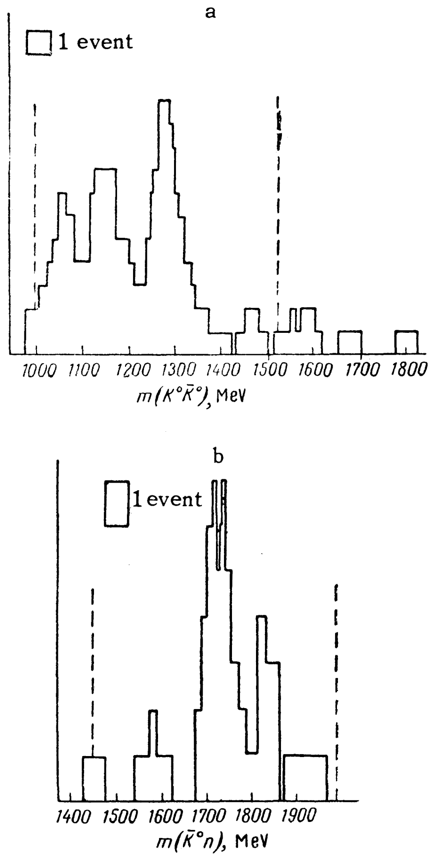
IN the study of the process of production of $K^0\overline{K}^0$ meson pairs by negative pions with 2.8 BeV/c momentum, using a freon (C, Cl, F)[1] and xenon (Xe)[2] double chamber, in the reaction

$$\pi^- + (A, Z) \rightarrow K^0 + \overline{K}^0 + (A, Z)^* + n\pi, \qquad n = 0, 1, 2, \ldots \tag{1}$$

thirty-eight $K^0\overline{K}^0$ pair-production events were observed in freon and thirteen in xenon. The experimental procedure was described in detail previously[3,4]. In order to search for the possible resonances in the $K^0\overline{K}^0$ system, we have plotted the distribution of the obtained pairs by their effective masses (Fig. a). The accuracy with which the masses were determined is approximately ±25 MeV. The dashed lines indicate the limiting values of the mass $m(K^0\overline{K}^0)$. The distribution obtained has a noticeable peak at $m(K^0\overline{K}^0) = 475$ MeV,



Distribution of the $K^0\overline{K}^0$ and $\overline{K}n$ systems over the effective masses.

but its reliability is low in view of the scanty statistics.

Kobzarev and Okun'[5] predicted the existence of a pseudoscalar σ_0 meson, which decays in accord with the scheme $K^0 + \overline{K}^0 + \pi^0$. This decay could lead, in principle, to the appearance of a peak in the $m(K\overline{K})$ distribution, but in this case ten out of the twenty $K^0\overline{K}^0$ pairs, which fall in the peak, should be accompanied by at least one electron-positron pair (in accordance with the efficiency of registering π^0 mesons in our chambers). In fact, only one such event was observed (in the freon chamber), thus completely refuting the hypothesis that we are observing a σ_0 decay. It must be noted that for events that occur at the peak, n = 0 (in approximately 70% of the cases), while for events outside the peak n = 1 (also approximately in 70% of the cases).

The $K^0\overline{K}^0$ pairs can appear also during the production of some excited hyperons, which decay rapidly into a $\overline{K}$ and a nucleon, as was observed for example in [6]. We have attempted to observe a reaction of the type

$$\pi^- + p \rightarrow \underset{\substack{\downarrow \\ n + \overline{K}^0}}{Y^*} + K^0. \tag{2}$$

If the reaction (1) does actually go in some of the cases via the intermediate reaction (2), then a peak corresponding to the mass Y^* should appear in the spectrum of the lacking masses for the K^0 mesons. In our material there are nine events (six in freon and three in xenon) in which two K^0 mesons are emitted from the production point without being accompanied by any charged particles or gamma quanta. Such events are most probably interpreted as the reaction

$$\pi^- + p \rightarrow K^0 + \overline{K}^0 + n,$$

the products of which do not experience secondary interactions in the parent nucleus. In this case we can calculate with sufficient reliability the effectice mass of $\overline{K}^0 + n$ from the momentum and angle of emission of the K^0 meson. The results obtained are shown in Fig. b. Inasmuch as we do not distinguish the K^0 from the $\overline{K}^0$, the lacking masses were calculated for both K^0 mesons. The distribution has a narrow peak at an energy 1715 MeV, but the statistical guarantee of this peak is exceedingly small. The dashed lines show the limiting values of the $\overline{K}n$ mass. Since the same K^0 meson cannot simultaneously participate in the $K^0\overline{K}^0$ and $\overline{K}^0n$ resonances, the K^0 mesons entering in the peak at 1715 MeV should not enter in the peak at 1275 MeV. This condition is actually observed.

In view of the small statistical assurance, the results obtained must be regarded as only an indication of the possibility of resonances in the $K^0\overline{K}^0$ system at 1275 MeV and in the $\overline{K}n$ system at 1715 MeV.

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