Hadron Physics in Bubble Chambers

K* RESONANCES PRODUCED BY 3.5 GeV/c K⁻ INTERACTIONS IN HYDROGEN

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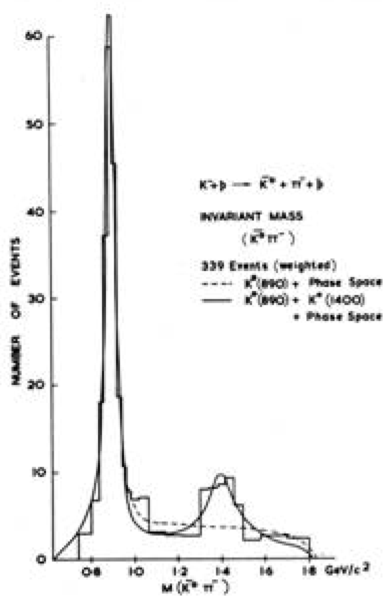

Discovery of the $K^*(1400)$

The observation of this $J^P = 2^+$ strangeness 1 state in3.5 GeV/c K^- p interactions helped to complete a new nonet of meson states and contributed to the establishment of the SU(3) quark--antiquark model for meson constituents.

AN Ω^- PARTICLE PRODUCED BY A 6 GeV/c K^- MESON IN HYDROGEN

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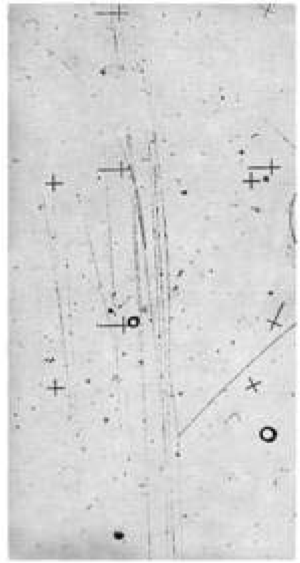
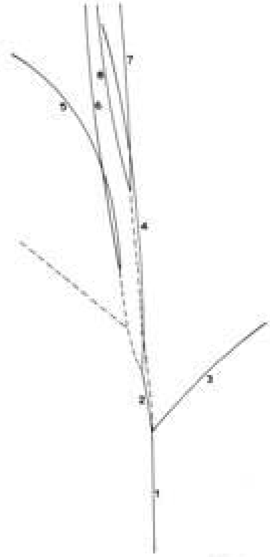




The Ω^- Hyperon

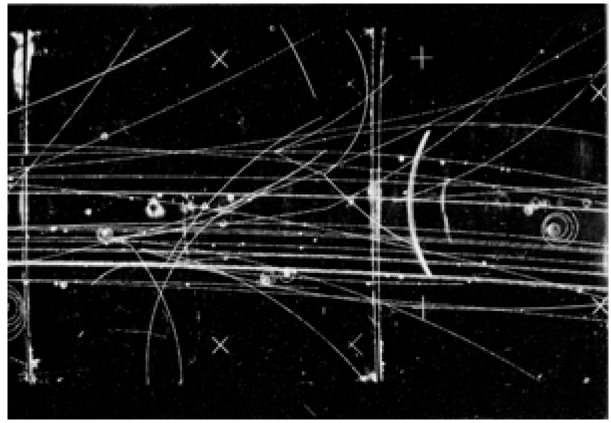
This event, produced by a 6 GeV/c K^- meson in the 1.5m British National Hydrogen Bubble Chamber at CERN, provided the first confirmation of the discovery of the Strangeness -3 Ω^- hyperon at the Brookhaven National Laboratory in the US. The existence of the Ω^- was the 'key-stone' firmly establishing the Gellmann–Zwieg quark model of hadron structure. The sequence of events shown in the picture is:

$$K^- + p \rightarrow K^0 + K^+ + \Omega^-$$

$$\Omega^-(\text{track } 2) \rightarrow \Xi^0 + \pi^-; \quad \Xi^0 \rightarrow \Lambda^0 + \pi^-$$

$$\Lambda^0 \rightarrow p + \pi^- \text{ and } K^0 \rightarrow \pi^+ + \pi^-$$

PEPR semi-automatic scanning and measuring console and operator.



Particle tracks in CERN 2m hydrogen bubble chamber

A NEW STUDY OF Kπ SCATTERING BETWEEN 0.7 AND 2 GeV/c²

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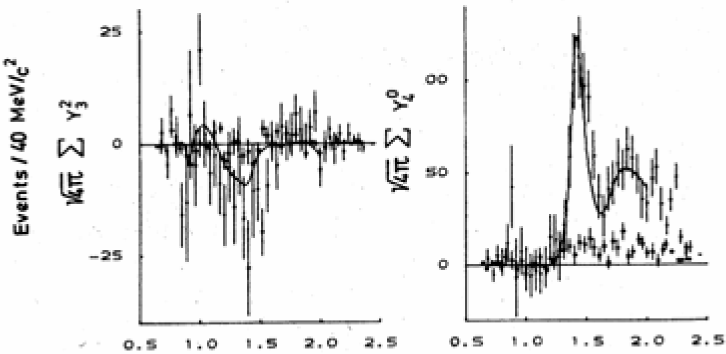

K π masses

The figure above is taken from one of several papers in a programme of high statistics bubble chamber experiments looking at hadronic states and production mechanisms. The data are from the interaction $K^+d \rightarrow K^+ \pi^- p(p)$ at 5.4 GeV/c, used to study $K^+ \pi^-$ scattering. The figure shows one example of the detail obtained for the moments of spherical harmonics. All aspects of the data up to 2 GeV/c^2 were explained using s,p,d and f-waves, including evidence for an f-wave resonance at ~ 1.76 GeV/c^2.

Charm hadron properties in 400 GeV/c pp interactions *

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Properties of Charm Hadrons

This experiment used the high-resolution Little European Bubble Chamber (LEBC), followed by the European Hybrid Spectrometer (including Oxford's ISIS) in a study of Charm hadrons produced by 400 GeV/c protons in hydrogen. At a time when information on charm particles was still very limited, a harvest of new, accurate data was obtained on masses, lifetimes, decay modes, cross-sections and production mechanisms.

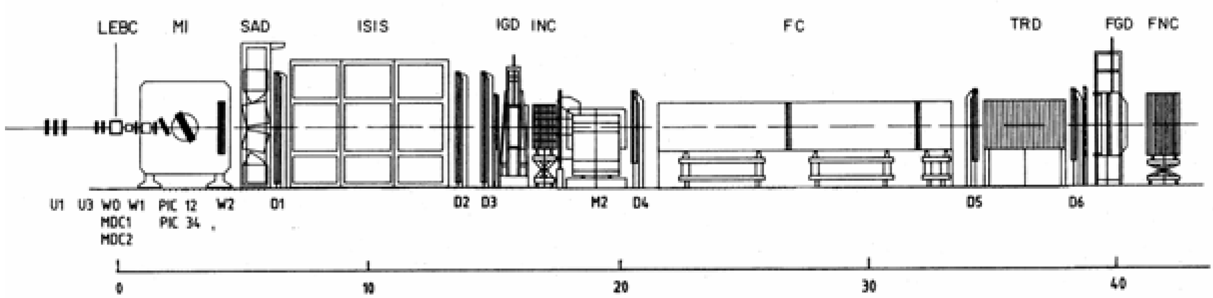

Fig. 1. The European Hybrid Spectrometer in the version used for the NA27 proton exposure