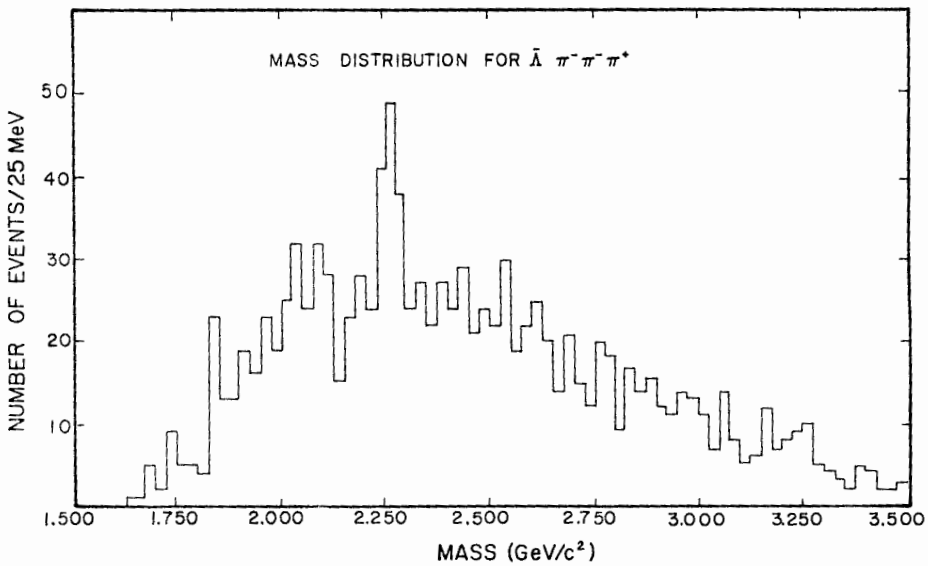
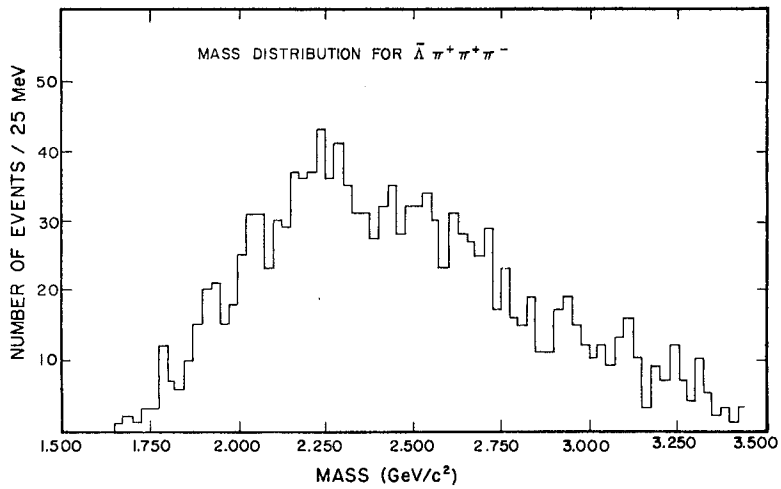
CHARMED ANTIBARYON

John Peoples

The discovery of a narrow antibaryon resonance that the members of E-87 interpret as evidence for a charmed antibaryon was announced on August 19. The resonance was identified through its decay into $\bar{\Lambda}^{o}\pi^{-}\pi^{-}\pi^{+}$. Its mass was 2.26 ± 0.01 GeV/c^2 and its measured width was less than 75 MeV/c^2, consistent with zero width. The experimenters did not observe a resonance in the final state of $\bar{\Lambda}^{o}\pi^{+}\pi^{+}\pi^{-}$ at a mass of 2.26 ± 0.01 GeV/c^2. Since the final state of the resonance has isospin of at least 1, the absence of the additional members of the charged multiplet suggests a weak decay in which isospin changes. A resonance that decayed strongly would conserve isospin in its decay. Both mass distributions are shown below.





Glashow, De Rújula, and Georgi predicted that the lightest charmed baryon Λ^+_c, would have a mass of 2.25 ± 0.05 GeV/c^2. The Λ^+_c is the charmed analog to the Λ^o, wherein the strange quark is replaced by a charmed quark. The predicted mass was based by the aforementioned authors on a single neutrino event in a Brookhaven Bubble Chamber experiment. The Λ^+_c has isospin zero and its non-leptonic decay will lead to an isospin -1 final state. Since these features were observed experimentally, the members of E-87 identified the resonances as the isospin-zero charmed baryon.

The experimenters have also presented evidence for the existence of a charmed antibaryon with a mass of 2.5 GeV/c^2, which decays strongly with the emission of a soft pion into the $\bar{\Lambda}_c$. This resonance, denoted as the Σ_c, would be analogous to the Σ.

Participants in E-87 are from Columbia University, the University of Illinois, and Fermilab. Wonyong Lee is the spokesman.