

$$\tau_{D^0} = (4.4_{-0.6}^{+0.8}) \times 10^{-13} \text{ sec.}$$

$$\tau_{D^+} = (9.2_{-1.2}^{+1.7}) \times 10^{-13} \text{ sec.}$$

(ix) *Semileptonic decays.* The DASP experiment at DESY has identified electrons in multiprong events ($N > 3$) with a maximum signal observed in the $E_{\text{cm}} = 4.0-4.2$ GeV region. They have also observed $K^+ - e$ correlations which peak in the same E_{cm} region. Furthermore the PLUTO group at DESY have observed K_s^0 correlations also peaked in the $E_{\text{cm}} = 4.05$ GeV region. More recently the decay modes

$$\begin{aligned} D^0 &\rightarrow K^- e^+ \nu \\ &\rightarrow K^{*-} e^+ \nu \end{aligned}$$

have been identified and the decay spectrum measured in the LGW and DELCO experiments at SPEAR⁽²³⁾ as well as in the DESY experiments. The existence of semileptonic decays is further proof for the weak interaction being responsible for D decays as predicted for charmed quarks.

(x) *The Cabibbo-suppressed decay modes.* The charm model also predicts a specific ratio between Cabibbo enhanced and suppressed decay modes. For example,

$$(D^0 \rightarrow \pi^- \pi^+) / (D^0 \rightarrow K^- \pi^+) = \tan^2 \theta_c$$

where θ_c is the Cabibbo angle. The decay modes

$$D^0 \rightarrow \pi^+ \pi^-$$

and

$$D^0 \rightarrow K^+ K^-$$

were later observed in the SLAC-LBL MARK II detector.⁽²³⁾ The average value for the two decay modes is indeed consistent with the above relation.

Establishment of the Cabibbo suppressed decay modes is another characteristic requirement of charmed quarks.

(xi) *The F-meson.* In addition to the D^0 and D^+ , the isodoublet of the charm model, which correspond to $\bar{u}c$ and $\bar{d}c$, an additional singlet $\bar{s}c$ is predicted. This object was expected to have decay modes into two strange particles, $F^+ \rightarrow K^+ K^- \pi^+$, for example. This state was hard to find, at first. Early indications were observed at a mass of 2040 MeV, but very recently the clear observation has been made in the CLEO experiment at CESR, the ARGUS experiment at DORIS and the TASSO experiment at PETRA.⁽²⁷⁾ These experiments observe the decay $F^+ \rightarrow \phi \pi^+$ at a mass of $M_F = 1970 \text{ MeV}/c^2$.

These observations together with possible evidence for an F^* from ARGUS and the TPC at PEP, complete the picture, and give us an unambiguous identification of the charmed mesons.

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