Results on Charmed Meson Decay from the WA82 Experiment at the CERN Omega Spectrometer

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Much work has been carried out in trying to understand the so-called charm-decay puzzle [1]: 1^o the difference between the lifetime of the D^+ meson and the lifetimes of the D^0 and D_S^+ mesons; 2^o disagreements between experimental data and theoretical expectations for D^0 decays. It has been shown early [2] that the origin of this puzzle was in the non-leptonic sector. Effects of possible relevance include non-leptonic decays occurring via processes not described by spectator diagrams, final-state interactions and the destructive interference that may arise in the Cabibbo-favoured decays of the D^+ but not in the decays of the D^0. It is noted that doubly Cabibbo-suppressed D^+ decays are not subject to destructive interference, therefore their relative branching fractions might be enhanced [3].

The WA82 experiment [4] has collected data from 1987 to 1989 with the Ω' spectrometer at the CERN SPS. The aim of WA82 was a high statistics study of charm hadroproduction, using a silicon microstrip vertex detector and a trigger on impact parameter. WA82 is also studying rare decay modes for charm. The experiment has measured relative branching fractions for several charmed meson non-leptonic decay modes: Cabibbo-suppressed D^0 2- and 4-body decays [5] and $D^\pm$ and $D_S^\pm$ 3-body decays, in particular those which cannot occur through simple spectator diagrams. This analysis, using the particle identification provided by a Ring Imaging CHerenkov detector (RICH), gives an indication for a new decay mode, $D^+ \rightarrow K^-K^+K^+$, doubly Cabibbo-suppressed [6].

[1] I. I. Bigi, in *Heavy quark Physics*, edited by Persis S. Drell and David L. Rubin, AIP Conference Proceedings No. 196 (American Institute of Physics, New York, 1989), and references therein.

[2] A. Pais et S. B. Treiman, Phys. Rev. **D 15** (1977) 2529.

[3] I. I. Bigi, *Proceedings of the* 16^{th} *SLAC Summer Institute on Particle Physics*, edited by E. C. Brennan (Stanford University, Stanford, 1988).

[4] M. Adamovich *et al.* (Coll. WA82), IEEE Trans. Nucl. Sci. **37** (1990) 236. M. Adamovich *et al.* (Coll. WA82), Nucl. Instr. and Meth. in Phys. Res. **A 309** (1991) 401.

[5] M. Adamovich *et al.* (Coll. WA82), Phys. Lett. **B 280** (1992) 163.

[6] M. Adamovich *et al.* (Coll. WA82), CERN-PPE/93 – 27 18-02-1993. To appear in Physics Letters B.