



Contribution ID: 17

Type: **contributed parallel talk**

Charm-flavor-conserving weak decays of charmed baryons: A story that has lasted 30 years

Thursday 20 July 2023 17:10 (20 minutes)

Three decades ago, heavy-flavor-conserving (HFC) weak decays of heavy baryons such as $\Xi_Q \rightarrow \Lambda_Q \pi$ and $\Omega_Q \rightarrow \Xi_Q \pi$ for $Q = c, b$ had been studied within the framework that incorporates both heavy-quark and chiral symmetries. HFC decays have two great advantages: (1) S-wave can be evaluated reliably using current algebra, and (2) if the heavy quark in the HFC process behaves as a spectator, then the P -wave amplitude of $\Xi_Q \rightarrow \Lambda_Q \pi$ will vanish. In the b sector, HFC decay was first measured by LHCb in 2014 and it was well understood. However, HFC decay in the charm sector, namely, $\Xi_c \rightarrow \Lambda_c \pi$ was not measured until 2020. The theoretical prediction of its branching fraction is too small compared to experiment. The puzzle was finally resolved recently. It takes thirty years to fully understand the underlying mechanism for charm-flavor-conserving weak decays of charmed baryons.

Consent

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Session Classification: Parallel A

Track Classification: decays