Contribution ID: **17** Type: **Regular talk (15'+5')**

Study of the $K\bar{K}$ $S-$wave amplitude near threshold in the $D^+ \to K^-K^+K^+$ decay

Monday 4 December 2023 16:50 (20 minutes)

The description of scalar mesons has been a persistent challenge in the field of light meson spectroscopy over the past several decades. Notably, the investigation of scalar states, such as the $a_0(980)$ and the $f_0(980)$, has been of significant interest due to the limited understanding of their properties. Amid these ongoing challenges, the study of three-body decays of charmed mesons, employing Dalitz plot analysis, has emerged as a valuable tool for probing the nature of these states.

Within this context, the doubly-Cabibbo suppressed decay $D^+ \to K^-K^+K^+$ stands out as a promising channel for conducting investigations at LHCb. This decay process offers a unique opportunity to gain insights into the $K\bar{K}$ $S-$wave amplitude, a fundamental component in determining branching fractions and couplings of scalar states to their final decay products. Additionally, this amplitude holds relevance for measurements of CP-violation in B_s meson decays.

The main focus of this presentation is to provide an update on the latest findings regarding the $K\bar{K}$ $S-$wave amplitude in the $D^+ \to K^-K^+K^+$ decay channel. The data employed in this study were collected using the LHCb detector during the period spanning from 2016 to 2018, from proton-proton collisions. This dataset corresponds to an integrated luminosity of 5.6 fb^{-1} and was acquired at a center-of-mass energy of 13 TeV.

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