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Discovery of CP violation in charm decays at LHCb experiment and prospects for Run III and Run IV

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The existence of CP violation in the decays of strange and beauty mesons is very well established experimentally. On the contrary, CP violation in the decays of charmed particles has never been observed before (2018). During the LHC Run I and Run II the LHCb collaboration has collected a huge sample of charmed hadrons. This sample enables some of the most sensitive searches for CP violation ever performed. In this presentation, the results of the latest search for time-integrated CP violation in $D^0 \to K^-K^+$ and $D^0 \to \pi^-\pi^+$ decays, performed using the full data set collected by LHCb corresponding to an integrated luminosity of $9fb^{-1}$, will be discussed. The flavour of the decaying charm meson is determined by looking at the charge of the pion from the strong decay $D^*(2010)^+ \to D^0\pi^+$ for promptly produced D^0, or at the charge of the muon in semileptonic $\bar{B^0}, B^- \to D^0\mu^-\bar{\nu}_\mu X$ decays for secondary production of D^0. Also a brief prospects for further analyses (especially including Ξ_c barion decay) will be presented.

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