Contribution ID: **91** Type: **Oral**

extremely strong evidence of CPV in baryon-anti-baryon production processes of heavy hadron decays

The violation of the charge-parity (CP) transformation symmetry, which although has been observed in plenty of pure meson decay processes, was only confirmed just very recently by the LHCb collaboration in the four-body decay of the heavy baryon Λ_b^0, $\Lambda_b^0 \to pK^-\pi^+\pi^-$, through a comparison of the decay branching ratio with that of the CP-conjugate process. However, the detailed dynamics behind this CP asymmetry is obviously far from clear. In this talk, we propose a formalism for the full analysis of the decay angular correlations in four-body cascade decays of heavy hadrons which can provide more information about the CP violation in these decays.

To illustrate this, we apply the decay angular correlation analysis of CP violation to another four-body decay channel that involve baryons, $B^0 \to p\bar{p}K^+\pi^-$, which has also been investigated by the LHCb collaboration with no evidence of CP violation being found. Surprisingly, with the event yield extracted inversely from the published data of LHCb, we obtain non-zero CP asymmetries of about 10% corresponding to the decay angular correlations at larger than 5σ confidence level, which are considerably larger than the CPA asymmetries observed in the $\Lambda_b^0 \to pK^-\pi^+\pi^-$ channel, indicating that CP violation could have been observed in processes involving baryons much earlier if the full analysis of angular correlations had been performed. We suggest our experimental colleagues to perform full decay angular correlation analyses of CP violation in four-body decays of heavy hadrons, including the above two decay channels.

Primary authors: Mr YANG (杨), Jian-Yu (健宇) (University of South China); Prof. GUO (郭), Xin-Heng (新恒) (Beijing Normal University); Prof. ZHANG（张）, Zhen-Hua（振华）(University of South China)

Presenter: Prof. ZHANG（张）, Zhen-Hua（振华）(University of South China)

Track Classification: Fundamental symmetries and spin physics beyond the standard model