

Spin-flavor entanglement in $\Lambda_b \rightarrow \Lambda D$ and weak phase extraction

Tuesday, 23 June 2026 15:50 (20 minutes)

We identify a new spin-flavor entanglement structure in $\Lambda_b \rightarrow \Lambda D$ decays, formed by the correlation between the Λ spin and the neutral- D flavor states ($D = D^0, \bar{D}^0, D_1, D_2$). The entanglement information is encoded in the decay rates and Lee-Yang parameters of the four neutral- D modes. We then show that the same spin-flavor structure provides a new method to determine the weak phase γ , a key angle of the Cabibbo-Kobayashi-Maskawa unitarity triangle. We find that the experimental uncertainty scales as $\sigma_\gamma \propto 1/calC$, where $calC$ is the Wootters concurrence, thereby quantitatively relating the precision of the weak-phase extraction to the amount of spin-flavor entanglement.

Primary authors: GENG, Chao-Qiang (Hangzhou Institute for Advanced Study, UCAS); Mr LIU, Sheng-Lin (HIAS,UCAS); HE, Xiao-Gang; DU, Yong (IMP CAS); LIU, chiawei

Presenter: LIU, chiawei

Session Classification: Parallel Session 1