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FCC-ee Sensitivity Estimation to the Direct CP-Violating Decay-Rate Asymmetry $A_{C\backslash!P}(D^0 \to \pi^0\pi^0)$

lundi 1 décembre 2025 17:00 (25 minutes)

The Future Circular Collider (**FCC-ee**) is a proposed electron-positron collider designed to enable high-energy collisions at unmatched scales. It is expected to produce $O(10^{12})$ $Z \to q\bar{q}$ events, significantly enhancing our ability to perform **precision measurements** of **electroweak observables**. So far, LHCb has measured **CP violation** in D^0 decays to charged particles. Our understanding of CP violation in the **charm sector** can be further improved by studying the decay mode $D^0 \to \pi^0\pi^0$.

This talk presents a study focusing on the reconstruction of $D^{*\pm} \to (D^0 \to \pi^0(\to \gamma\gamma) + \pi^0(\to \gamma\gamma))\pi^{\pm}$ decays at the FCC-ee to estimate the sensitivity to direct CP violation to complement the knowledge gathered by LHCb with charged modes. Monte Carlo samples, including a simulated detector response based on the **IDEA detector** concept, are used for this purpose. It is demonstrated that the FCC-ee will significantly improve the precision of the measurement of the CP-Violating decay-rate asymmetry $A_{C\backslash!P}(D^0 \to \pi^0\pi^0)$. Furthermore, the reconstruction of this particular decay chain can serve as a benchmark for the **electromagnetic calorimeter** of future electron positron colliders like the FCC-ee, because the reconstruction of neutral pions π^0 is challenging, as identifying the two photons from a single decay requires high angular and **energy resolution**.

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