Contribution ID: **64** Type: **Asynchronous Talk**

CP-violation studies of hyperon-hyperonbar pairs with BESIII

CP violation was first observed more than 50 years ago. Although its effect has been studied in meson decays for a long time, we still have no observation of CP violation in weakly decaying baryons. Baryons consisting of one or more heavy quarks, so called hyperons, Y, can be used to search for CP-violating mechanisms beyond the Standard Model. At the BESIII experiment in Beijing, strange hyperon and anti-hyperon pairs can be produced simultaneously through the process $e^+e^- \to J/\psi \to Y\bar{Y}$. The BESIII experiment has collected the world's largest J/ψ data sample and the symmetric, excellent detector conditions and low background contributions allows for a clean environment for CP-tests in the strange sector. This is done by measuring and comparing the CP-odd decay parameters of the hyperon together with the anti-hyperon. The CP-symmetry tests can be performed in processes like e.g. $J/\psi \to \Lambda\bar{\Lambda}$, $J/\psi \to \Sigma\bar{\Sigma}$ and $J/\psi \to \Xi\bar{\Xi}$. Recently it was shown that for the process $J/\psi \to \Lambda\bar{\Lambda}$ the CP-odd asymmetry decay parameter for the decay $\Lambda \to p\pi^-$ was nearly twenty percent larger compared to the PDG tabulated value. Another example is the $J/\psi \to \Xi\bar{\Xi}$ which allows for accessing the Ξ decay parameters and perform three independent CP tests in a single measurement. In the talk, we will give an outline of the methods, present recent results and give prospects for the future from the BESIII experiment.

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Session Classification: Flavor and Precision Physics Session 2

Track Classification: Flavor and Precision Physics