



Contribution ID: 11

Type: **not specified**

Hyperon physics at BESIII

Wednesday 23 October 2024 14:40 (20 minutes)

With the large datasets on $\Lambda\bar{\Lambda}$ -annihilation at the $\Upsilon(4S)$ and $\Upsilon(3686)$ resonances collected at the BESIII experiment, multi-dimensional analyses making use of polarization and entanglement can shed new light on the production and decay properties hyperon-antihyperon pairs. In a series of recent studies performed at BESIII, significant transverse polarization of the (anti)hyperons has been observed in $\Upsilon(4S)$ or $\Upsilon(3686)$ to $\Lambda\Sigma\bar{\Lambda}$, $\Sigma\Sigma\bar{\Lambda}$, $\Xi\Xi\bar{\Lambda}$. The decay parameters for the most common hadronic weak decay modes were measured, and due to the non-zero polarization, the parameters of hyperon and antihyperon decays could be determined independently of each other for the first time. Comparing the hyperon and antihyperon decay parameters yields precise tests of direct, $\Delta\Gamma = 1$ CP-violation that complement studies performed in the kaon sector. Furthermore, the high production of long-lived baryons in J/ψ decays serves as a novel source of hyperon beams, which open a unique opportunity for exploring the hyperon-nucleon interactions. Recent results, including interactions of Λp , Σp and Ξn , will be presented in this talk.

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Session Classification: Parallel Session 3