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Hyperon physics at BESIII

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With the large datasets on e^+e^- -annihilation at the $\psi(3720)$ and $\psi(3686)$ 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 $\psi(3720)$ or $\psi(3686)$ to $\Lambda\Lambda^-$, $\Sigma\Sigma^-$, $\Xi\Xi^-$, and $\Omega-\Omega^+$ and the spin of Ω^- has been determined model independently for the first time. 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, $\Delta C = 1$ CP-violation that complement studies performed in the kaon sector.

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