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Hyperon reconstruction method with machine learning in Pb-Pb collisions at ALICE

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Reconstructing hyperons with high purity and high reconstruction efficiency is essential for measurements of hyperon-hyperon correlation and searches for exotic strange hadrons, which are both presently discussed topics in the QCD community. Hyperons can be abundantly produced in Pb-Pb collisions at LHC. However, achieving high purity of reconstructed hyperons with high efficiency is particularly challenging in high charged-particle multiplicity environments.
The conventional reconstruction method of ALICE rejects many hyperon candidates by using topological cuts. To improve the detector performance, we studied the reconstruction of all hyperon candidates based on their decay vertex using the Kalman Filter (KF) technique. Furthermore, a Boosted Decision Tree (BDT) algorithm is applied to the LHC Run 2 Pb-Pb collision data based on the training by the combinatorial background and Monte Carlo simulation. By inputting many parameters for decay vertex reconstruction, we can make finer adjustments than would be possible by simply applying topological cuts manually. Therefore, BDT may help optimize cuts to better separate signal and background. This poster will report the current status of the reconstruction of Λ, Ξ, and Ω with the KF approach, discussing its performance and prospects for the future. These developments are important for the high-luminosity Pb-Pb data-taking campaign foreseen at the end of 2023.

Category

Experiment

Collaboration (if applicable)

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