Contribution ID: **41** Type: **Poster + Flashtalk**

Neural Network-Based Particle Identification: Towards Physics-Informed Loss Functions

In this conference contribution, we present our findings on applying Artificial Neural Networks (ANNs) to enhance off-vertex topology recognition using data from the HADES experiment at GSI, Darmstadt. Our focus is on decays of Λ and K^0_S particles produced in heavy ion as well as elementary reactions. We demonstrate how ANNs can enhance the separation of weak decays from combinatorial background by performing a MultiVariate Analysis (MVA), taking into account strong nonlinear correlations between topology parameters.

Furthermore, we introduce Physics Informed Loss Functions to test whether it improves the results significantly. This contribution also discusses the potential of improving the identification of single charged particle tracks coming from the primary vertex.

AI keywords

Artificial Neural Networks (ANN); Physics Informed Neural Networks (PINN); MultiVariate Analysis (MVA)

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Track Classification: Explainability & Theory