

Executive Summary

In this work, two neural networks (deep neural networks (DNN) and graph neural networks (GNN)) are applied to distinguish proton and gamma in the LHAASO-KM2A simulation data. The receiver operating characteristic (ROC) curves are used to evaluate the quality of the model. Both KM2A-DNN and KM2A-GNN models give higher Area Under Curve (AUC) scores than the traditional baseline model.

This paper is organized as follows. Section I is a brief introduction for LHAASO, DNN model and GNN model.

Section II, we introduce the Monte Carlo simulation, the KM2A detector simulation, events reconstruction and events selection which used in this paper. In this section, the partition of KM2A-DNN model and KM2A-GNN model data sets is shown in Table 1 and Table 2, respectively.

Section III, we review the baseline method for identification of proton and gamma. Baseline=Nu/Ne.

Section IV, parameter settings of two deep learning models are given.

In the last section, the results of the baseline model, DNN model and GNN model are shown.