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A Framework for Data Simulation and Analysis of the BabyCal Electromagnetic Calorimeter

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This research introduces an automated system capable of efficiently simulating, translating, and analyzing high-energy physics (HEP) data. By leveraging HEP data simulation software, computer clusters, and cutting-edge machine learning algorithms, such as convolutional neural networks (CNNs) and autoencoders, the system effectively manages a dataset of approximately 10,000 entries.
Using the framework, we generated simulated data of muon and antimuon particles and implemented CNNs and autoencoders to analyze the data. The experiment results showed that autoencoders were able to reconstruct muons, achieving accuracies of up to 97%. This work is a starting point that serves as a helpful data analysis tool, aiding researchers in their investigations.

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