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Optimizing Event Selection for Muon-to-Positron Conversion Search via Machine Learning Methods XIAOHE SHEN, Lawrence Berkeley National Laboratory, MU2E COLLABORATION — The high-precision Mu2e experiment at Fermilab will search for the lepton-flavor violating process of neutrinoless muon-to-electron conversion, and the lepton-number violating muon-to-positron conversion. The selection of events of interest relies on machine-learning Multivariate Analysis (MVA) methods to distinguish signals from various backgrounds. Aiming to optimize the signal selection and to compute an estimated sensitivity for the muon-to-positron conversion process, we investigate the performance of several MVA methods in Toolkit for Multivariate Analysis (TMVA). We use the output of the major reconstruction algorithms with their corresponding Monte Carlo Truth information as training and testing data sets. We compare the performance of various machine-learning methods to get their optimal configurations for the signal selection. Then we compare the performance of different methods. We apply the event selection to the dominant background processes of the Radiative Muon Capture (RMC) and the cosmic ray induced events. We then estimate the sensitivity of Mu2e to the electron-to-positron conversion process.

Xiaohe Shen
Lawrence Berkeley National Laboratory

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