Abstract Submitted
for the APR18 Meeting of
The American Physical Society

Identification of semi-muonic Λ decays using machine learning models LOTTIE MURRAY, SETHIN BURRIER, MICHAEL MCCRACKEN, Washington Jefferson College — The semi-leptonic decays of strange baryons have played an important role in the development of the Standard-Model electroweak interaction. The muonic decay of the Λ baryon, $\Lambda \to p\mu^-\overline{\nu}$, however, is relatively poorly characterized, with a world database of only 28 events. Better characterization of this decay could constrain several types of beyond-SM interactions, but such measurements are made difficult by an irreducible background from the primary decay mode ($\Lambda \to p\pi^- \to p\mu^-\overline{\nu}$) which produces the same final state with similar kinematics. Past measurements of the decay were performed with bubble chamber experiments, in which background events were identified by kinks in prospective μ^- tracks. Modern hadron spectroscopy experiments provide advantageous kinematics and statistics for investigating these decays, but are not capable of directly identifying intermediate vertices. However, modern multi-variate classification techniques such as deep neural networks may allow for sufficient reduction of background. We present an investigation of the effectiveness of several machine learning models in classifying signal and background for this reaction using a Monte Carlo simulation.

Michael McCracken
Washington
Jefferson Coll

Date submitted: 08 Jan 2018 Electronic form version 1.4