Kaon Pion separation using the ATLAS Transition Radiation Tracker.

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Ludwig-Maximilians-Universität München

von

Julian Schutsch

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Abstract

A simulation is presented to study pion kaon separation in the ATLAS TRT. Relativistic particles with identical momentum but different mass have different energy loss distributions in gases. The TRT straw simulation with Garfield++ is used to understand the dependence of the Time over Threshold(ToT) to the energy loss of a particle and how to use the ToT as an observable to separate pions and kaons. Two different models for electronics and signal propagation are compared for their impact on the ToT distributions. A TRT track simulation is implemented using straw hit counts from ATLAS data. Separation power between pions and kaons for both single straws and TRT track simulation are estimated. A comparison of different ToT summing methods is provided. The Sum-ToT summing method provided the best separation power providing up to 1.2σ separation power using detailed electronics model.

Contents