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Pulse Shape Discrimination Studies with CsI(Tl) for Improving High Energy Hadron Identification (G)*

Tuesday 12 June 2018 16:00 (15 minutes)

We study the potential for using CsI(Tl) pulse shape discrimination in order to improve particle identification at high energy electron-positron collider experiments such as the Belle II experiment. Using neutron and proton testbeam data collected at the TRIUMF Proton Irradiation Facility we analyze the scintillation pulse shape differences between photon and hadron energy deposits and demonstrate that the pulse shape variations in CsI(Tl) for hadronic energy deposits can be characterized using an additional scintillation component for CsI(Tl) [1]. Using this new pulse shape characterization techniques for computing the pulse shapes for CsI(Tl) are develop and applied to GEANT4 simulations. With these simulations comparisons are made with testbeam data and predictions for the performance of CsI(Tl) pulse shape discrimination for separating high energy electromagnetic and hadronic showers will be presented. Ongoing work to incorporate pulse shape discrimination into the Belle II experiment will also be discussed.

[1] S. Longo and J. M. Roney, "Hadronic vs Electromagnetic Pulse Shape Discrimination in CsI(Tl) for High Energy Physics Experiments", arXiv: 1801.07774

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