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Particle identification using plastic scintillation counters in the COMET Phase-I experiment

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The COMET (COherent Muon to Electron Transition) experiment searches for a muon-to-electron conversion with muonic aluminium in which a muon is captured in an orbit instead of an electron. This process violates the conservation law of charged lepton flavour and is forbidden in the standard model of particle physics. If discovered, this would be clear evidence of the new physics. In the first stage of the experiment, an electron will be detected by a Cylindrical Detector (CyDet) which consists of a Cylindrical Drift Chamber (CDC) and a set of Cylindrical Trigger Hodoscopes (CTH). The CDC reconstructs the momentum of electrons while the CTH measures the precise timing. The CTH is composed of two layers of segmented plastic scintillators, and scintillation photons are read out through optical fibre bundles and detected by silicon-photomultiplier (SiPM). In the experiment, cosmic ray muons can mimic the signal electron whose momentum is 105 MeV/c. We demonstrated that the CTH detector can identify most of those muons by combining the energy deposition among four counters by conducting the beam test at Paul Scherrer Institut (PSI), Switzerland.
In this report, the results of the beam test will be presented.

Collaboration

Role of Submitter

I am the presenter

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