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Studies on fast timing and high precision tracking trigger based on Resistive Plate Chambers

We report our studies of fast timing and high precision tracking trigger using Resistive Plate Chambers (RPCs). Two beam tests were carried out with 180 GeV muons at CERN using 1.0 - 1.15 mm gas-gap RPCs equipped with readout strips of 1.27 mm in pitch. This is the first time RPCs with fine-pitch readout strips have been tested with high energy muons to explore the capabilities of precision tracking and triggering simultaneously. RPC signals are acquired with precision timing TDCs and charge ADCs electronic circuits at both ends of the strips. The time resolution is measured to be less than 0.6 ns and the spatial resolution is found to be 200 um using charge information and 287 um using timing information. The dual-ended readout allows to determine the mean and the difference of the signal arrival times from both ends. The mean time is found to be independent of the incident particle position along the strip and is useful for triggering purposes. The time difference yields a determination of the hit position with a precision of 7.5 mm along the strip. These results demonstrate the feasibility of using RPCs as high precision tracking trigger devices.

quote your primary experiment

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Track Classification: Gaseous Detectors