

Abstract Submitted
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Resistive Plate Chamber Efficiency & Rate Capability Analysis

MAX CANDOCIA, University of Illinois at Urbana-Champaign — Bakelite-based resistive plate chambers (RPCs) are particle detectors commonly used in muon trigger systems for high-energy physics experiments. Bakelite RPCs combine fast response, sufficient position resolution and low cost, and they can be operated at instantaneous background rates up to approximately 1.5 kHz/cm². Current and future collider experiments will demand operation of trigger RPCs under background rates higher than what is currently achieved. The rate capability is related to the bulk and surface conductivities of the Bakelite material used for the plates bordering the active gas volume in the RPCs. At the LHC and RHIC, these surfaces are coated with linseed oil, which lowers the surface resistivity of the Bakelite, which, to a point, improves the rate capability of the detectors. We have doped our own plates with various concentrations of carbon black. Over the past year we have tested RPCs with Bakelite plates of different resistivity using cosmic ray muons and radioactive Fe55 sources to emulate different levels of background in the detector. Results on the RPC efficiencies at different background rates and for different Bakelite coatings will be presented.

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