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Investigation of Ceramic based Resistive Plate Chambers for high rate beam environments

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A solution proposed for timing detectors in new high rate beam environments as FAIR, LHC and ILC could be Resistive Plate Chambers (RPC) with semi conductive electrodes. The gas gap between two electrodes amounts to less the 300 µm, to increase the electric field strength up to 100 kV/cm. Different electrode materials are under investigation. RPC prototypes with semi conductive Si3N4/SiC ceramic sheets have been tested with relativistic electrons at the accelerator ELBE (HZDR) where a beam flux of up to 1.5x10Ê5 cm-2 s-1 was used, and with pions at the T10 beam-line (CERN). In both tests a detection efficiency of 98% and sub nanosecond timing resolution was achieved.

Primary author: Dr NAUMANN, Lothar (Helmholtz-Zentrum Dresden-Rossendorf)

Co-authors: Dr LASO GARCIA, Alejandro (HZDR); Dr AKINDINOV, Alexander (ITEP); Mr STACH, Daniel (HZDR); Mr MALKEVICH, Dmitry (ITEP); Dr DREYER, Jörn (HZDR); Mr SULTANOV, Rishat (ITEP); Dr KOTTE, Roland (HZDR); Mr FAN, Xingming (HZDR)

Presenter: Dr NAUMANN, Lothar (Helmholtz-Zentrum Dresden-Rossendorf)

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