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High rate, fast timing RPC for future LHC experiments upgrade

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New generation of RPC using semi-conductive plates could provide an excellent choice for the upgrade of LHC muon detectors. These cost-effective GRPC stand high particle rate. The excellent timing they can provide could allow to improve on the trigger rate and reduce the pileup consequences of the LHC luminosity increase.

Single and multi-gap GRPC using low-resistivity glass are being proposed to equip high eta region of experiments such CMS. Electronics readout with a time measurement precision of less than 25 ps is being developed to equip such detectors.

Summary

With the increase of the LHC luminosity foreseen in the coming years many detectors currently used in the different LHC experiments will be dramatically impacted and some need to be replaced. The new ones should be capable not only to support the high particle rate but also to provide excellent timing to reduce the data ambiguity due to the expected high pileup. RPC using low-resistivity glass are proposed to equip the very forward region of the LHC experiments. In their single-gap version they can stand rates of few kHz/cm². Their time precision of about 1ns could in principle allow to reduce the noise contribution, leading to an improvement of the trigger rate. In their multi-gap version they can do better in both the particle rate detection and the time precision measurement. Time precision of less 25 ps could be obtained. This aims at reducing the ambiguity the high expected pileup will introduce. In both cases new electronics equipped with excellent timing precision measurement are being developed to read out the RPC detectors. Tests are ongoing to validate the different scenarios.

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