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Development of large GRPC for an ultra-granular Semi-Digital Hadronic Calorimeter

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Large GRPC detectors equipped with semi-digital electronics readout and 1 cm² lateral granularity were conceived to be used as a sensitive medium in the hadronic calorimeter of the future linear collider experiments. The GRPC detector was designed to provide high detection efficiency, excellent homogeneity and negligible dead zones. The readout electronics was developed to associate performance and compactness. A hadronic calorimeter of 1 m³ was built with 48 GRPCs. The GRPCs were tested in cosmic rays bench before to be assembled into the HCAL prototype. The HCAL was then tested with pion beams at CERN. The preliminary results confirm the expectations. Future tests at the SPS will allow to validate definitely the choice of the GRPC as a good candidate for the sensitive medium of a semi-digital hadronic calorimeter.

Summary

We will give a summary of the R&D that was achieved to build large but very thin GRPCs to be used as a sensitive medium for an ultra-granular HCAL. Developments on the resistive coating, gas distribution, spacers as well as the embedded electronics will be mentioned and the construction of 48 GRPCs and their insertion in a self-supporting mechanical structure will be presented

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