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A Cylindrical GEM Detector with Analog Readout for the BESIII Experiment

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We are developing a cylindrical GEM detector with analog readout to upgrade the Inner Tracker of the BESIII experiment at IHEP (Beijing). The new detector will match the requirements for momentum resolution ($\sigma_{pt}/Pt \sim 0.5\%$ at 1 GeV) and radial resolution ($\sigma_{xy} \sim 100\mu\text{m}$) of the existing drift chamber and will improve significantly the spatial resolution along the beam direction ($\sigma_z \sim 150\mu\text{m}$) with very small material budget (about 1% of X_0). With respect to the state of the art the following innovations will be deployed: a lighter mechanical structure based on Rohacell, a new XV anode readout plane with jagged strip layout to reduce the parasitic capacitance, and the use of the analogue readout inside a high intensity magnetic field to have good spatial resolution without increasing the number of channels.

A beam test has been performed at CERN in order to measure the performance of a BESIII GEM prototype in a magnetic field up to 1 Tesla. An overview of the project and the preliminary results of the test among with a comparison with detailed Garfield simulations will be presented in the talk.

The project has been recognised as a Significant Research Project within the Executive Programme for Scientific and Technological Cooperation between Italy and P.R.C. for the years 2013-2015, and more recently has been selected as one of the project funded by the European Commission within the call H2020-MSCA-RISE-2014.

Collaboration

on behalf of the BESIII CGEM group

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