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The new Cylindrical GEM Inner Tracker of BESIII

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The CGEM-IT (Cylindrical GEM - Inner Tracker) is the upgrade of the internal tracking system of the BESIII experiment, running at BEPCII in Beijing, China. The subdetector is currently under construction and its installation in the spectrometer is foreseen in 2018, after a final verification that its performance matches the BESIII requirements.
The layout consists of three layers of cylindrically-shaped triple GEMs, with some important innovations with respect to the existing GEM detectors, in order to achieve the best performance with the lowest material budget.
It will be the first cylindrical GEM running with analog readout inside a 1T magnetic field. The analog readout provides the simultaneous measurement of both the deposited charge and the signal time. Thanks to this, the CGEM-IT reconstruction will use a combination of two algorithms to evaluate the spatial position of the charged tracks inside its volume: the charge centroid and the micro time projection chamber. The two modes are complementary and can cope with the asymmetry of the electron avalanche when running in magnetic field and with non-orthogonal incident tracks.
Both planar chambers and the first cylindrical layer prototype have been tested during various test beams on the H4 line of SPS (CERN) with muons and pions of momentum = 150 GeV/c, to evaluate their behaviour under different working settings.
The efficiencies and resolutions obtained with the two modes will be shown as well as a comparison between the planar and cylindrical chambers.

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