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RPC online monitor

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An online monitor with GUI interface has been developed for ATLAS Phase I RPC mass production in BB5, CERN. It could speed up the RPC cosmic ray tests which are the QC procedures after singlets and triplets RPC assembled.

The monitor could control VME controller and TDC e.g. start or end the DAQ. During the data taking, the monitor would read the data from TDC, reconstruct the event, calculate the preliminary results and display all plots in real time. The mapping between TDC channels and readout strips is accepted by specifying a mapping CSV file so that the monitor could reconstruct events of different singlet RPCs.

Around 20 plots are offered for preliminary results including efficiency curves, cluster size histograms, hit maps, TOT, TOF distribution and so on. Several kinds of efficiency curves and histograms show chamber / gap efficiency and Eta / Phi strips efficiency to help find the broken channels. Another singlet could be specified as reference. 2D hit heat-plot and 2D noise heat-plot give quick views of inefficiency areas and noisy areas of gas gaps. TOF with gaussian fit could give preliminary RPC time resolution.

Simple cosmic ray track reconstruction is offered for AR propose: the reconstructed tracks would be broadcasted via TCP/IP and could be received by AR program to display the tracks upon the video recorded by the camera in real time.

After DAQ finishes, a pdf-formatted quick analysis report would be generated contains all the plots and the mapping for archive.

Basing on Qt, C++ and root, the monitor could reconstruct events and refresh plots in an efficient way.

The monitor is fully open source on gitlab and has the potential to be utilized in further RPC production and cosmic ray tests.

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