

CMS RPC Upgrade Program

Felipe Silva, on behalf of the CMS Collaboration

Rio de Janeiro State University - Email: felipe.silva@cern.ch



Abstract

The LHC will be upgraded in several phases that will allow significant expansion of its physics program. The luminosity of the accelerator is expected to exceed $5 \times 10^{34} \text{cm}^{-2} \text{s}^{-1}$. In order to sustain the harsher conditions and to help maintaining good trigger efficiency and performance the Resistive Plate Chambers (RPC) system of the CMS experiment will be upgraded. The present RPC system would continue to operate, and it would be upgraded with new Link Boards system. In addition, the coverage of the RPC system would be increased up to pseudo rapidity of 2.4 by installing a new generation of improved RPCs (iRPCs). Their design and configuration are optimized to sustain higher rates and hence to survive the harsh background condition during HL-LHC operation. The iRPC are equipped with newly developed electronics designed to read out the detectors from both sides, allowing in this way a good spatial resolution along the strips O(cm). The status of the upgrade project are presented.

CMS RPC Upgrade

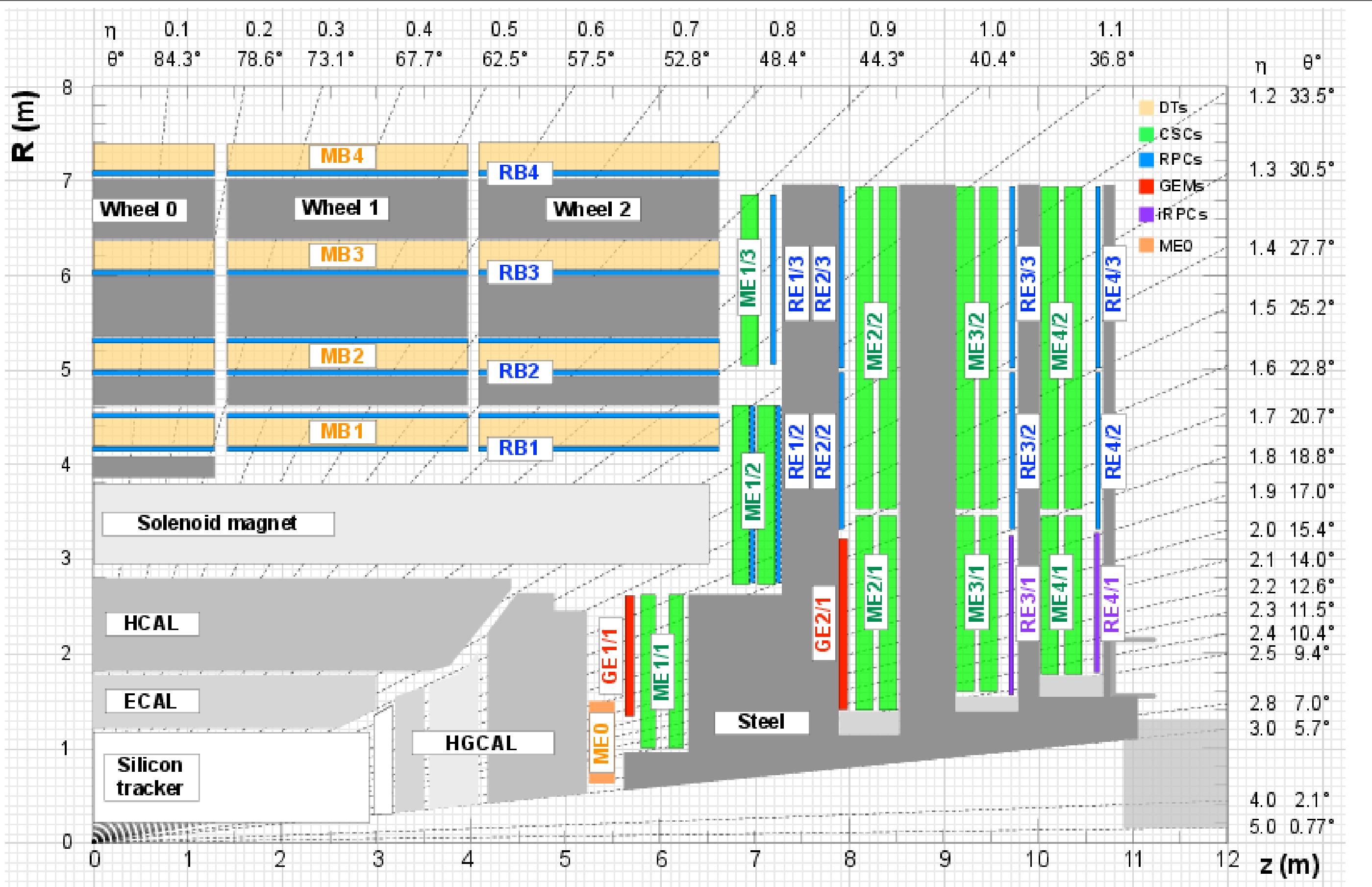
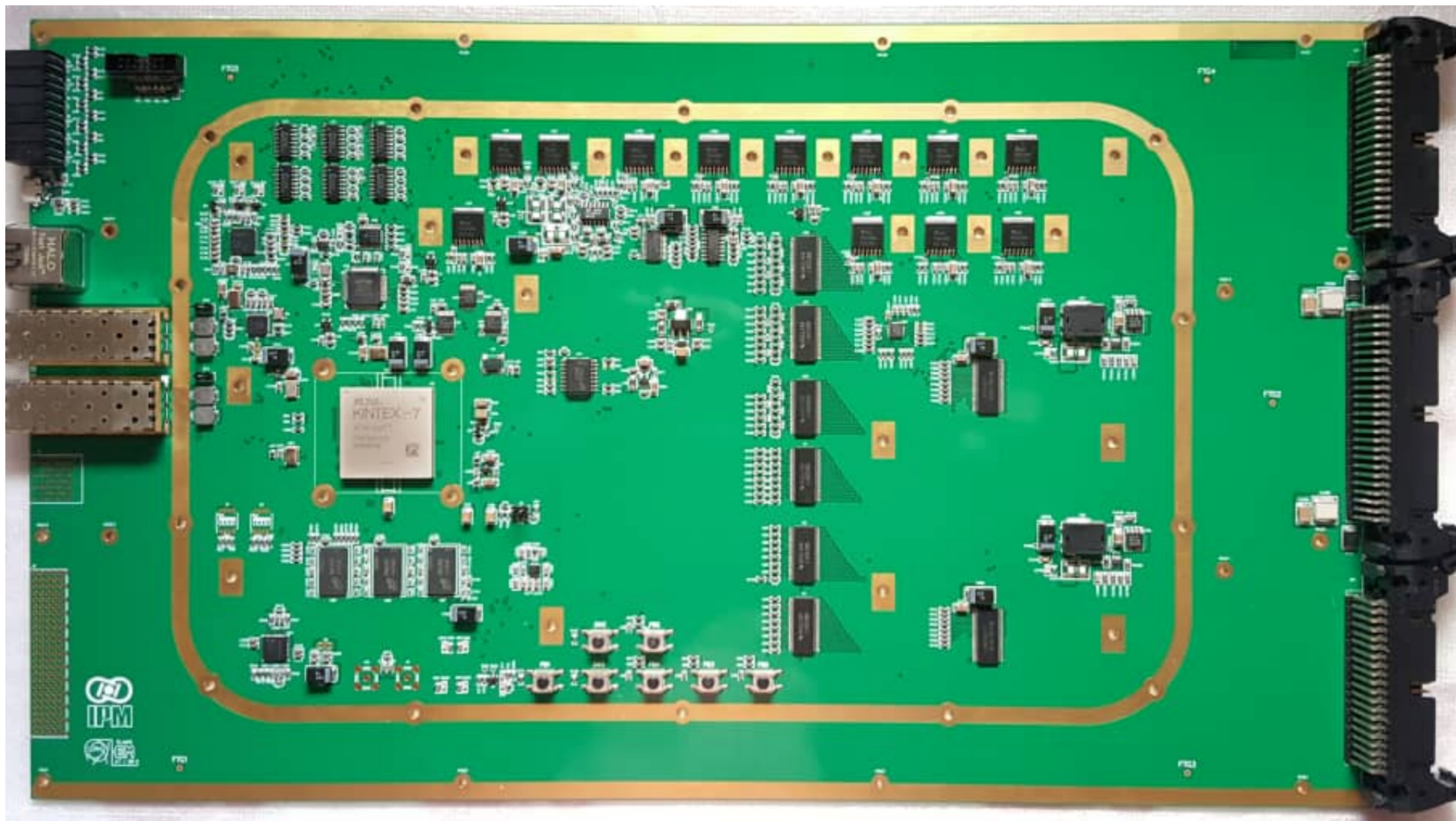


Figure 1: A quadrant of the CMS Muon Spectrometer, showing DT chambers (yellow), RPCs (light blue), and CSCs (green). The locations of new forward muon detectors for the HL-LHC project are contained within the dashed box and indicated in red for Gas Electron Multiplier (GEM) stations (ME0, GE1/1, and GE2/1) and violet for improved RPC stations (RE3/1 and RE4/1).

Link System

Bla bla bla ...



Bla bla bla ...

iRPC FEB

Bla bla bla ...

This plot shows s-curves with dependencies of Muon Efficiency versus High Voltage Effective (HVe_{eff}) for the second version of FEB with PETIROC2B (FEBv1b). Also, this slide showing the mean value of multiplicity for each side. AND efficiency showing without crosstalk impact. Data was taking during GIF++ (ATT=3.3) cosmic tests (September-November 2019). Scintillators placed in the HR of the chamber and covered about 20cm. This setup includes three protected with leads scintillators inside GIF++ (without outside scintillators) HR: 500-480=20DACu. (50±10fC)

LR: 500-480=20DACu (50±10fC)

HIGH VOLTAGE EFFECTIVE (X-axis)

Effective HV takes into account the change in pressure and temperature with respect to an HV reference value V0 at given pressure P0 and temperature T0.

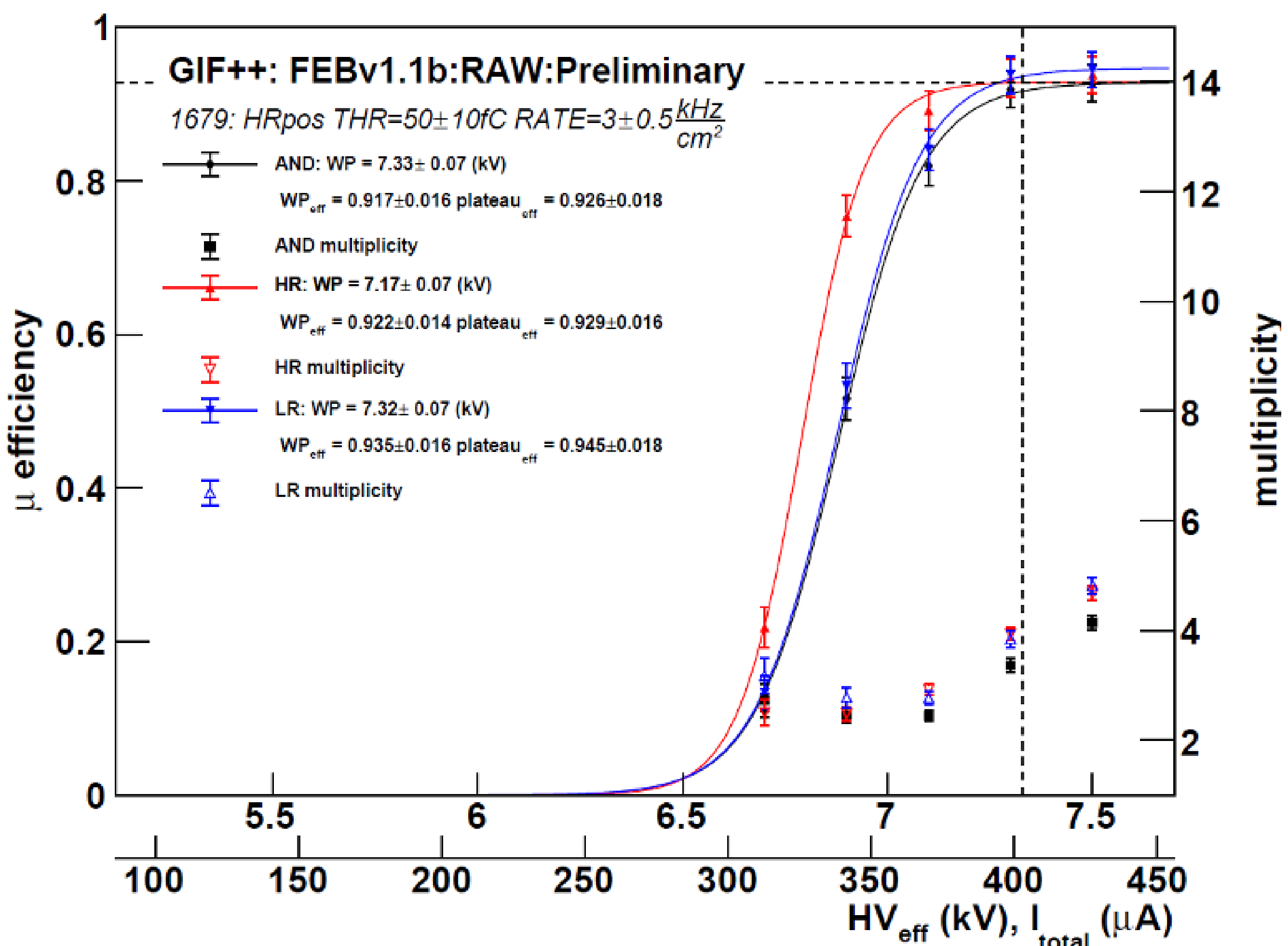
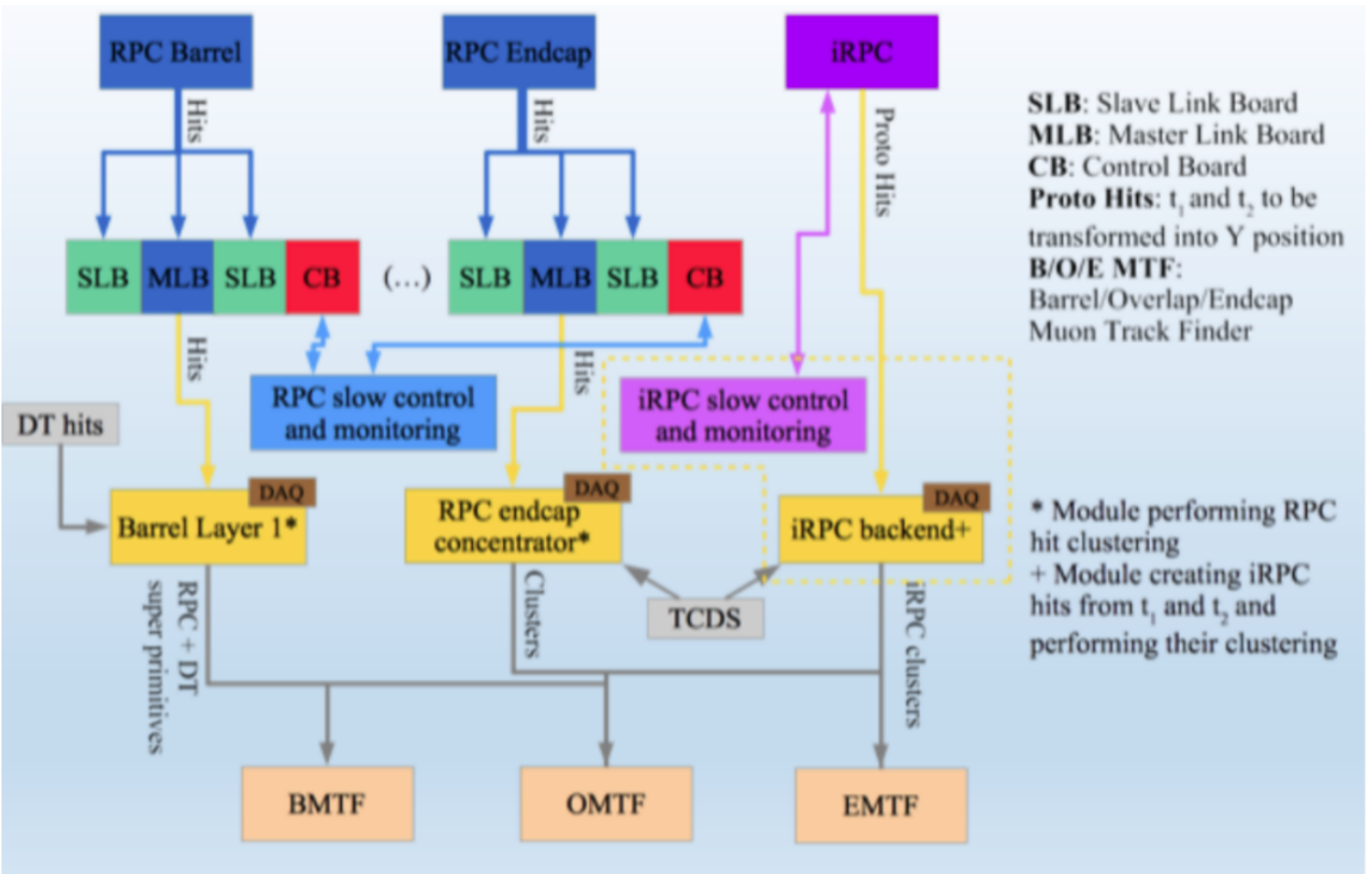


Figure 2: A caption for iRPC FEB.

Bla bla bla ...

Readout Electronics

Bla bla bla...



Bla bla bla...