

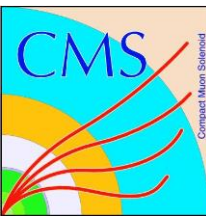


RPC Upgrade updates from CERN

Saleh Muhammad
National Centre for Physics



TDR and important upgrade events timelines



□ Technical Design Report:

- Comprehensive reviews for each subsystem with TDRs in 2017 (Tracker, Calo and muons)
- Two annual review cycles leading to TDRs
 - **CR July 2016: focus on results from simulations**
 - CR June 2017: review of full project
- Submission of **muon TDR now scheduled for Sept. 2017**
- MB Nov. 23: present proposal for timeline

□ Phase-2 Muon Upgrade workshop, Feb. 4-5, 2016

- Feb. 4: new detectors (RPCs, GEMs)
- Feb. 5: discussions; consolidation of existing detectors
- get ready for LHCC/Upgrade Cost Group review in March, i.e. define plans for TDR and funding approvals

□ 2016 Muon Weeks proposals: Apr. 4-8; May 9-13; May 23-27 in CERN; October in Bari



RPC TB planning 2016



- GIF++ is an excellent tool to test our detectors in very strong irradiation conditions
- But we are many groups with different requirements and very limited control on the beam conditions. In addition we have limited place and the priority should be given to aging tests.
- To test new technologies, compare them, we need to have dedicated TB with easy access and enough space to accommodate as many detectors as we would like.
- We can get profit to test different gas mixtures including eco-friendly ones.
- We propose to have 2 weeks at the SPS-H2 (we can have up to 10^6 muons/spill)
- In the period April-June so we can have some preliminary results in time for the TDR discussion.
- We can discuss with the SPS coordinator the choice of the TB period to optimize costs and efforts with respect to the GIF++



Electronics options for RPCs upgrade



- Use exactly existing electronics for new detectors
 - Need some minors/major changes
 - Completely new electronics
 - If fast detector then fast electronics
 - uTCA or some thing else
 - New chip prepared by Lyon group
- Introduction and training expected soon



New electronics developed by Lyon group



- ✓ Electronics for 2-gap CMS-(G)RPC
 - HR2 is an adequate ASIC. It is Low-noise, low-consumption, three thresholds (could be very helpful for space precision). Cost of 0.18 €/channel
 - Extensive tests on small and large GRPC.
 - Tests on Bakelite was performed and excellent results found.
 - Full CMS HPL-RPC will be equipped by HR2 soon

- ✓ Electronics for MRPC including timing
 - PETIROC is an appropriate ASIC. It provides excellent charge and time measurement. Time related jitters < 20-25 ps.
 - A TDC with 25 ps is available and will be tested soon. Development to include TDC/ch in PETIROC is ongoing.