CMS-RPC-BA

2026-02

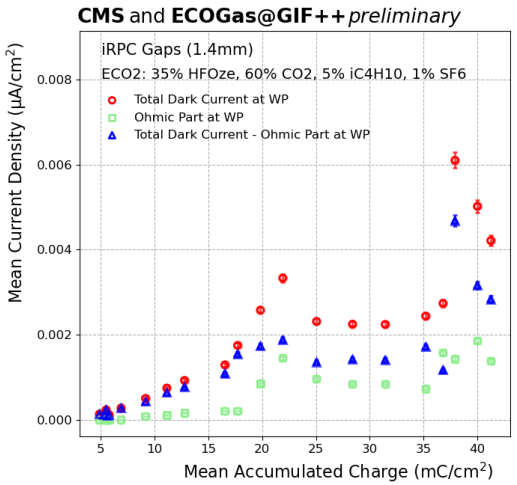
CMS-RPC a Bari

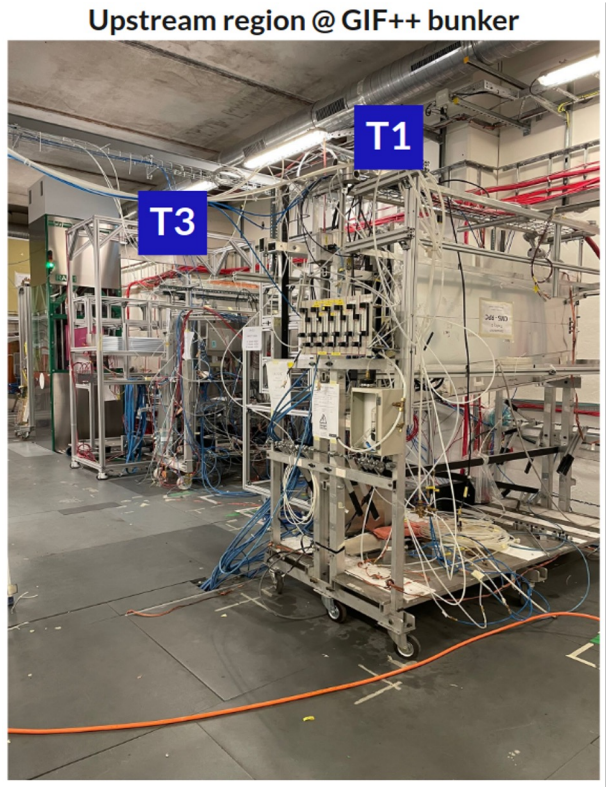
- "New" entry: Reham Aly
  - Consolidation analysis
- New position: Dayron → Deputy Upgrade Coordinator for RPC CMS
  - Coordination of Longevity programs for CMS-RPC and beam tests @GIF++ (activities @GIF for CMS-RPC)

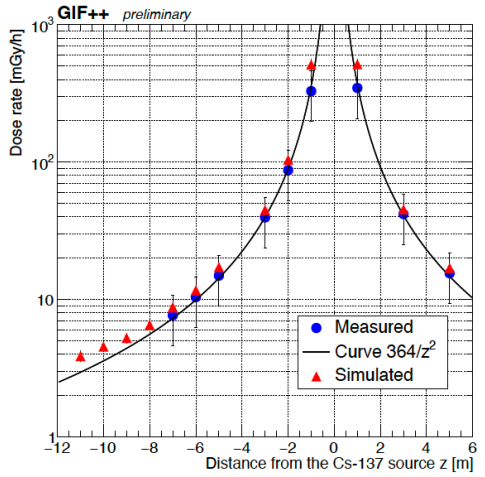
Activities:

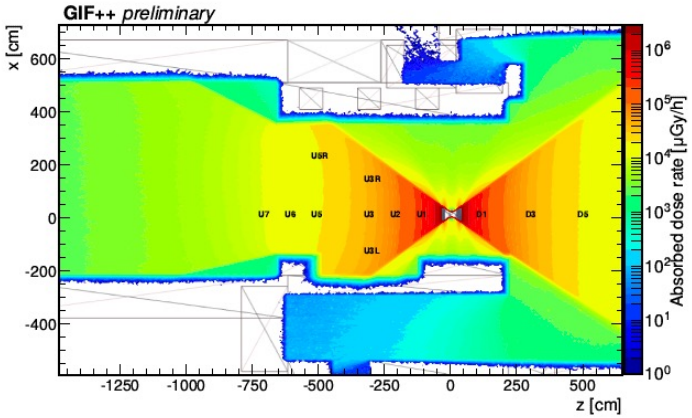
- **HFO/CO2 based mixtures R&D (beam tests and longevity)**
  - 2 chambers under study → "iRPC gaps" prototype (Upgrade RPC like, 1.4 mm gas gap) and RPC legacy (2 mm)
  - "iRPC gaps" prototype experimented loses in rate capability w.r.t 2024 TB → single gap malfunctioning most probably related to gas flushing schema (around 150 and 300 mC/cm2 integrated already respectively)
    - Discussion ongoing with results from Nov2025 TB

- **Study of the radiation fields at CERN GIF++**
  - Dose measurements campaigns and analysis to compare with simulation results
  - Outcome: full simulation code able to estimate the backgrounds in the irradiation bunker









CMS-RPC a Bari

Activities:

- **Longevity studies of present CMS RPC system**
  - Expected Integrated charge @HL-LHC 840 mC /cm^2 (including safety factor 3)
  - RE2/2 has been tested to 100 % of expected IC @ HL-LHC
  - RE4/2 has been tested to 63 % of expected IC @ HL-LHC
  - The change of the HGCAL geometry @ HL-LHC phase:
    - Will affect mainly the first stations both from the barrel and endcap regions.
    - No change in the expected IC @ HL-LHC for RE2 and RE4 chambers => No need to rescale IC values
    - An increase of the expected IC @ HL-LHC by ~ 1.5 for RE1 region
  - The current accumulated IC for RE2 chamber corresponding to 100 % of expected IC @ HL-LHC for
    - RE2 Chambers (including safety factor 3)
    - RE1 Chambers (including safety factor 2)
  - We can extend the irradiation test to cover safety factor 3 for RE1 chambers (depending on the gas rate availability @ GIF)
  - The detector parameters are almost stable with fluctuation in resistivity due to different gas conditions during operation
  - Stable efficiency at different IC values & different bkg conditions

RE2

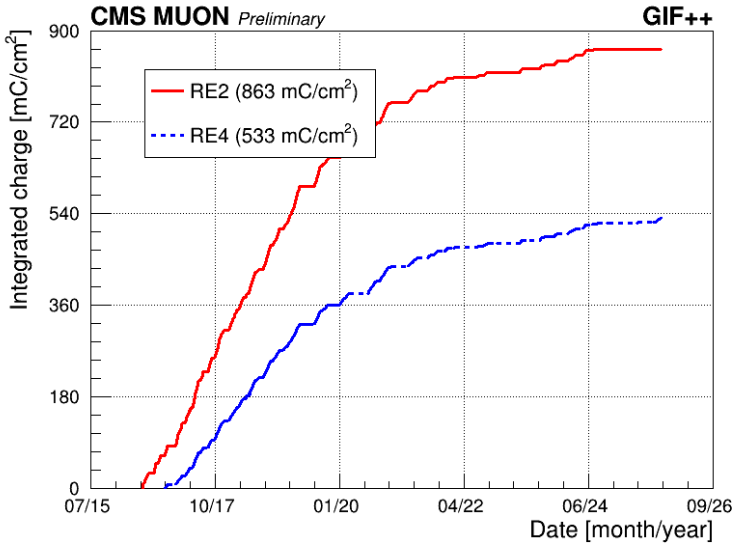
- IRR. In 3 July 2016
- Q_{int} : 863 mC /cm^2

> 100 %

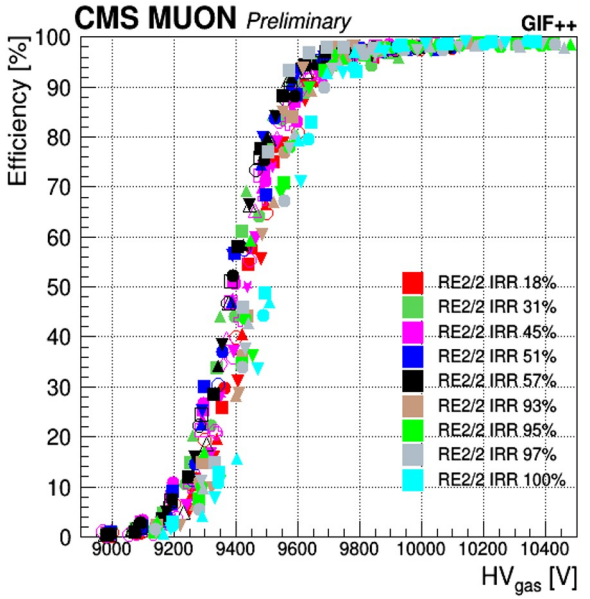
RE4

- IRR. In 25 Nov. 2016
- Q_{int} : 533 mC /cm^2

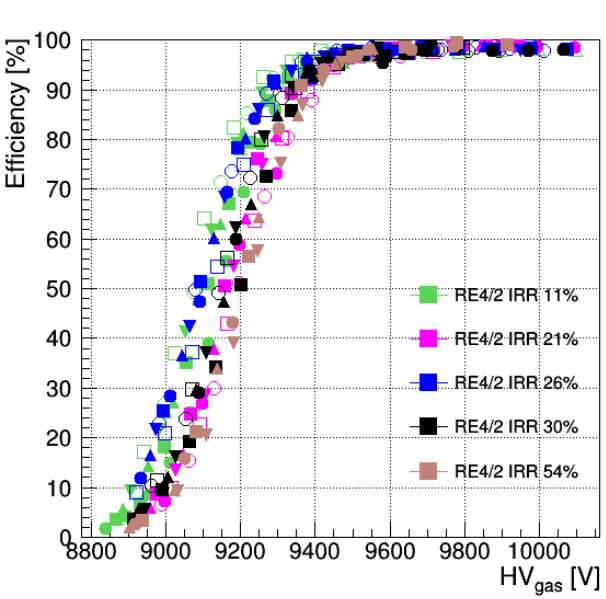
63 %



RE2



RE4

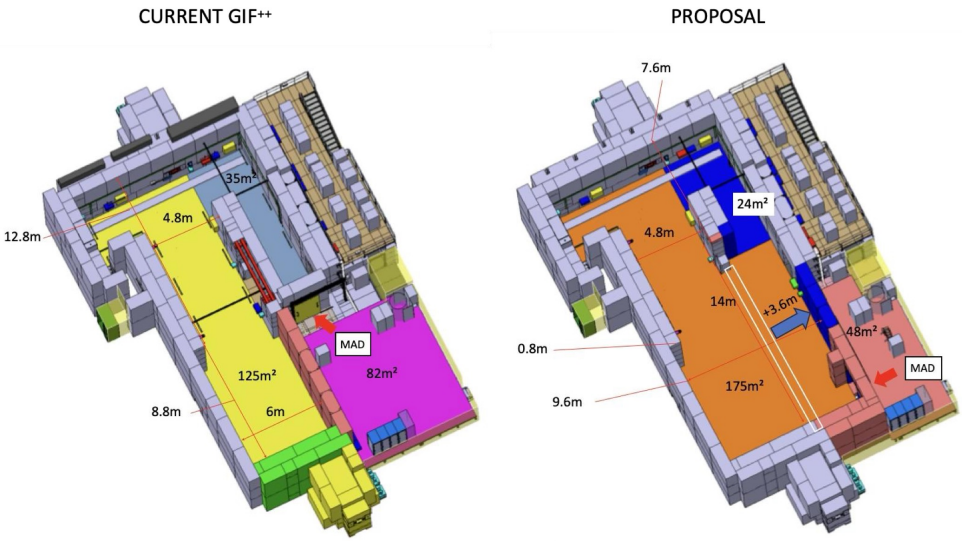


Efficiency @ different Test Beam

Recently at GIF++

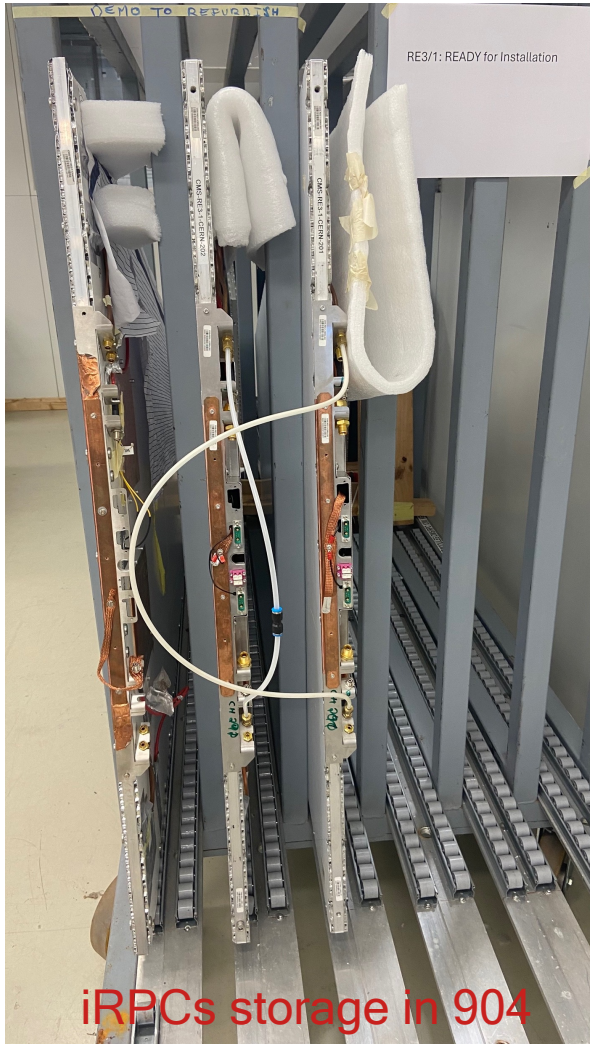
GIF++ decommissioning:

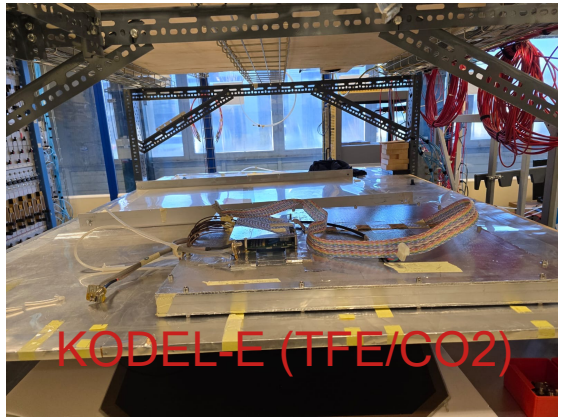
- Trolleys have been removed from the bunker in preparation for the extension works at GIF (Ecogas trolley to ECAL space and Consolidation to 904)
- All HV +LV +signal cables removed and labelled (under floor)
- Connected gas line to the input of Ecogas trolley to flush humidified Ar using Ecogas mixer for ISE measurements (next slide)
- iRPCs longevity and KODEL-F (TFE/CO2) moved to 904 lab



Recently at GIF++

GIF++ decommissioning:

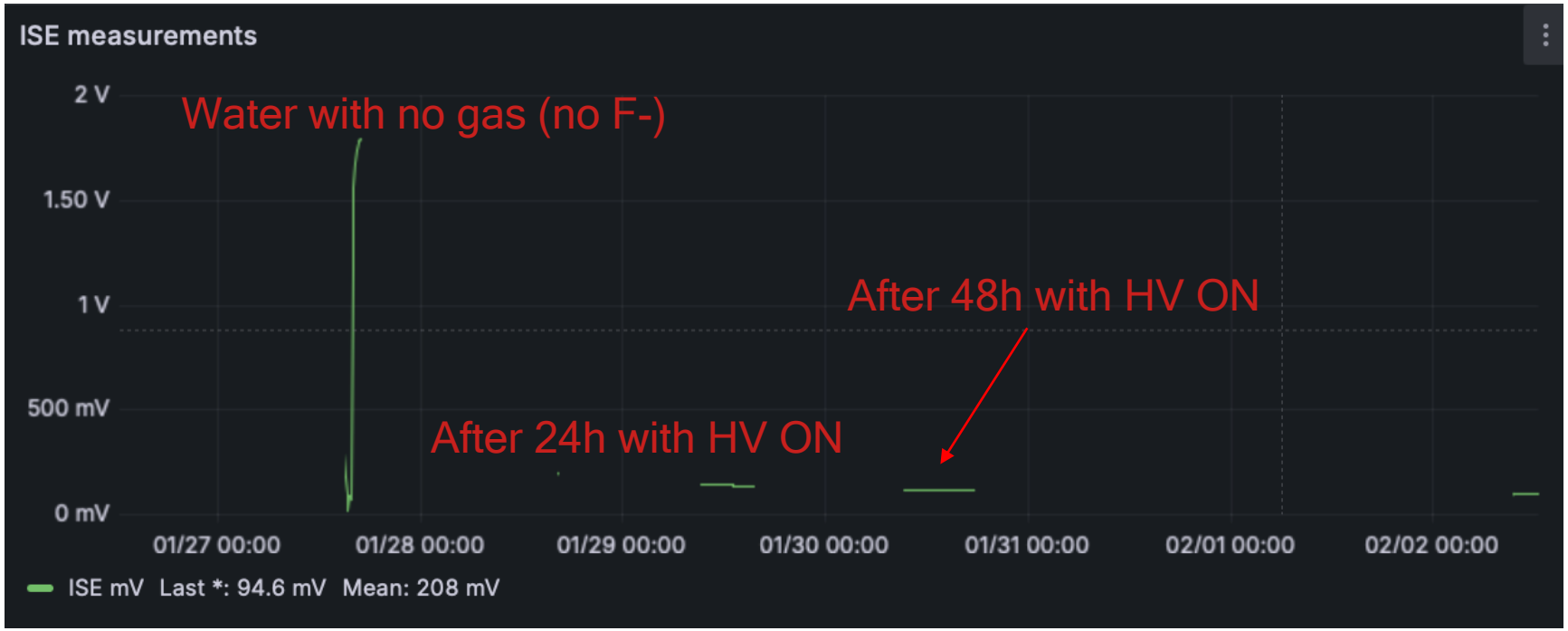




Recently at GIF++

ISE measurements:

Cumulative ISE measurements have been started with RPC aged with HfO/CO2 based mix



The lower the mV signal, the higher the F- concentration in the solution

CMS-RPC a Bari foreseen 2026

- GIF++ CMS setups decommissioning and installation after bunker extension
  - Most of decommissioning will take place end Jan-Feb → **DONE**
  - Installation foreseen on April (still to confirm)

- 2 test beams at GIF++
  - **from 06/05 to 20/05**
  - **from 15/07 to 03/08**

- All longevity programs will continue

- Study of HFO/CO2 based mixture will be extended covering also SF6 replacement candidates (Cl-HFO)

- LightBEB commissioning studies on iRPC and prototypes