

PS/SPS - End of the Year Wrap Up

M.R. Jäkel



<http://gif-irrad.web.cern.ch/>

02.12.2022

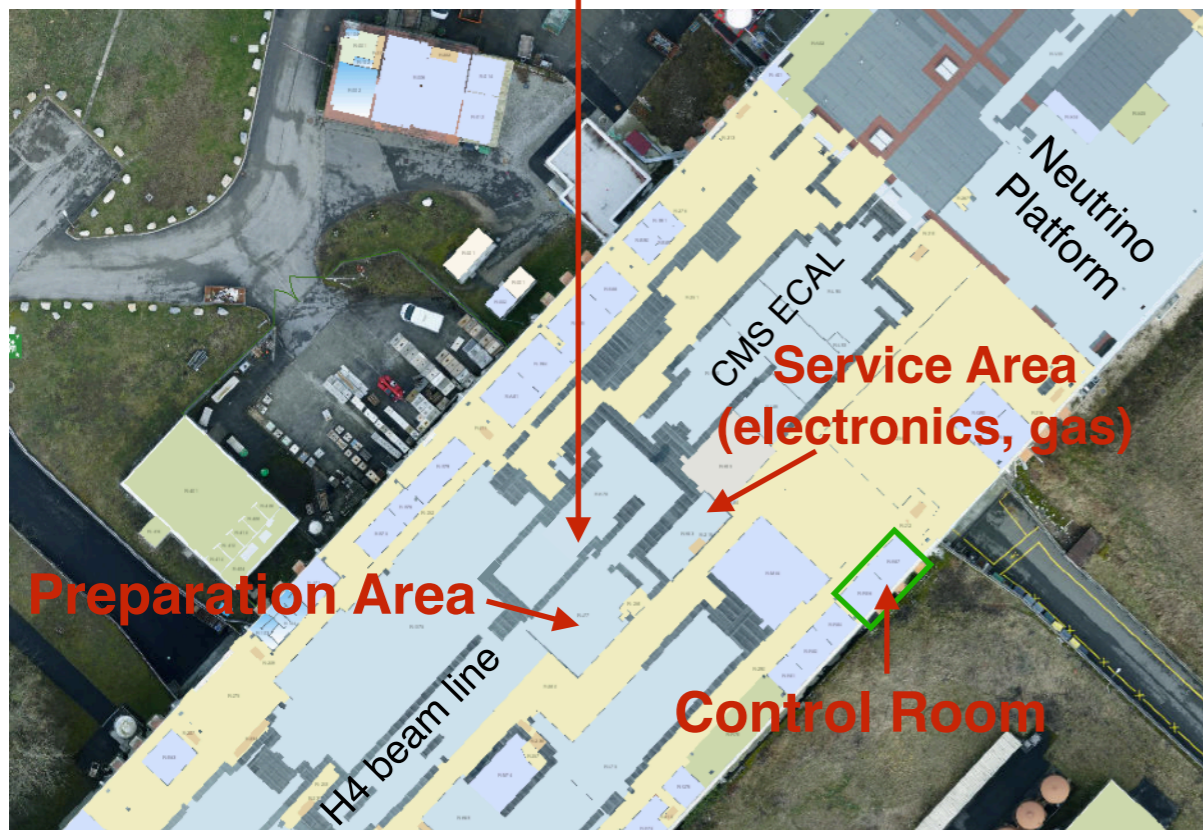
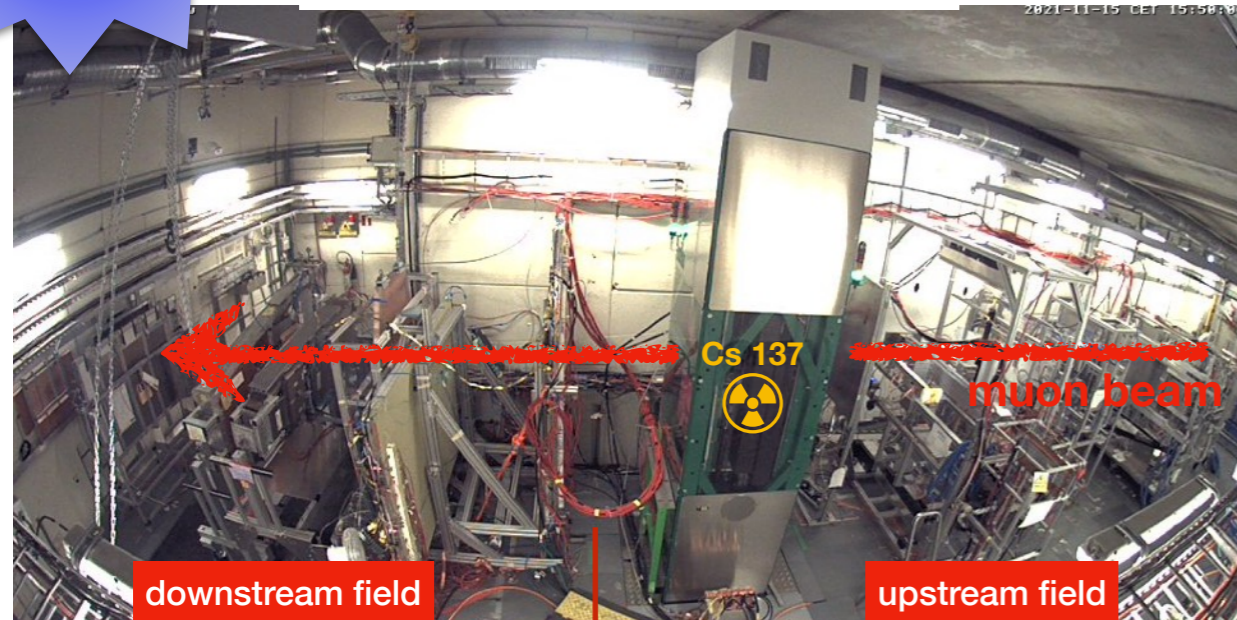


EP-DT
Detector Technologies

Irradiator operation throughout the whole year

GIF⁺⁺ @ EHN1

Irradiation Bunker



Introduction :

- Unique place, combining a **high energy muon beam** with a **12 TBq* ¹³⁷Cs gamma source**
- Joint EP & BE facility, operated by EP-DT**
- Designed for testing **real size detectors**
- ≈100 m² irradiation fields, 2 irradiation zones with independent attenuation systems
- Central Control System, wide range of available gases (+ custom gases), common DCS...

*) 14TBq as of 2014

Current R&D Program :

- Detector validation tests in presence of high radiation background & muon beam
- Ageing studies under HL-LHC radiation conditions
- Search for eco-friendly gas mixtures
- Mass-production test of muon chambers
- Radiation tests of electronics and optical components

Successful 2022 with extended muon beam operation :

- ▶ Irradiator operation from 14.Jan. to 16. Dec. = **48 weeks of operation !**
(stop only during CERN Christmas closure and essential maintenance)
- ▶ **9 weeks of dedicated muon beam**, up from 7 weeks requested
Providing essential muon beam time for critical projects like ECOGAS beyond requests

Setups participating		Date of beam period starting:										Requested
		25.04	4.05	11.05	18.05	25.05	1.06	13.07	20.07	19.10	26.10	
Nr.	Setup / Week	17	18	19	20	21	22	28	29	42	43	
1	ATL NSW MM	D	D	D	∅	∅	D	D	D	D	D	3 x 1 week
2	ATL NSW sTGC							∅	∅			3 x 1 week
3	ATL RPC	∅	∅	∅	∅	∅	∅	∅	D	∅	D	3 x 2 week
4	ATL sMDT	∅			∅	∅	∅	∅	∅	∅	∅	4 x 2 week
5	CMS CSC – 1	D	D	D	D	D	D	D	D	D	D	3 x 2 week
6	CMS CSC – 2	D	D	D	D	D	D	D	D	D	D	3 x 2 week
7	CMS CSC – 3							∅	∅	∅	∅	3 x 2 week
8	CMS DT	U	U			∅	∅	U	U	U	U	2 x 2 week
9	CMS GEM							D	D			2 x 2 week
10	CMS RPC – 1	U	U	U	U	U	U	U	U	U	U	4 x 2 week
11	CMS RPC - 3	U	U	U	U	U	U	U	U	U	U	4 x 2 week
12	iRPC (inside	U	U	U	U	U	U	U	U	U	U	3 x 2 week
13	EP DT2	U	U	U			U	U	U	U	U	3 x 2 week
14	RPC ECOGAS	U	U	U	U	U	U	U	U	∅	∅	2 x 2 week
15	ProTov-RPC							∅	∅	∅	∅	2 x 2 week
16	RE21/CBM									∅	∅	1 x 2 week
Upstream (U)		6	6	5	4	4	5	6	6	5	5	
Downstream (D)		3	3	3	2	2	3	4	5	3	4	
Beam Time		GIF Alone					GIF & RD51		GIF Parasitic		U/D	Extra weeks

- ▶ 2 dedicated weeks for GIF⁺⁺
- ▶ 5 shared weeks with RD51
- ▶ 1 parasitic week (sparsely used)
- ▶ +2 extra weeks due to cancelation of other H4 users

- ▶ Up to 15 setups scheduled
- ▶ **Up to 11 setup hosted** in parallel during beam weeks

Several cancelations (∅/∅) due to manpower issues (experts busy with LHC experiments)

6th GIF⁺⁺ Annual User Meeting 1.12.2022

EP-DT Gas Studies at GIF⁺⁺
 Mattia Verzetti, Giulia Giannandrea on behalf of the EP-DT-FS Gas Team

1. Université Claude Bernard Lyon 1
 2. Università degli Studi di Pavia

GIF⁺⁺ Annual User Meeting 2022

TEST BEAM 2022 (PROTOV @ H8)
 ALESSANDRO ROCCHI

ATLAS NSW Micromegas GIF⁺⁺ studies

Valerio D'Amico
 on behalf of the ATLAS NSW Collaboration
 and Micromegas Isobutane working-group

ATLAS EXPERIMENT

GIF⁺⁺ Annual Users Meeting
 01/12/2022

**CMS-GEM 2022 Report
 -and future-**

Davide Fiorina – INFN Pavia
 On behalf of the CMS-GEM group

ATLAS RPC- GIF⁺⁺ annual meeting

**Annual GIF User Meeting 2022
 CMS-RPC**

Breno Christianes Ferreira
 on behalf of the CMS-RPC Group

01 December 2022

TGC detectors for ATLAS-EIL4
 report of tests in GIF⁺⁺

Luca Moleri, Giannis Maniatis - Weizmann Institute of Science

MuCH RPC Test Results and Status
 Zubayer Ahammed
 (For the MuCH Team@CBM)
 VECC, Kolkata

Outline:

- Expected particle rate at 3rd and 4th stations of MuCH
- RPC design parameters
- Test Results:
 @ GIF⁺⁺
- Observations & Summary
- Future plan

RPC EcoGas@GIF⁺⁺ setup

Luca Quaglia¹ on behalf of the RPC EcoGas@GIF⁺⁺ collaboration

¹University and INFN TORINO

CMS Drift Tubes

Federica Primavera (Bologna University and INFN)
 on behalf of the CMS DT Collaboration

6th Annual GIF⁺⁺ User Meeting 2022 – 1st of December 2022

ATLAS sMDT achievements and plans

Oliver Kortner
 Max-Planck-Institut für Physik, München

6th Annual GIF⁺⁺ User Meeting, 01.12.2022

CMS-CSC longevity studies at GIF⁺⁺

E.Kuznetsova (UF)
 for the CMS CSC longevity team

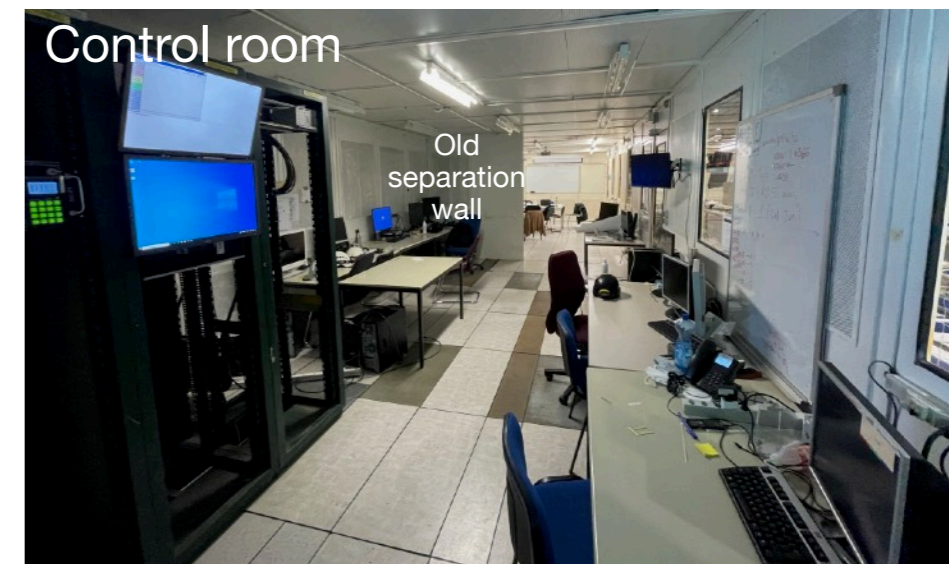
Annual GIF⁺⁺ User Meeting

<https://indico.cern.ch/e/GIF-AUM-2022>

Comments on 2022 Run

- ▶ After the turmoil of the pandemic at the end of the LS2 and last year's start of Run 3, we had a comparable smooth year of running
 - Several primary gas system issues, access system issues.... but no major show stopper
 - + Improved beam configuration file, with good muon intensity for PPE134 (RD51) and GIF⁺⁺ simultaneously (Thanks Nikos !)
- ▶ Many of the improvements made during the last years paid off, and **we could host all user** requesting irradiation and beam time (!)
 - With the parallel startup of the LHC experiments, user manpower become an issue. Hard to fill night shift for muon beam weeks when people are working hard on their experiment
 - + The GIF⁺⁺ control room could be extended by converting/joining the nearby sparsely used meeting room (again, thanks to BE-EA)
- ▶ We did profit from a generous allocation of beam time in 2022 (partly caused by cancelation of other H4 users)
 - + Very good relationship with RD51 (we also share some users)
 - Parallel weeks can not fully be counted as GIF⁺⁺ allocated weeks
Frequent access in RD51 - while fully understandable - shuts down the beam for GIF⁺⁺ while our access is transparent.
Use of Goliath or electron beam by RD51 is lost time for us.

Any improvements on making RD51 access more transparent (e.g. dedicated XTDV upstream of 134 ?) would be highly appreciated



Control room

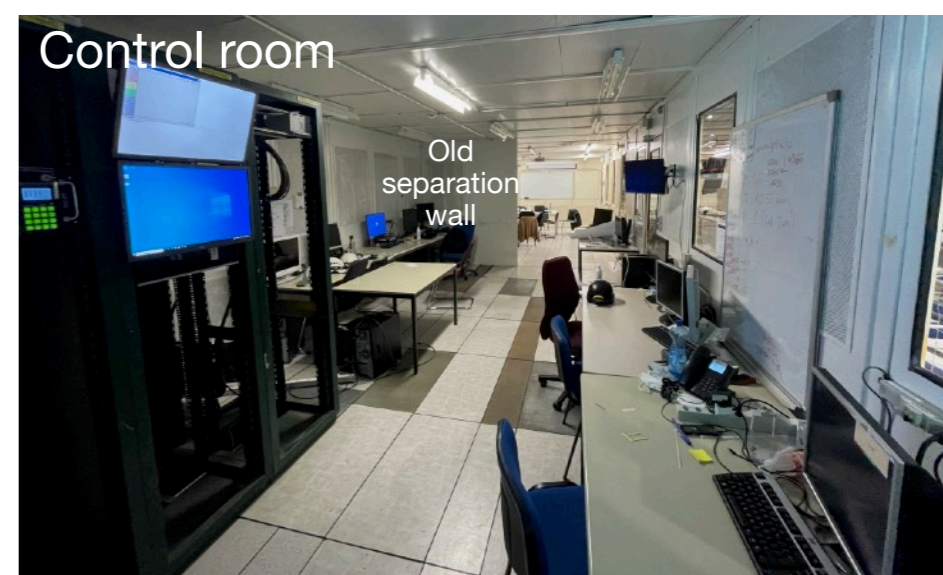
Old
separation
wall

Comments on 2022 Run

- ▶ After the turmoil of the pandemic at the end of the LSP, we had a comparable smooth year of running
 - Several primary gas system issues, access system issues
 - + Improved beam configuration file, with good muon (Thanks Nikos !)
- ▶ Many of the improvements made
 - user requesting irradiation and host all
 - With the parallel startup of SPS and host all
 - + The GIF⁺⁺ control room to fill night shift for muon
 - (again, thanks) , sparsely used meeting room
- ▶ We did p. in 2022
 - + Very good re (partly cause)
 - Parallel weeks (e users)
 - Frequent access allocated weeks
 - beam for GIF⁺⁺ w standable - shuts down the
 - Use of Goliath or ei parent.
 - RD51 is lost time for us.

A heartfelt THANKS
 to all support teams, beam physicist,
 SPS Operators, safety teams....
 making a successful operation
 in 2022 possible

Any improvements on making RD51 access more transparent (e.g. dedicated XTDV upstream of 134 ?) would be highly appreciated



Not done yet.....

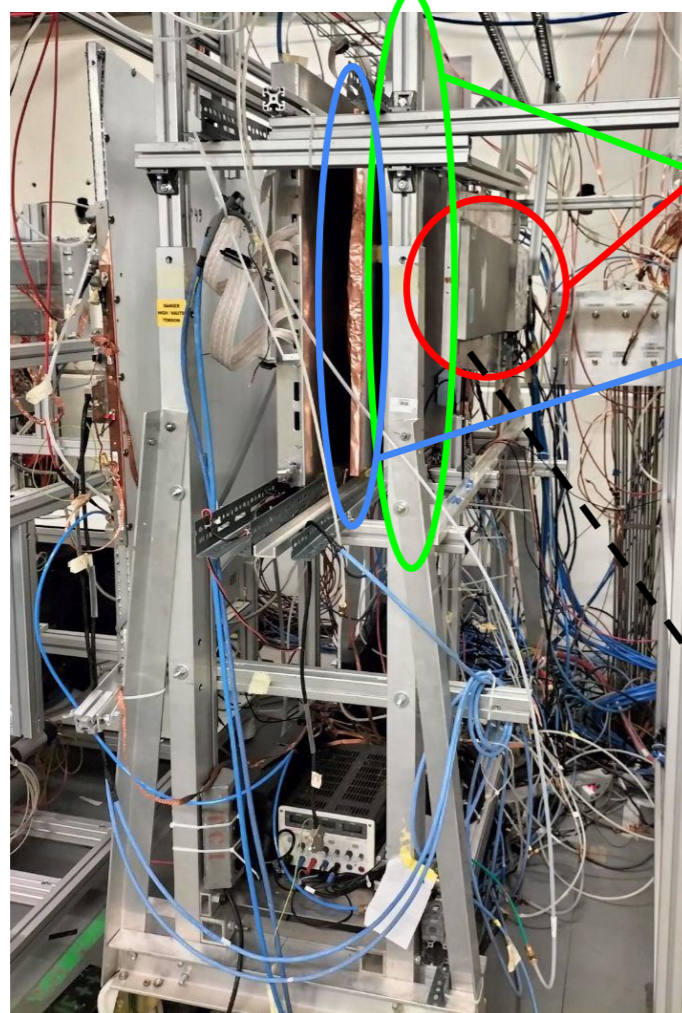
- ▶ **GIF⁺⁺ is still fully operational (!)**
 - ▶ We will stop the Irradiator FRIDAY 16.12.2022 for the CERN closure
- ▶ **Annual Irradiator maintenance :**
 - ▶ First full week of new year to avoid 2 shutdowns : 09-12.01.2023
 - ▶ DSO Source Permit on 12.01.2023
- ▶ **Restart of facility**
 - ▶ We expect normal access from Friday 13.01.2023
 - ▶ Restart of irradiator on/after Monday 16.01.2023
- ▶ **Operation throughout the YETS**
 - ▶ **The time between beam operation is essential for us to progress on ageing studies by accumulating gamma dose**
 - ▶ Electricity, Gas System, Access System & Radiation Monitoring are vital for us
 - ▶ Stops can of course be arranged. However unplanned stops can lead to lengthy recovering (e.g. several days of flushing after gas system failure...)
 - ▶ With a very moderate power consumption of 13kW during beam (and less without beam), we hope to be able to run for most of the YETS.

We expect some very challenging years for the gas system upcoming, with increased RPC and ECOGAS activities.

Backup



The setup - Trolley 3



CMS RE1_1 RPC:

- 2 mm thick bakelite electrodes
- 2 mm double gas gap
- 1D readout, 128 strips
- Strip pitch ~ 1.2 cm
- TDC readout

Bari-1p0

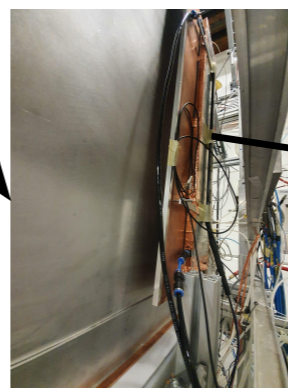
- 1 mm thick bakelite electrodes
- 1 mm single gas gap
- 1D readout, 32 strips
- Strip pitch ~ 1.27 cm
- TDC readout
- 70x100 cm²

EP-DT RPC:

- 70x100 cm²
- 2 mm thick bakelite electrodes
- 2 mm single gas gap
- 1D readout, 7 strips
- Strip pitch ~ 2.1 cm
- Digitizer readout

ATLAS (small) RPC*:

- 10x50 cm²
- 1.8 mm thick bakelite electrodes
- 2 mm single gas gap
- 1D readout, 1 strip (3 cm thick) + confirmation scintillator on RPC
- Digitizer readout



Picture of trolley 3 - Upstream - 3 m from the source