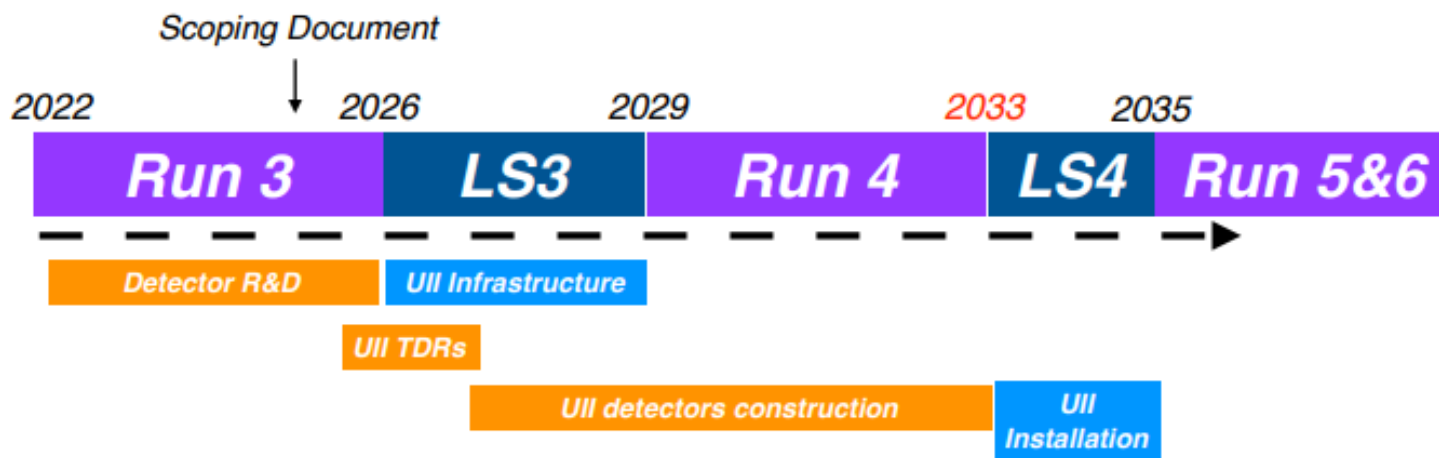




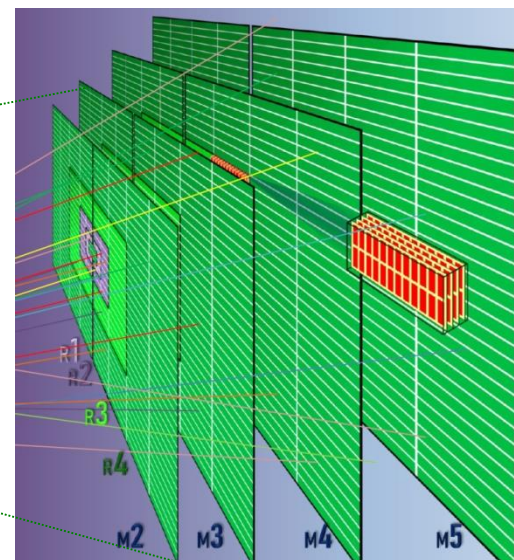
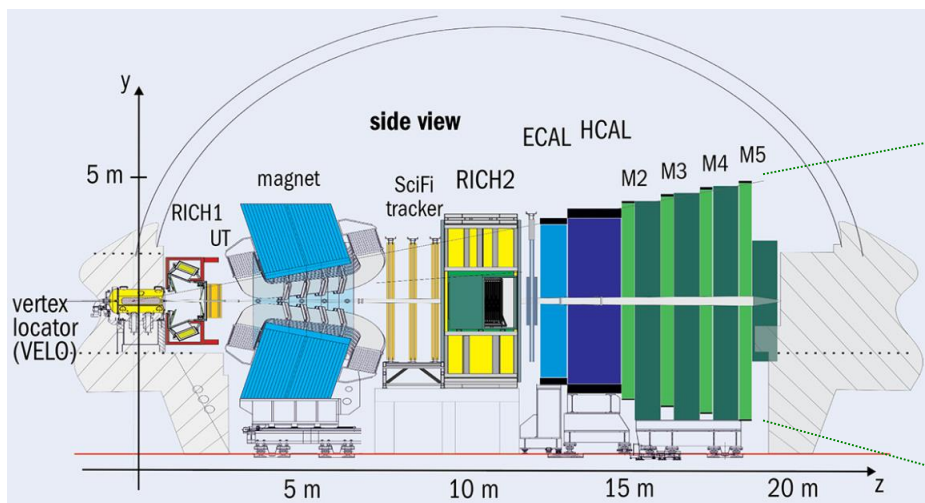
Attività, anagrafica e richieste servizi LHCb



Scoping document in preparation (to be finalized by Sept. 2024)



- Contribution to Muon Detector section



Baseline option (stations M2-M5):

- Inner regions (R1-R2): μ RWell, 23 m², max rate: ~ 1 MHz/cm²
 - Outer regions (R3-R4): MWPCs (present + new higher granularity), 364m², max rate: $\sim 5\div 10$ kHz/cm²
- Other option for outer regions: RPCs



- **Muon detector simulation studies**
- **Development of dedicated FE electronics for μ RWells / RPCs**
- **R&D on new-generation RPCs (AIDAInnova/DRD1)**
- **Test station with μ RWells and RPCs - in progress**

**Activities
will continue in 2025**



Ph.D. thesis, F. Debernardis

Performance of the Muon Detector for the LHCb Upgrade II

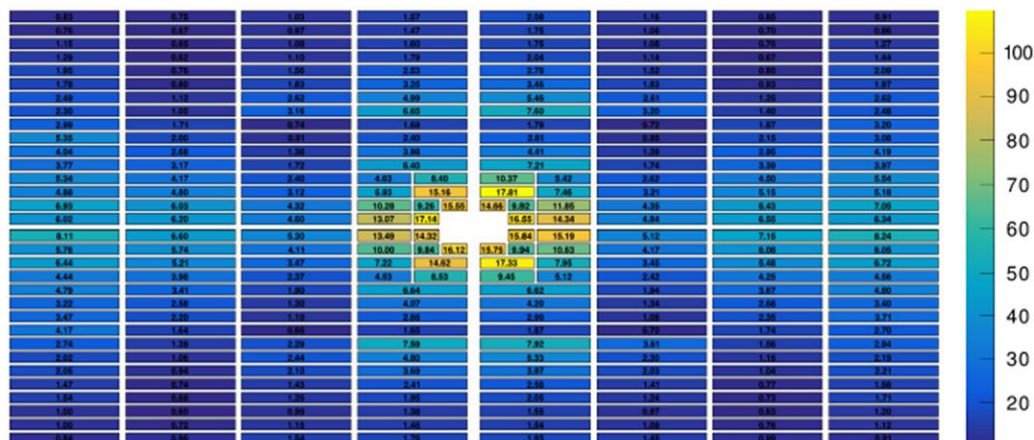


Figure 3.15: Inefficiencies (%) induced by the electronics dead time at Run 5 for each chamber of M2 station

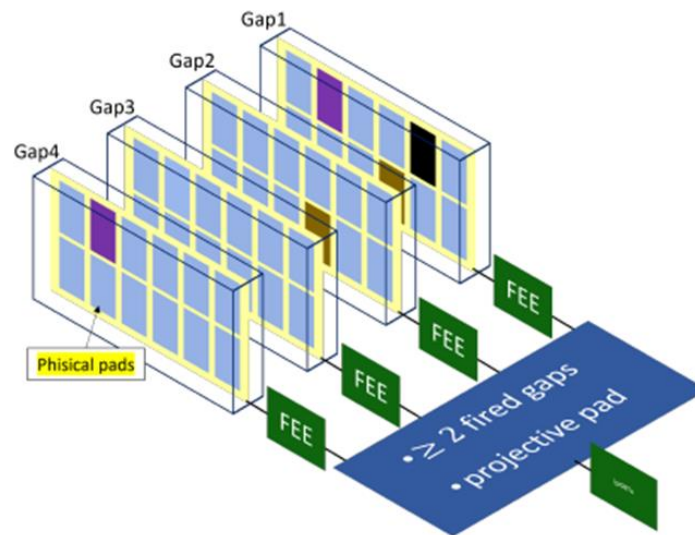


Figure 3.7: The simplified new readout scheme layout.

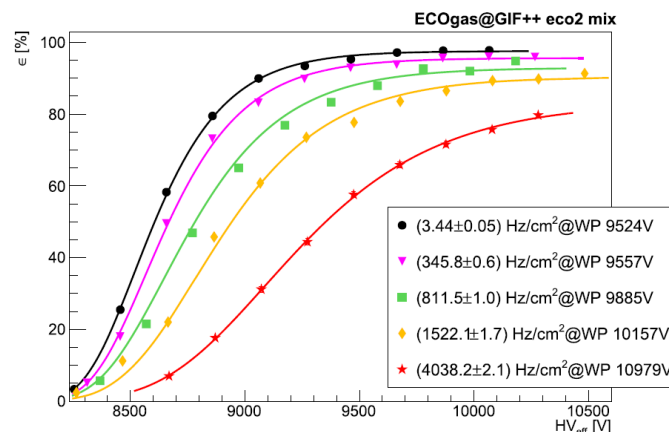
	Maximum chamber rate (kHz/cm ²)			
	M2	M3	M4	M5
R1	594.0 -> 344.5	274.5	203.5	232.7
R2	255.6 -> 79.2	64.2	34.1	39.0
R3	53.4 -> 19.2	8.9	6.2	8.9
R4	9.9	3.0	1.7	6.8



- Ongoing studies on eco-friendly gas mixtures (@Bari/CERN GIF++) in combination with *thin* gaps (study of performance and longevity at high rates)



Activity ongoing in collaboration with the RPC EcoGas@GIF++ group



New beam test at GIF++ just started...



Eur. Phys. J. C (2024) 84:605
<https://doi.org/10.1140/epjc/s10052-024-12907-2>

THE EUROPEAN
PHYSICAL JOURNAL C



Regular Article - Experimental Physics

LHCb Bari

Performance of thin-RPC detectors for high rate applications with eco-friendly gas mixtures

RPC ECOGas@GIF++ Collaboration

Eur. Phys. J. C (2024) 84:300
<https://doi.org/10.1140/epjc/s10052-024-12545-8>

THE EUROPEAN
PHYSICAL JOURNAL C



Regular Article - Experimental Physics

High-rate tests on resistive plate chambers operated with eco-friendly gas mixtures

RPC ECOGas@GIF++ Collaboration

**One more paper in preparation:
First results of the longevity tests
(submitted to EPJC)**



DRD1 WP 1 Trackers, Hodoscopes, Large area muon systems

Editors:

Giulio Aielli, Riccardo Farinelli, Mauro Iodice, Atsuhiko Ochi, Gabriella Pugliese

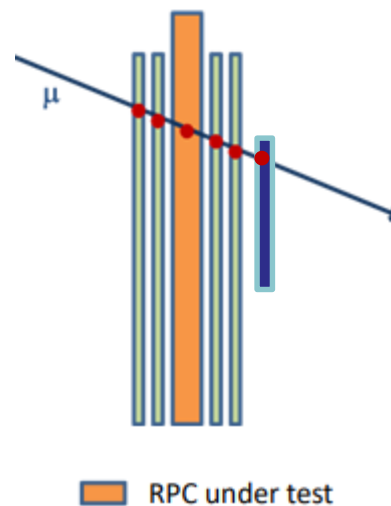
TASK 5
Eco-friendly gases

D5.1 Test and characterization of RPCs operated with low-GWP (HFO) and new eco-gas mixtures.

TASK 7
Longevity on large detector areas

D7.1 Studying the impact of integrated current and unknown gas-induced ageing effect on the long-term performance of the detector.

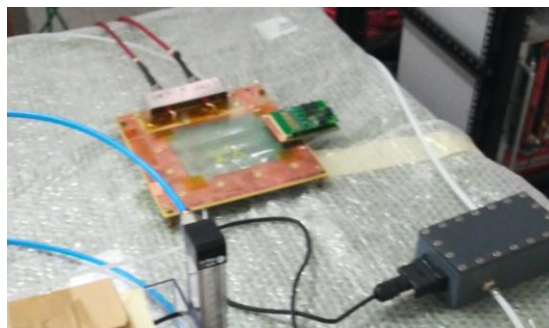
A. Pastore DRD1 CB representative for the INFN Bari-UniBA-PoliBA Group
WG3 (Gas and Material Studies) convener until 20.6.2026



Vertical cosmic test stand:
 several chambers ($\sim 3 \times 1 \text{ m}^2$)
 operated in streamer mode
 for triggering and tracking

Gas distribution systems:

3 gas distribution systems, detectors can be operated with different gas mixtures and/or premixed gas



➤ **New tray to host RPC triplet and μ Rwell detectors**



Currently, equipped with one 1.6 mm gap and one 1.4 mm gap both instrumented with FATIC2 ASIC



G. De Robertis, F. Licciulli, F. Loddo



FATIC3 test board

- FATIC3 ASICS designed in 2023, chip production Jan. - Apr. 2024
- FATIC3 FE boards soon in production
- Beam test foreseen in November 2024

PROGRAM FOR 2025

- Design of FATIC4 (2024)
- Production Jan. - Apr. 2025
- Design and production of FATIC4 FE boards (2025)
- Extensive tests in 2025

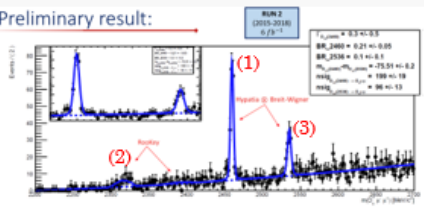


F. Debernardis, A. Pastore, M. Pappagallo, T. Gershon

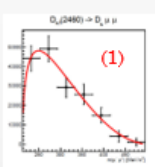
SEARCH FOR $D_{S1} \rightarrow D_S \mu\mu$ DECAYS

- > First observation of Dalitz decays: (1) $D_{S1}(2460) \rightarrow D_S \mu\mu$ and (2) $D_S^* \mu\mu$
- > Puzzling observation of (3) $D_{S1}(2536) \rightarrow D_S \mu\mu$

Preliminary result:

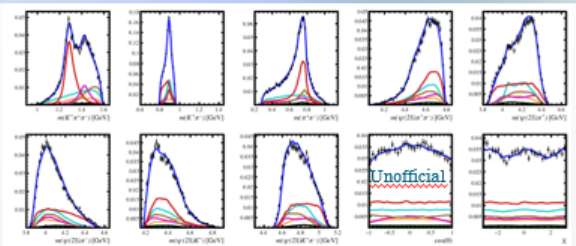


Collaboration with P. Colangelo, F. De Fazio, N. Losacco, F. Loparco to understand the dimuon distributions



P. d'Argent, E. Gersabeck, M. Pappagallo

AMPLITUDE ANALYSIS OF $B^+ \rightarrow \psi(2S) K\pi\pi$



Internal review of the analysis over, currently going through last editorial steps
Target: Preprint out by summer. Paper by the end of the year

A. Palano, M. De Serio, A. Pastore, M. Martinelli

STUDY OF $B_{(S)}^0 \rightarrow D^*(2010) K_S^0 \pi^+$ DECAY CHANNEL



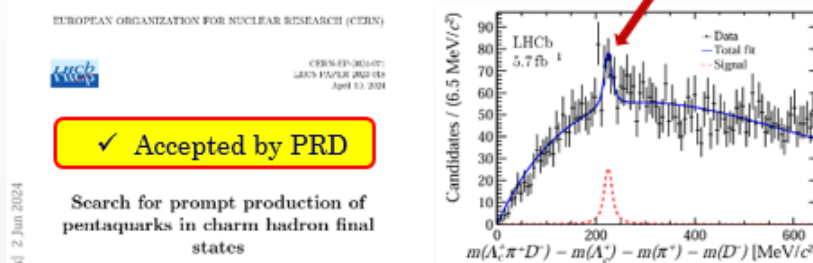
Analysis in progress



G. Robertson, M. Pappagallo, M. Needham

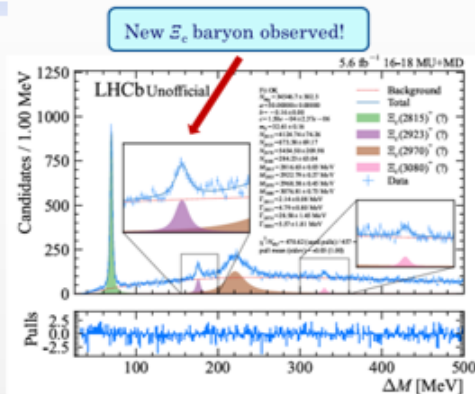
SEARCH FOR PENTAQUARKS IN $\Sigma_c D^{(*)}$ STATES

Most promising signal



R.H. O'Neil, M. Pappagallo, M. Williams

SEARCH FOR EXCITED $\Xi_c^{**} \rightarrow \Xi_c \pi \pi$



- ✓ Analysis is progressing smoothly through the internal review
- ✓ Target: Paper out by end of the year

Anagrafica LHCB-Bari 2025

M. De Serio (resp. loc.)	100%
R.A. Fini	100%
<i>A. Palano</i>	<i>0%</i>
M. Pappagallo	90%
A. Pastore	100% *
S. Simone	100%
F. Debernardis (PhD)	100%
L. Congedo	100%
G. De Robertis	30%
F. Licciulli	20%
TOT FTE	7.4

(*nota: di cui 10% AIDAInnova)

M. Pappagallo member of the Editorial Board (from 1st July 2024, 2-year mandate)

Richiesta servizi

Servizio elettronico: 4 mp

- Disegno e assemblaggio scheda di test FATIC4
- Disegno scheda FE FATIC4 per muRwell
- Disegno nuova scheda concentratore FE->MOSAIC

Camera pulita: 1 mp

- Bonding chip

Servizio meccanico: 2 mp (progettazione) + 2.5 mp (officina)

- Progettazione e realizzazione box per muRwell
- Completamento modifica struttura meccanica tripletto RPC per elettronica FATIC
- Progettazione e realizzazione di struttura meccanica per set-up muRWell + RPC