
Hardware projects in AG Biebel

Valerio D'Amico, Stefanie Götz, Eshita Kumar, Nick Schneider

Hardware Meeting

25/4/2024

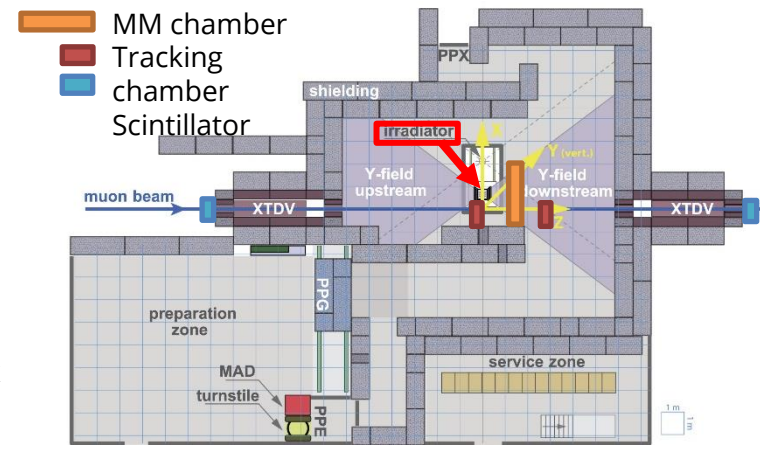


Outlook

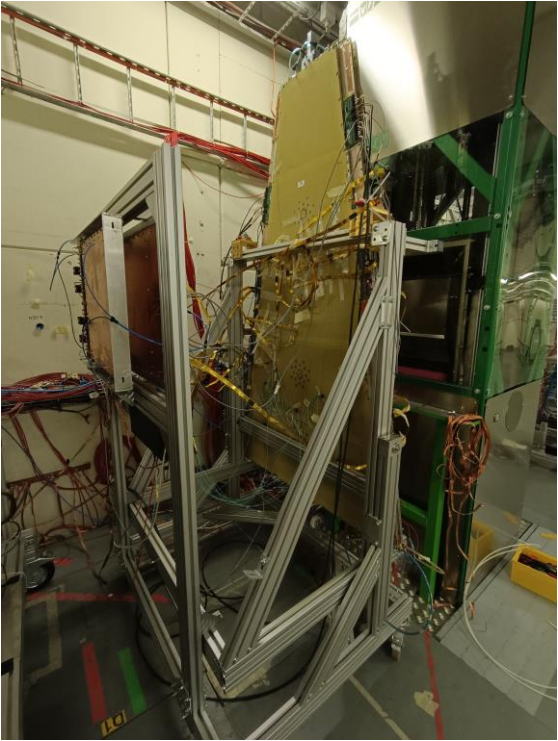
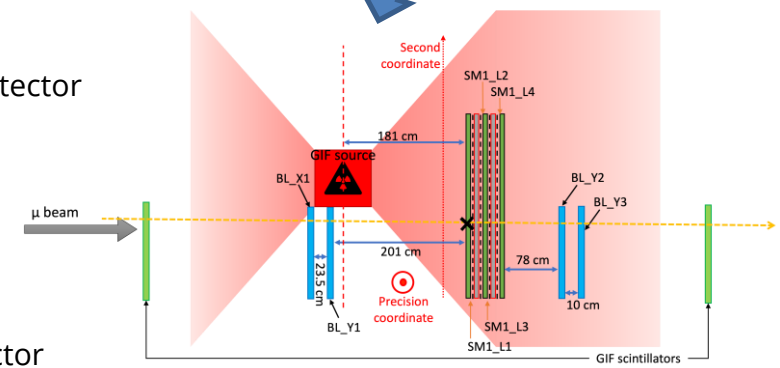
- GIF++ activities at CERN (Valerio)
- Qualification and operational tasks on the New Small Wheel (Stefanie)
- PAD DETECTOR: Brief Intro (Eshita)
- Conversion layers to enhance the detection efficiency of GEM-detectors for X-rays (Nick)

GIF++ activities at CERN

- Irradiation and performance studies of MM detectors with irradiation from a gamma-ray source in GIF++ facility at CERN

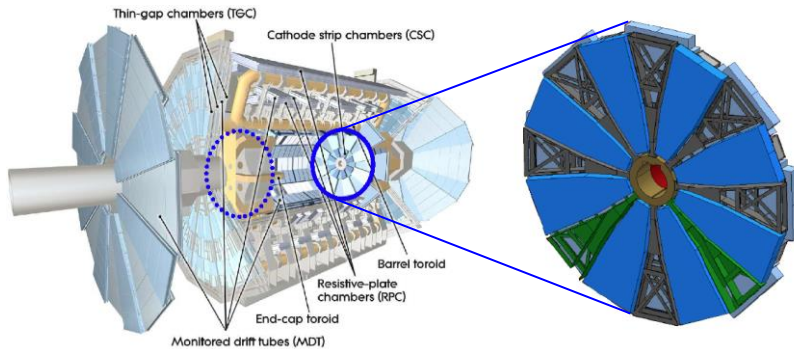


Test-beam setup



- Radioactive source: ^{137}Cs 662 keV
Gammas ~ 11.6 TBq with uniform flux
- Accumulated charge equivalent to more than 5 years of ATLAS operations during HL-LHC
- Test-beams to **study the spatial and timing performance** of the detector after long-term irradiation, and in presence of background particles
- Organizing a new test-beam in June 2024 at H8 (only pions) to perform an efficiency scan of the irradiated chamber surface and validate the robustness of the detector
- Possible additional test-beam in September 2024 at GIF++ (muons+photons)

Qualification and operational tasks on the New Small Wheel (NSW)



Misalignment studies (shifts and deformations)

Issue: The NSW was designed to achieve a transverse muon momentum resolution better than 15% in the muon spectrometer

- Simulation study on the impact of residual misalignment on the resolution

Zebra shifts

Issue: Data reconstruction requires correction for displaced MMFE8 cards and zebra connectors

- MC sample generation and reprocessing of runs to verify applied corrections

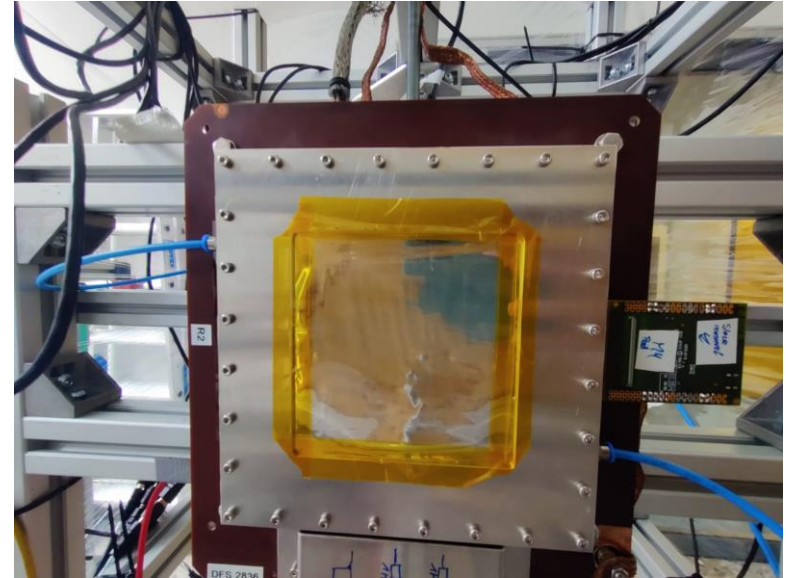
Layer comparison studies

Issue: Ongoing performance studies on the NSW

- Study of new calibrations, reconstruction methods and meshes of a different design in terms of position, energy and time resolution, and cluster charge/size
- Contribution to the development of a centralised framework

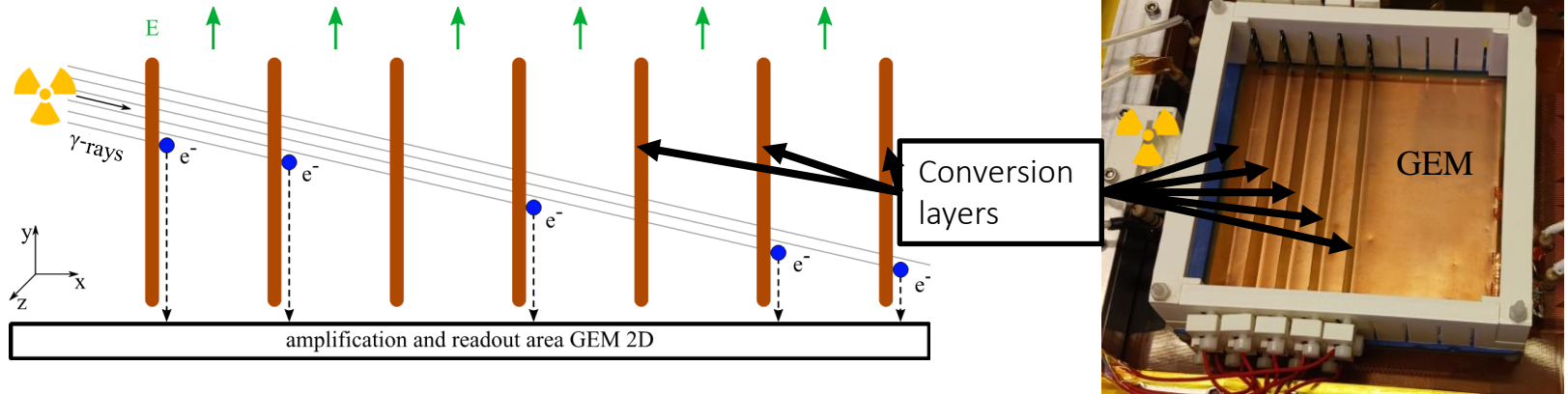
PAD DETECTOR: Brief Intro

- Gaseous detector ($10 \times 10 \text{ cm}^2$) with readout pixels (to obtain 2D resolution)
- Issue: To obtain a good resolution (~ 100 microns), pixels must be $< 1 \text{ mm}^2$
 - > For a $10 \times 10 \text{ cm}^2$ detector, this will result in 10k readout channels.
- Idea: Charge sharing of pixels down to a size of 1 cm^2



Nick Schneider

Topic: Conversion layers to enhance the detection efficiency of GEM-detectors for X-rays



Welcome to AG Biebel !

Any questions ?