



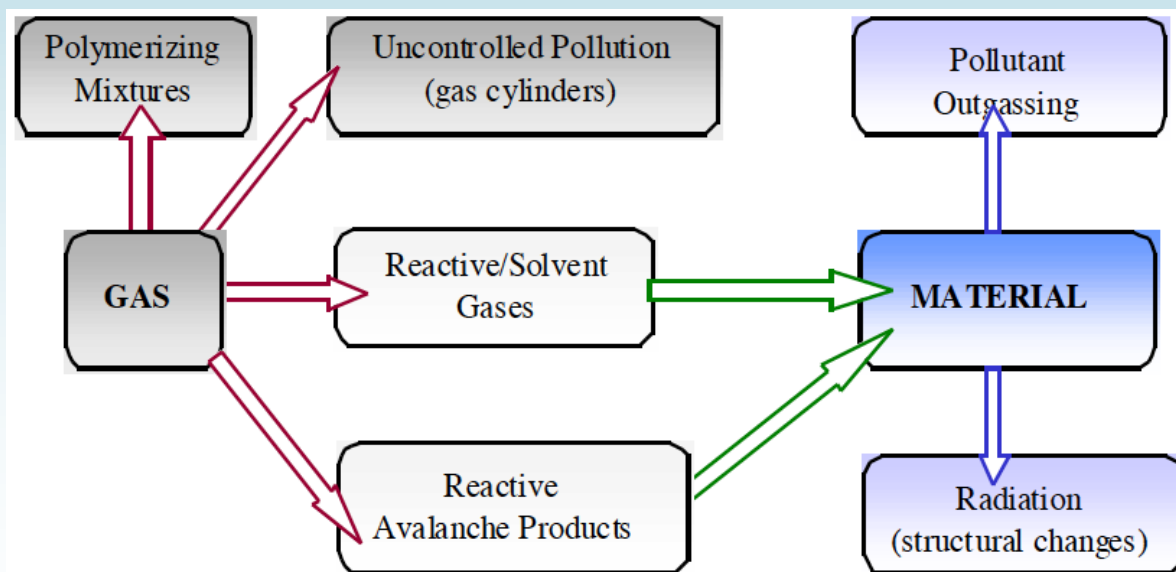
Long Term Operation and Plans for Tests at GIF

CMS GEM Upgrade Workshop III

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(University of Strasbourg*)

Introduction to the ageing process

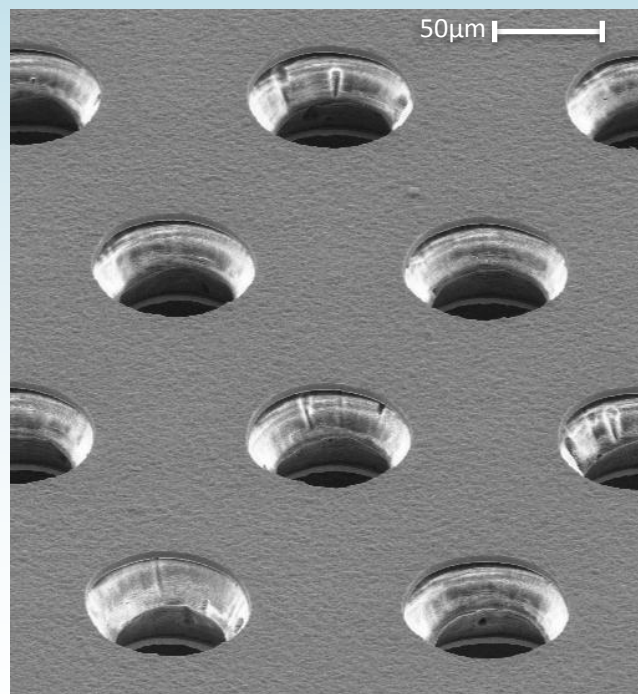
- The ageing process
 - Polymer formation in the avalanche plasma
 - Direct deposition of pollutants
 - Appearance of reactive gas/products in the avalanche process



From M. Capeans, Ageing of Gaseous Detectors : assembly materials and procedures, CERN

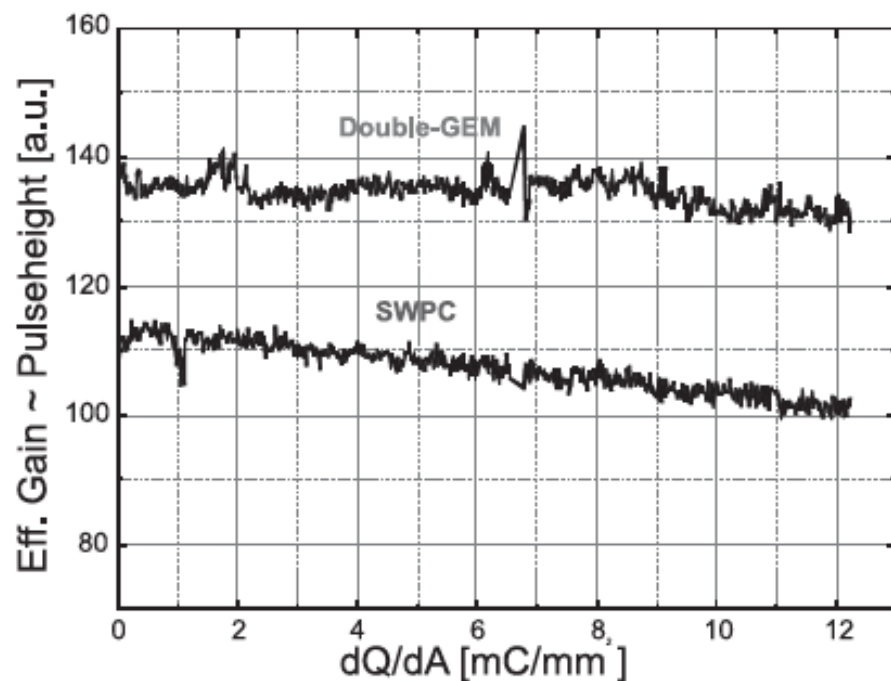
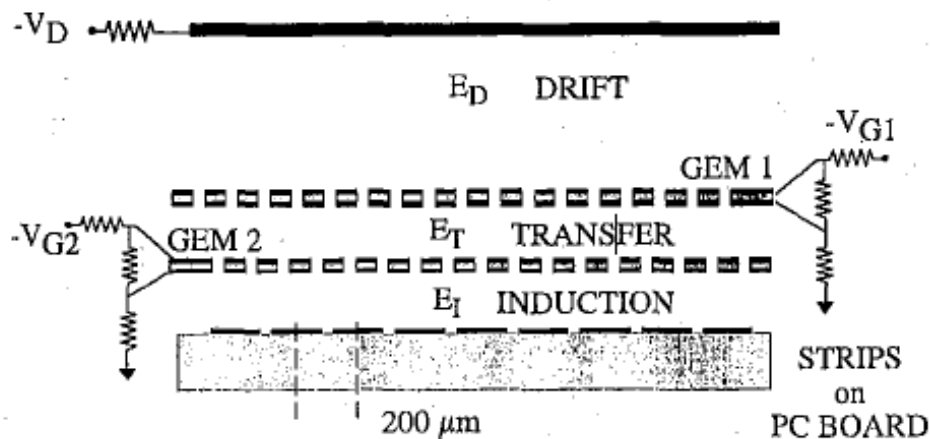
Introduction to the ageing process

- The aim of the ageing test
 - Ensure a long term operation in CMS
 - Understand the effects of the radiation on the materials
 - If there is ageing, understand its origin and propose solutions



The previous ageing measurements -double GEM-

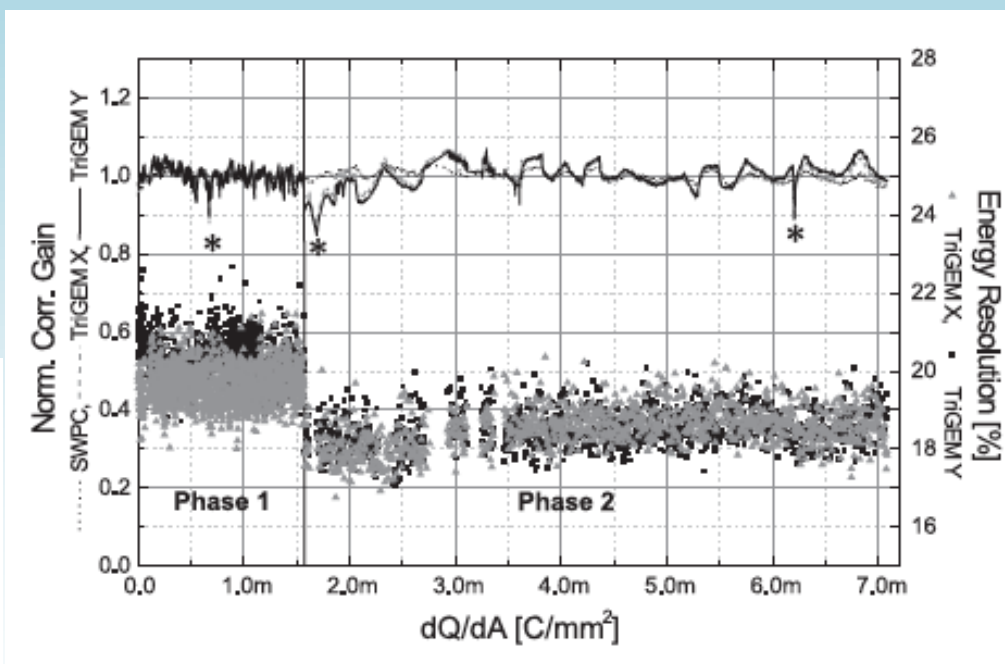
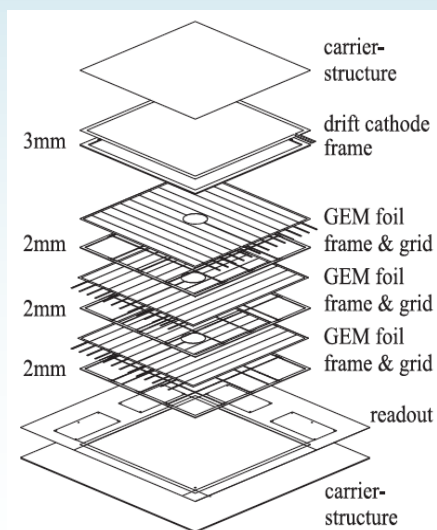
- Standard operation conditions
 - Ar/CO₂ : 70/30
- Setup
 - 6 keV X-rays, rate: $4,75 \cdot 10^4$ Hz/mm²
 - Drift: 2kV/cm , Others: 4kV/cm
 - Gain: $2,2 \cdot 10^3$



Data from S. Bachmann et al., Development and test of large size GEM detectors, IEEE Trans. Nucl. Sci. NS-47 (2000) 1412

The previous ageing measurements -triple GEM-

- Standard operation conditions
 - Ar/CO₂ : 70/30
- Setup
 - 8,9 keV X-rays, rate: 10³ - 10⁴ Hz/mm²
 - Drift: 2,5kV/cm , Others: 3,7kV/cm
 - Gain: 8,5.10³

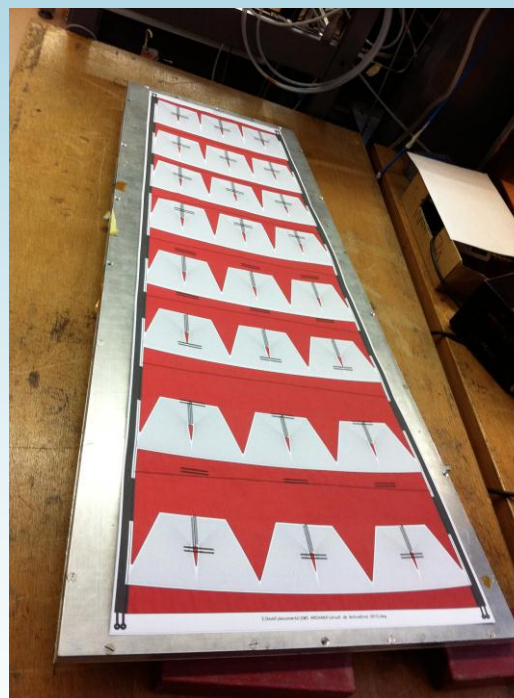


Data from M. C. Altunbas et al., Aging Measurements with the Gas Electron Multiplier (GEM), CERN-EP/2001-091

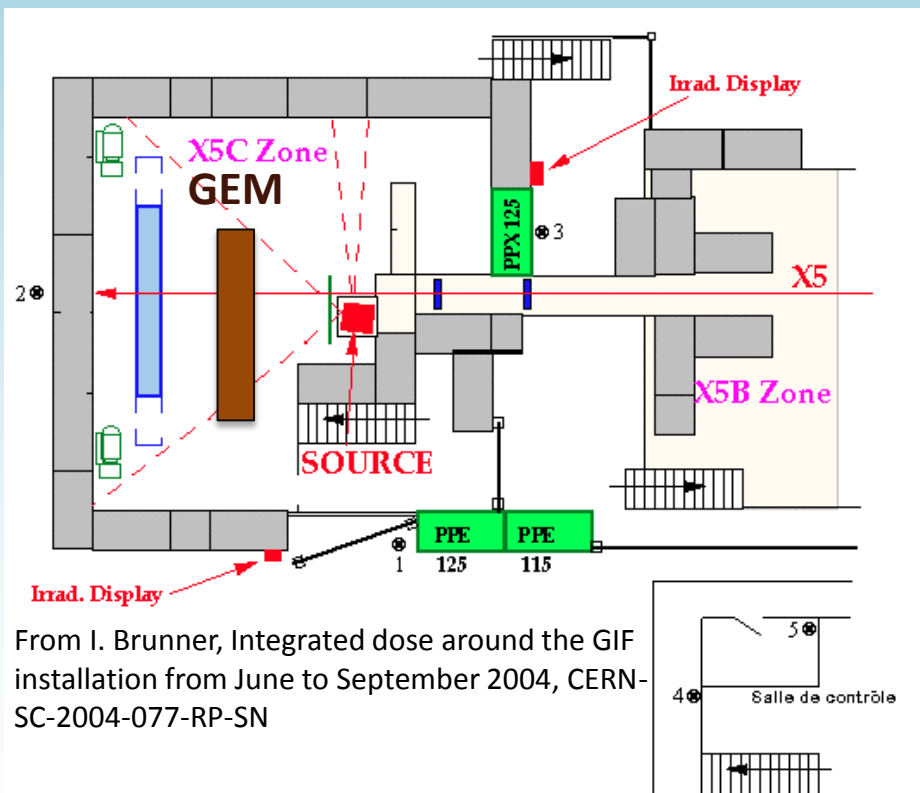
The ongoing ageing test

- **Standard operation conditions**
 - Ar/CO₂/CF₄ : 45/15/40
- **Setup**
 - ¹³⁷Cs source, A: 566 GBq
 - Drift: 3kV/cm , Others: 3,5kV/cm-5kV/cm
 - Gain: 8.10³ - 10⁴

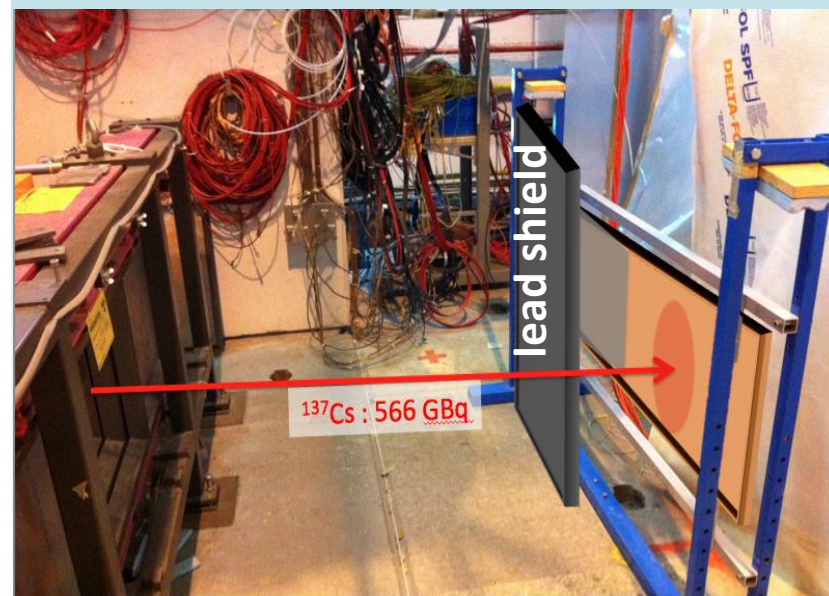
During 6 months in the GIF



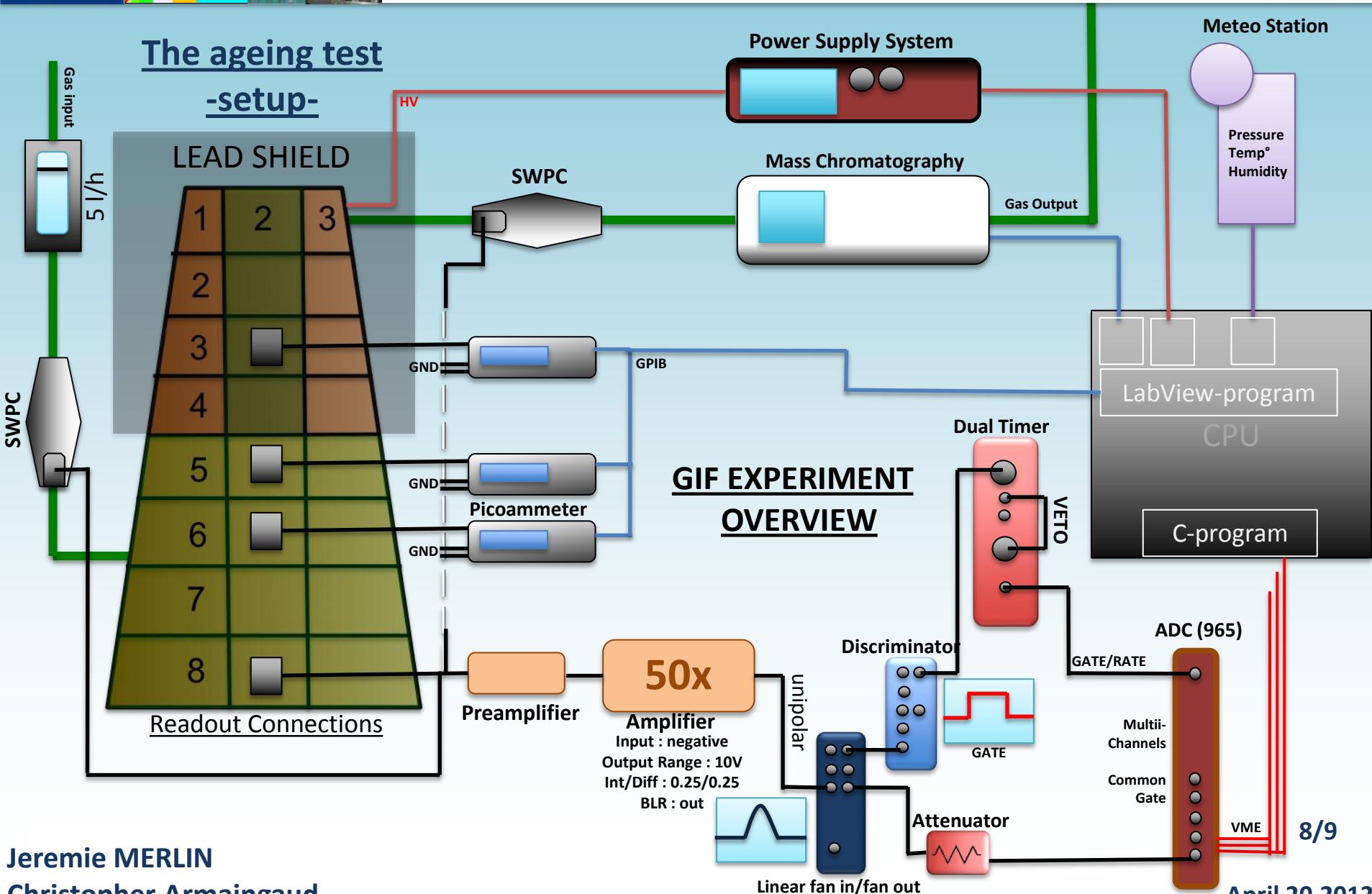
The ongoing ageing test -Gamma Irradiation Facility-



From I. Brunner, Integrated dose around the GIF installation from June to September 2004, CERN-SC-2004-077-RP-SN



The ageing test -setup-





Thank you