

Overview on the Proposal for a new Gamma Irradiation Facility at CERN GIF++

Mar CAPEANS
April 28th, 2009

GIF++ Proposal

- Background: **GIF facility at X5**
 - <http://ess.web.cern.ch/ESS/GIFProject/index.html>
 - Unique combination of particle beam and photon background (till 2005)
 - Irradiation of very large objects
 - Most LHC gas detectors have been validated at the GIF:
 - CMS: RPC, CSC
 - LHCb MWPC
 - ATLAS: MDT, RPC, TGC, CSC
 - Alice TOF, AMS, CPC, RPC
 - RPC Gas Filtering Studies
 - COMPASS
 - LHC Beam loss monitors

CERN B.190



GIF++ Survey

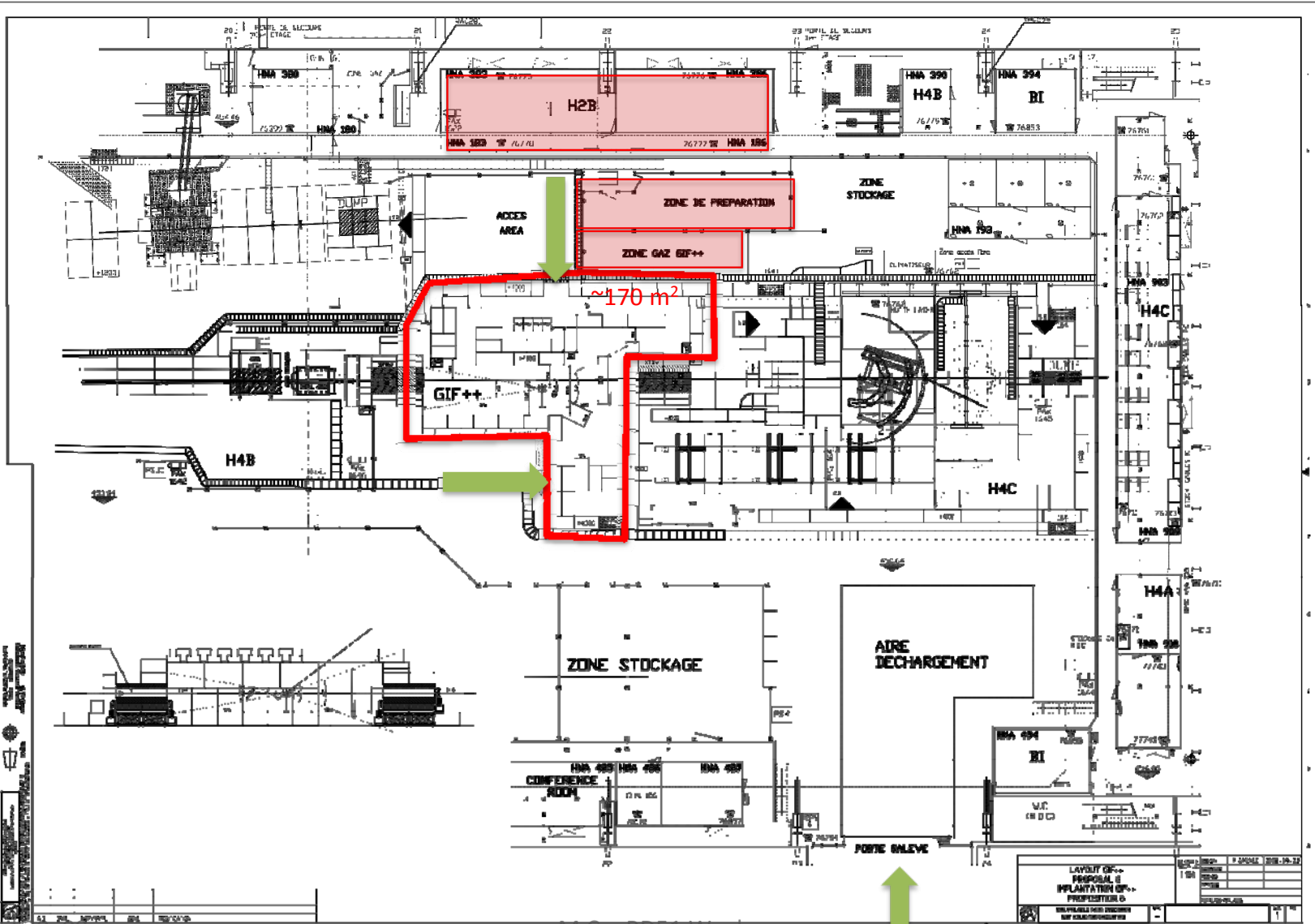
<http://cern.ch/irradiation-facilities/>

- Deadline for answers: February 2008
- GIF/GIF++ Answers: 29/9
 - There is a set of groups concerned by radiation hardness of materials, **small** prototype detectors, electronic components and radiation monitors or dosimetry under a **strong photon flux**.
 - The second set of users represent the **muon detector communities** of the LHC experiments. Their focus is the characterization and understanding of the long-term behavior of large particle detectors and therefore they need, in addition to the high-rate, large-area photon background, the availability of a high energy (SPS), low rate and narrow muon beam.
 - A common point made by all users is the need of well equipped facility providing an **excellent general infrastructure** and a variety of common services to minimize administrative and setting up procedures.

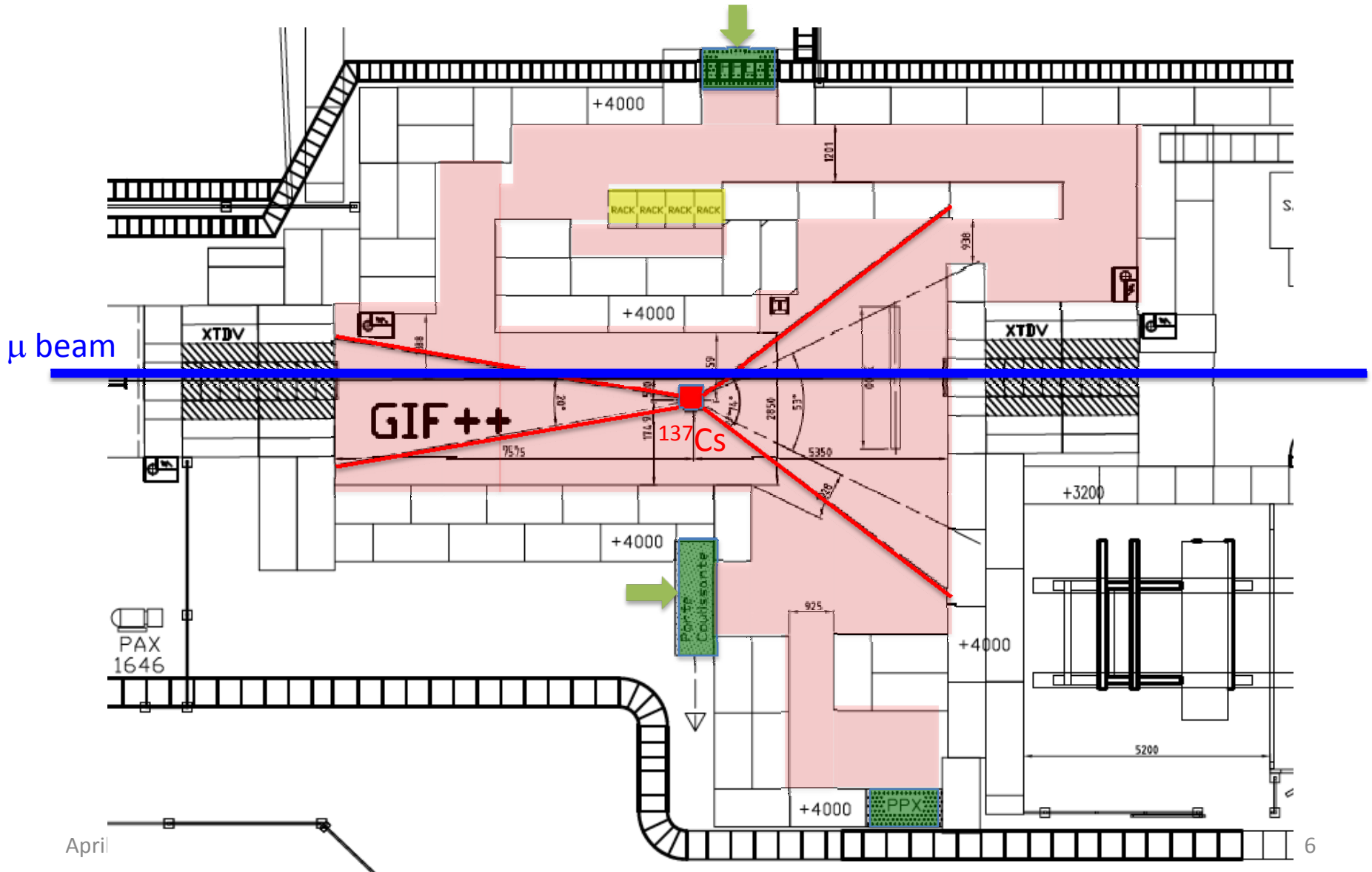
GIF++ Proposal

- Summary of the Technical Specifications available at
 - http://cern.ch/WP7/WP7_DOCUMENTS.htm
- Meeting for discussion with users on Thursday 30/4 in 13-1-017, and possibly go ahead :
 - <http://indico.cern.ch/event/57447>

Proposed Location (by EN Dept.)

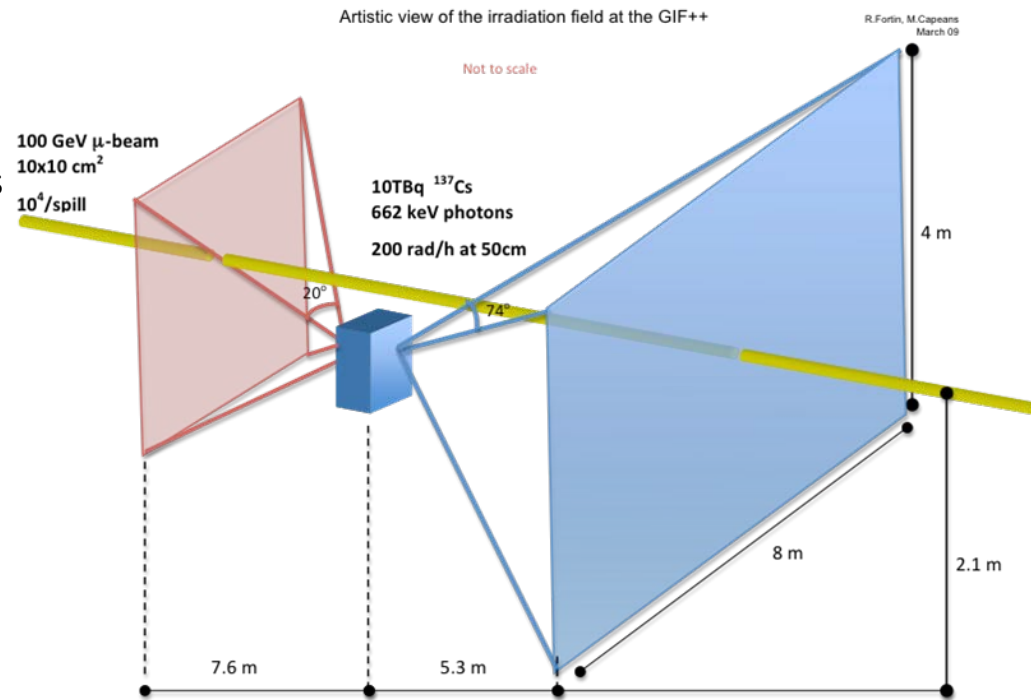


The Bunker



Irradiation field

- **Particle beam:**
 - 100 GeV covering an area of about $10 \times 10 \text{ cm}^2$ for 10^4 particles/spill
 - H4 beam line in the EHN1 (CERN Building 887) area of the SPS
 - 6 weeks/year, on request to PS/SPS Physics Coordinator
- **Source:**
 - Rate in the muon detectors will be dominated by background due to neutral particles, photons and neutrons with energies below 1 MeV
 - $^{137}\text{Cesium}$ source (662 keV photons), 30 y half-life
 - $\sim 10 \text{ TBq}$ providing up to 2 Gy/h at a distance of 50 cm
 - Back to Back beams



Dose Rates

- Estimates: 10 TBq ^{137}Cs providing up to 2 Gy/h at a distance of 50 cm
- Photon rate attenuation up to $\sim 10^5$ by a set of movable filters
 - sLHC dose rates:
 - Si-trackers \sim MGy/y
 - Calorimeters \sim 20 kGy/y
 - Muon systems: 0.1 Gy/y

Peripheral Infrastructure

- Electricity
- Fire detection
- Gas supply and detection systems
- Gas distribution close to bunker
- Chilled water
- Cable and pipe trays
- Ethernet
- Crane access
- Preparation area
- Short-term storage areas
- Barracks
- Safety systems (beam, access, etc...)

Neutral gases: Ar, N₂, CO₂, He, Xe
at > 5 bar
Flammable gases: iC₄H₁₀, CH₄,
Ar/H₂
Special gases: C₂H₂F₄, SF₆, CF₄

Mixers
Consumption monitor
Gas Analysis
IR analysis/interlock for
flammable gases

Infrastructure inside the Bunker

- Cable and pipe trays
- Tent with controlled environment (T, RH) ???
- Environmental sensors
- Dose rate monitoring
- Beam monitoring

Timescale

- Evaluation of possible scenarios and Design Proposals: June – September 08
 - Preparation Technical Design Proposal (PH and EN Dept): September 08 – April 09
 - Design of Final Infrastructure (not related to beam): September 08 – February 09
 - Approval of Technical Specifications of the facility: May 09
 - Procurement and construction phase: May 09 – December 09
 - Infrastructure commissioning: January 10 – May 10
 - Target date 'Ready for users': May 10
 - First report of results: Dec 10
-
- We need a strong and continuous support and contributions from the user community