30 April 2010 – PH-DT steering board meeting

Upgrade of the irradiation facilities in the PS East Hall

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activities are part of

PH-DT irradiation service, WP7 ,

CERN irradiation facilities working group, AIDA

Outline:

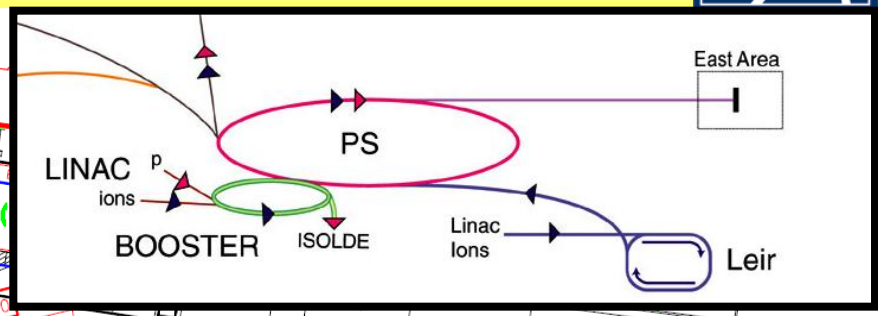
- **Introduction: Some facts about facilities, operation and user community**
- **Hardware upgrades in 2009 – New irradiation tables and boxes**
- **Long term upgrade plans:**
  - **Survey on need for future facilities at CERN**
  - **East Hall renovation plans (CERN-EN) & (our) preliminary concept of a new facility**
  - **Next steps:**

    a) Submit proposal to the LHCC (next week),

    b) Secure AIDA funding and use it to get upgrade started …

CERN PS East Hall - Irradiation Facilities

T7 & T8 beam lines in East Area



24 GeV/c protons

ALICE
ATLAS
CMS
LHC_B
DIRAC
ASSEMBLY AREA
SHUTTLE
Irrad 1
Irrad 2

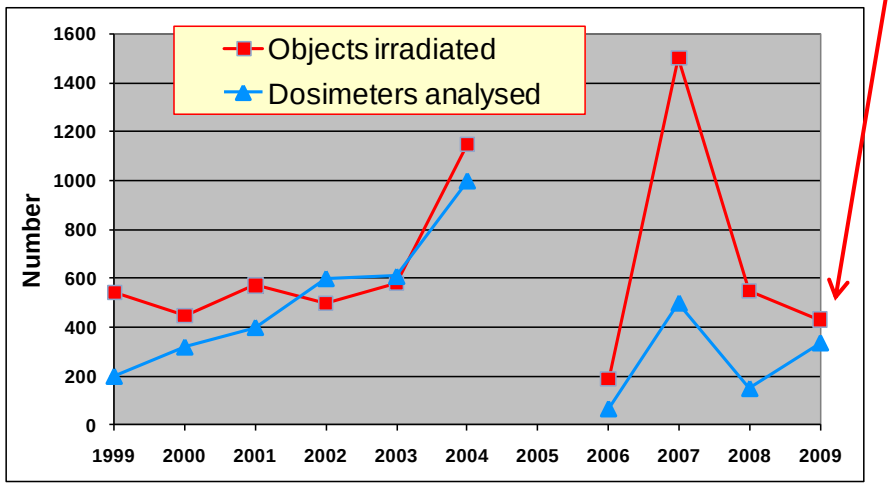
- **Proton irradiations (T7-line)**
  - **Direct exposure to 24 GeV/c protons** (shuttle + boxes in primary area)
  - **Flux: 1-10×10^{14} p/cm^2/hour** (on 2x2cm^2)
  - SEU testing field (IRRAD6)
- **Mixed field irradiations (T8-line)**
  - **Mixed field in cavity after carbon/lead 'target'**
  - **~5×10^{11} n$_{eq}$/hour** (at 50 cm from beam axis)

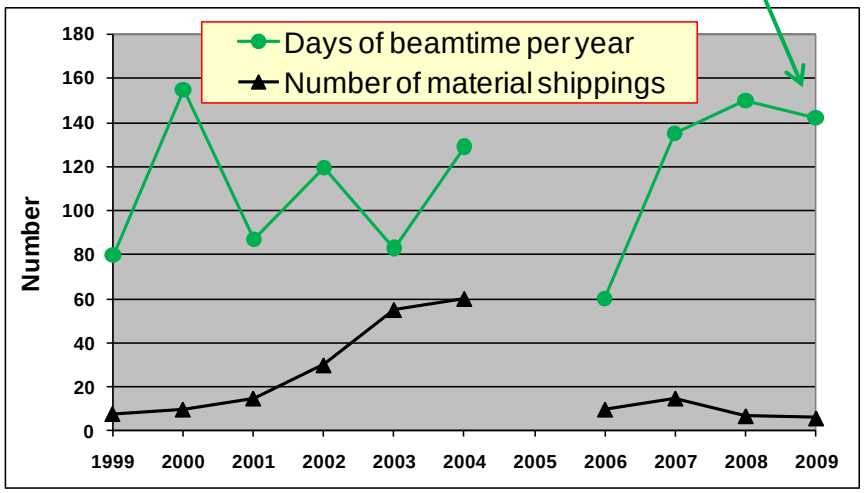
CERN PS Facilities – Operation 2009

- **Some statistics for 2009**

431 object irradiated

142 days of beam



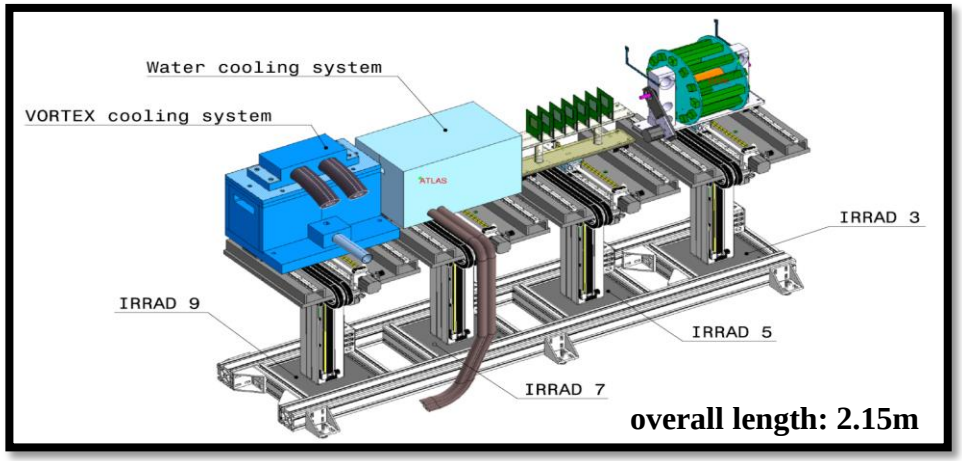


- **Most complex irradiations in 2009**
  - **12 CMS ECAL & Crystal Clear scintillating crystals** (get highly activated)
  - **ATLAS silicon sensors for SLHC** (cooling to low temperatures during irradiation)
  - **Optical link system R&D for SLHC** (system in operation during irradiation)
- **Main part of irradiations performed for**
  - **ATLAS, CMS, LHCb, RD39, RD42, RD50, RADMON, ….**
- **Operation in 2010**
  - **expect ~150 days of operation (as in 2009), users from ATLAS, CMS, RD50, LHCB,….**
  - **3 weeks of pion beam at the PSI (~280 MeV/c.) + 1 week of setup**

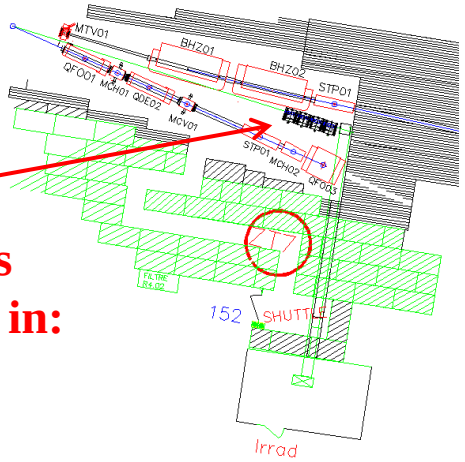
Hardware upgrades in 2009/2010

- **Activities focused on equipment that could be moved into an upgraded facility**
  - Planning and construction of new irradiation tables and cold box systems
  - Supported by WP7 & WP4 funding
  - In collaboration with facility users: Mainly ATLAS Pixel & ATLAS SCT, CMS ECAL

What we want:

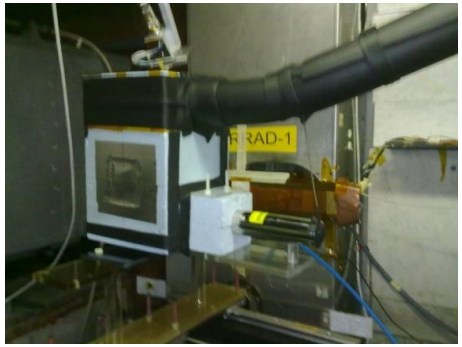


Where it has to be squeezed in:

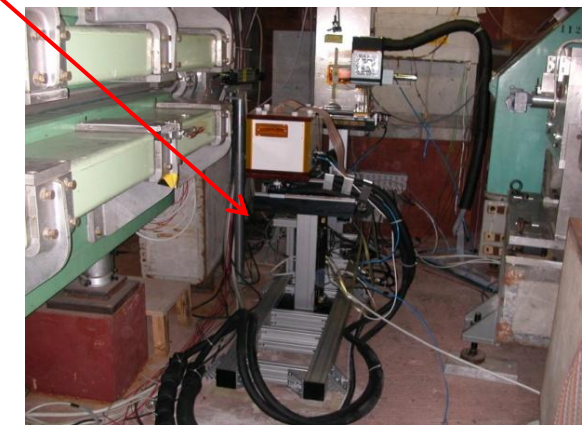


How it presently looks like:

Coldbox for ATLAS Pixel structures (WP4) inside facility (2009) with Vortex Cooling



Coldbox for ATLAS SCT structures in lab with water cooling



Long term plans for facilities: Needs

- **Survey performed by '*Working group on future irradiation facilities at CERN*'**
  - Interdepartemental working group formed in 12/07 on request of several department heads
  - Web-based survey on requirements and needs for irradiation facilities: Collected > 135 forms
  - Details on the survey: http://www.cern.ch/irradiation-facilities/
  - **<u>Conclusion</u>: 4 complementary irradiation facilities required to cover needs**

1) Proton and ion irradiations at high energy and high density (fast extraction) → **HiRadMat**

2) Gamma irradiations in the presence of a muon beam

3) Proton irradiation at high intensity (slow extraction)

4) Mixed-field irradiations with slow extraction

→ **GIF++**

→ **Why are the present East Hall facilities not sufficient?**

- **Proton Irradiation facility**
  - **Located in primary zone** *(limited access: stop all beam lines for access, wait for de-activation)*
  - **Limited space** *(Personnel exposed to radiation, difficult to scan beam over big objects, backscattered particles)*
  - **Low intensity** *(Should be increased if possible)*
- **Mixed field irradiations (behind DIRAC)**
  - **No irradiation position lateral to target, limited intensity, too little space (only shuttle), parasitic to DIRAC**
- **Proton & Mixed field facility located in different beam lines**
  - **Parallel operation of two facilities leads to competition for beam**

Long term plans for facilities

Two good reason to act now:

- **After Chamonix 2010: East Hall renovation plans progressing quickly**
  - Renovation plans presented on IEFC Workshop 2010 (L.Gatignon)
    with aim to implement changes in 2012

Proposed layout, 2010 version:

- **AIDA proposal approved including EU-funding for facility upgrade:**

  350 Keuros for facility and 150 Keuros for infrastructure (EU contribution)

Long term plans for facilities: Next steps

- **Presentation of AIDA proposal to IEFC - LHC injectors and experimental facility committee.** *(Presentation Today, Discussion with EN (R.Saban) on Monday)*
- **Proposal to LHCC to "seek recognition of the scientific case for improved radiation facilities at CERN" in order to proceed with implementation studies and cost estimates**

  (Proposal submitted today, presentation to LHCC on Tuesday 4.5.2010).
- **Achieve green light to sign contract on AIDA deliverables with EU and proceed towards implementation plans for new or upgraded facility.**
- **Personally, we would hope for the following:**

mixed field facility
(multiple user communities: LHC machine LHC Experiments, Dosimetry (RP), MC benchmarking)

Proton Facility
(main user community: LHC Experiments)