

30 April 2010 – PH-DT steering board meeting

Upgrade of the irradiation facilities in the PS East Hall

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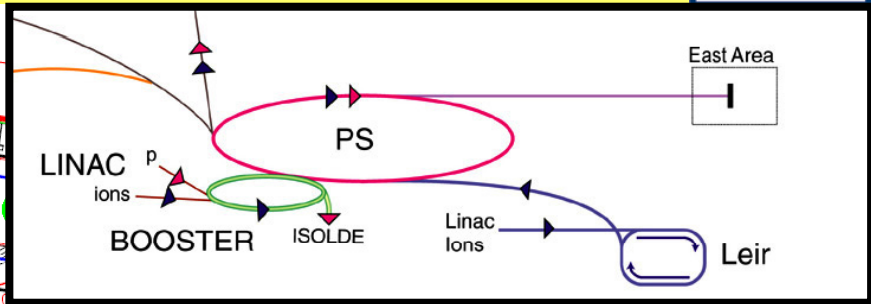
activities are part of

**PH-DT irradiation service, WP7 ,
CERN irradiation facilities working group, AIDA**

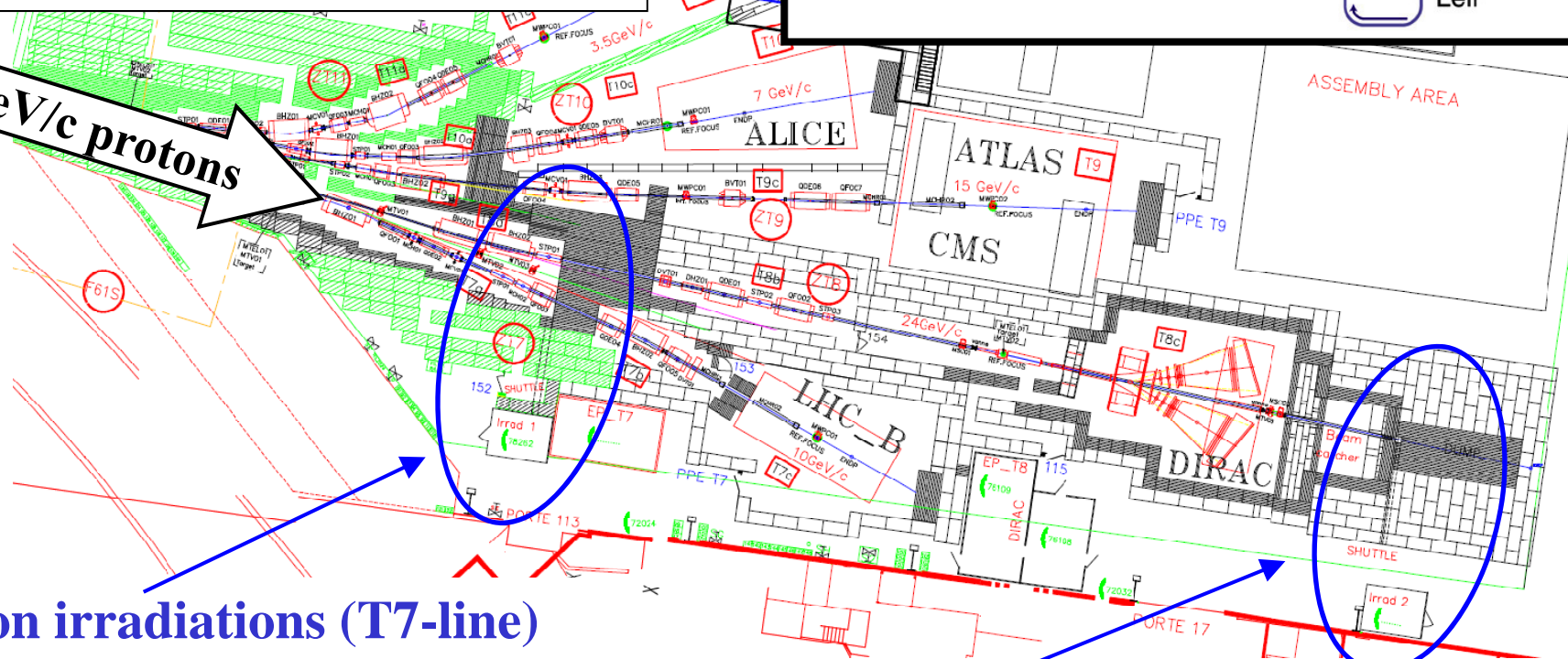
Outline:

- **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 ...

T7 & T8 beam lines in East Area



24 GeV/c protons



• Proton irradiations (T7-line)

- Direct exposure to 24 GeV/c protons (shuttle + boxes in primary area)
- Flux: $1\text{-}10 \times 10^{14}$ p/cm²/hour (on 2x2cm²)
- SEU testing field (IRRAD6)

• Mixed field irradiations (T8-line)

- Mixed field in cavity after carbon/lead 'target'
- $\sim 5 \times 10^{11}$ n_{eq}/hour (at 50 cm from beam axis)



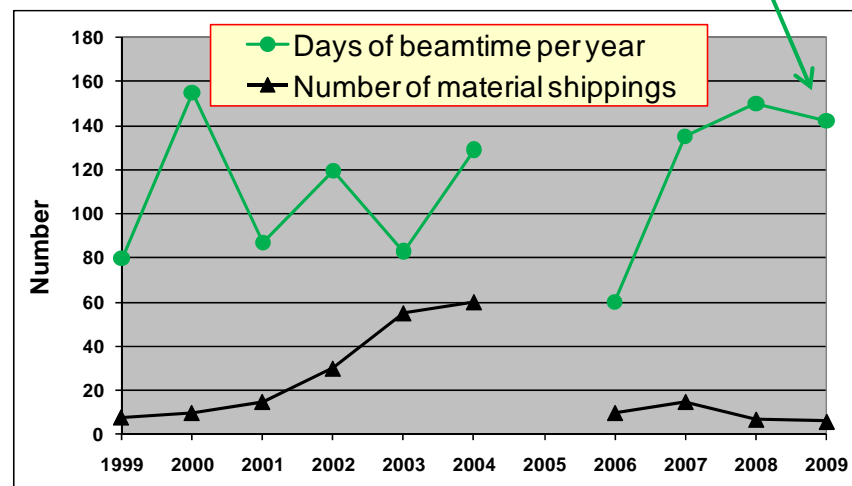
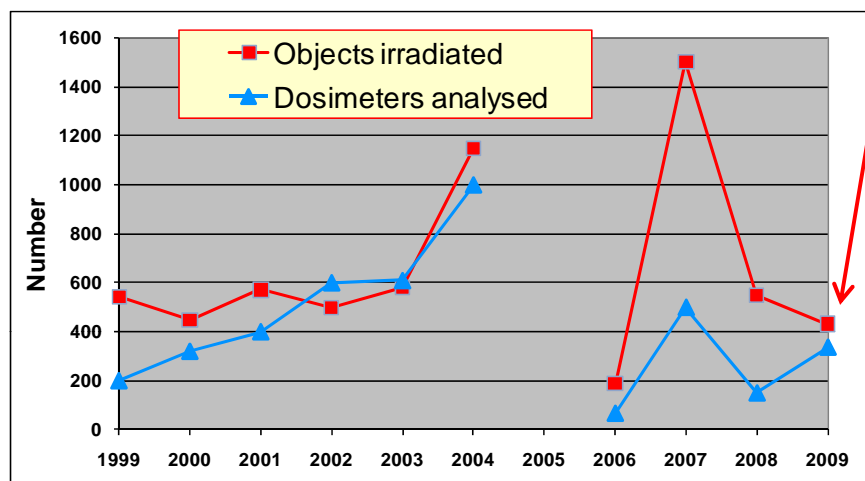
CERN PS Facilities – Operation 2009



• 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

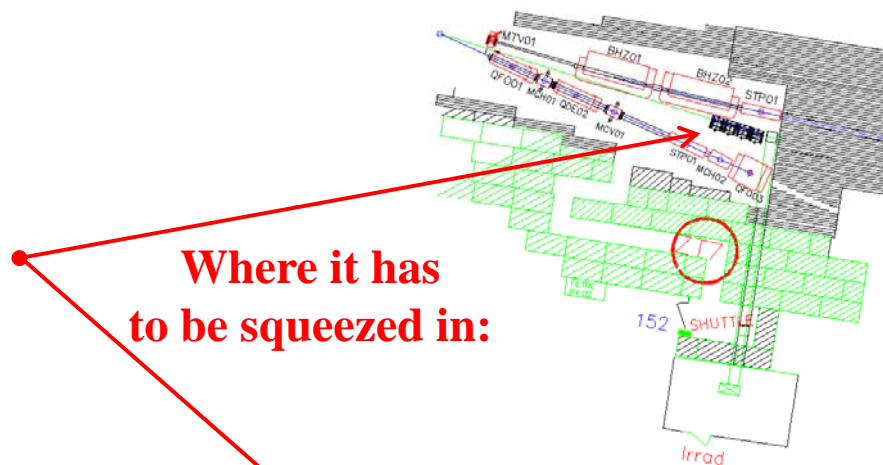
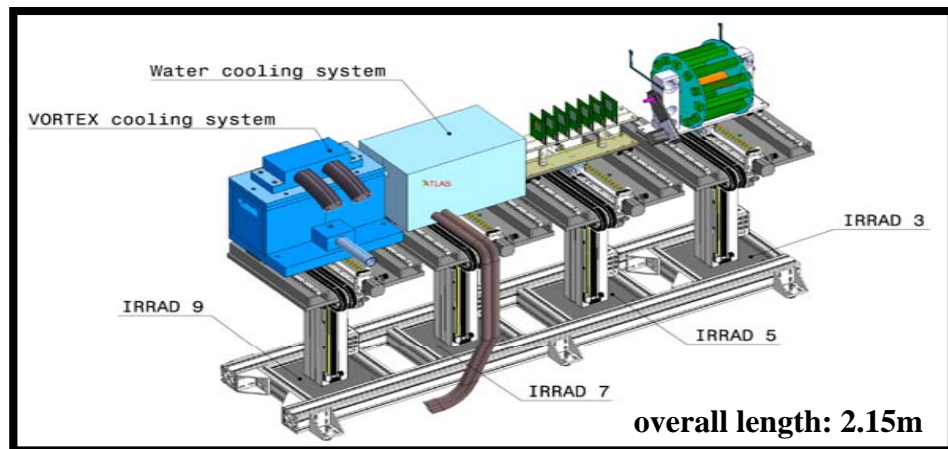


Hardware upgrades in 2009/2010



- **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:



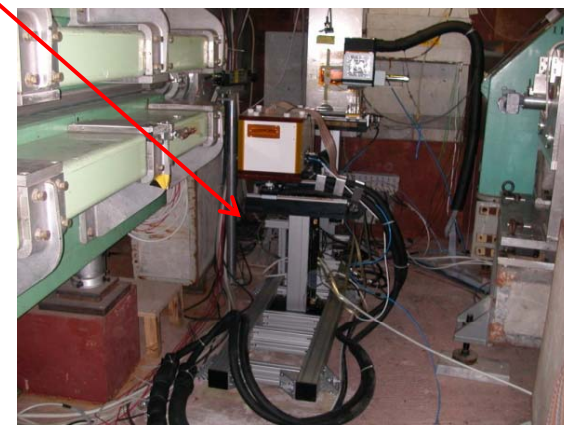
Where it has
to be squeezed in:

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’**

- Interdepartmental 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/>
- **Conclusion: 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)

GIF++

4) Mixed-field irradiations with slow extraction

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

Two good reason to act now:

- **After Chamonix 2010: East Hall renovation plans progressing quickly**
 - Renovation plans presented on IEFW 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 to be submitted beginning of next week*).
- **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)