WP8 – Improvement and equipment of irradiation beam lines

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WP8 – Task overview

- WP8 – tasks and task leaders

8.1.	**Coordination and Communication**	Co-leader: **Giovanni Mazzitelli (INFN LNF)** **Michael Moll (CERN)**	**(gm)** **(mm)**
8.2.	**Test beams infrastructure at CERN and Frascati**		
	8.2.1. CERN	Leader: **Ilias Efthymiopoulos (CERN)**	**(gm)**
	8.2.2. Frascati	Leader: **Giovanni Mazitelli (INFN-LNF)**	**(gm)**
8.3.	**Upgrade of PS proton and neutron irradiation facilities at CERN**	Leader: **Michael Moll (CERN)**	**(mm)**
	8.3.1. Improvement of irradiation facilities and evaluation of upgrade proposals		
	8.3.2. Common infrastructure for the facilities		
8.4.	**Qualification of components and common database**	Leader: **Simon Canfer (STFC)**	**(mm)**
	8.4.1. Review existing data and experience from LHC, define test program		
	8.4.2. Define test procedures and conduct tests on selected components		
	8.4.3. Set-up and publish a WEB database compiling the information above		
8.5.	**General infrastructure for test beam and irradiation lines**		
	8.5.1. Commission and operate beam tracking telescope	Leader: **Hanno Perry, Igor Rubinsky (DESY)**	**(gm)**
	8.5.2. TASD and MIND	Leader: **Paul Soler (STFC)**	**(gm)**
	8.5.3 .GIF++ user infrastructure	Leader: **Davide Boscherini (INFN Bologna)**	**(mm)**
8.6.	**Coordination of combined beam tests and common DAQ**		
	8.6.1. Common test beam experiments at CERN and DESY	Leader: **Ties Behnke (DESY)**	**(mm)**
	8.6.2. Common DAQ	Leader: **David Cussans (Uni Bristol)**	**(WP9)**

Test beams infrastructure at CERN and Frascati

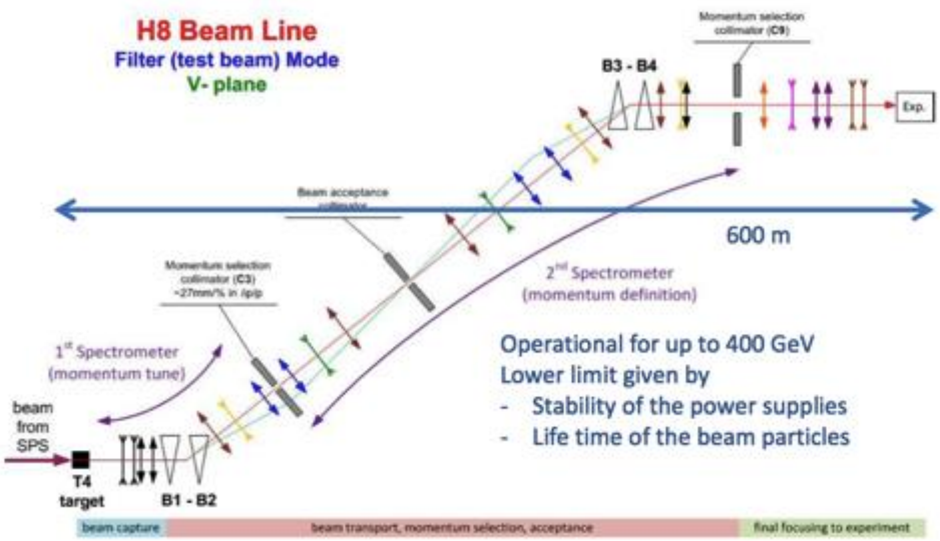
Task 8.2

8.2.1 CERN

8.2.2 Frascati

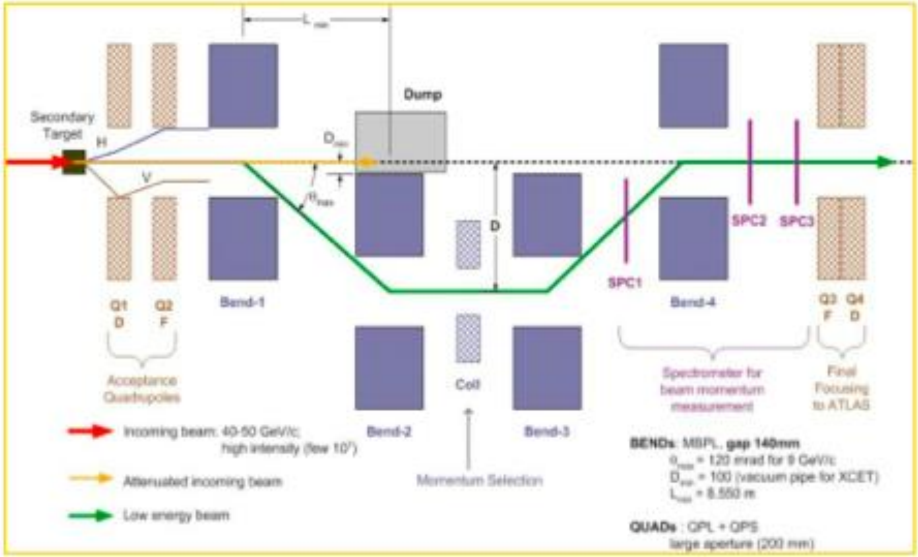
Task 8.2.1 - CERN

- Design of a low-energy (1-9 GeV/c) muon, pion and electron beam in the H8 beamline, for neutrino detector R&D
  - Design of the **optics** for the very low energy muon, pion and electron beam.
  - **Maximize** the ratio at the experiment for the **muon** beam.
  - **Maximize** the **acceptance** of the beamline.
  - **Minimize** the **background** (muon beam halo + decay) at the experiment.
  - Adapt to the **layout constraints** in the building; use of the large MORPURGO magnet.

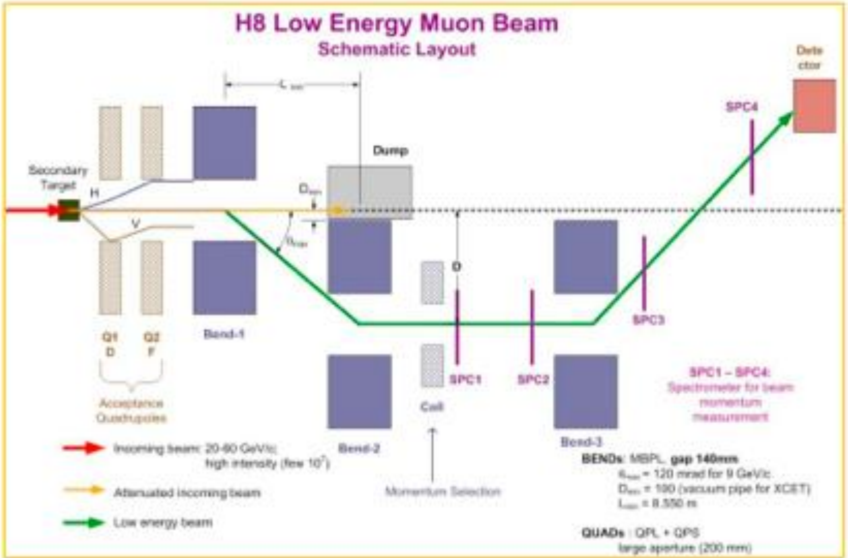


Layout Options

- **Four-bends layout**
  - similar to the one used for the ATLAS&CMS calorimeters in the past
  - compatible with detectors installed inside the large Morpurgo magnet
  - suffers from large background from the direct secondary beam

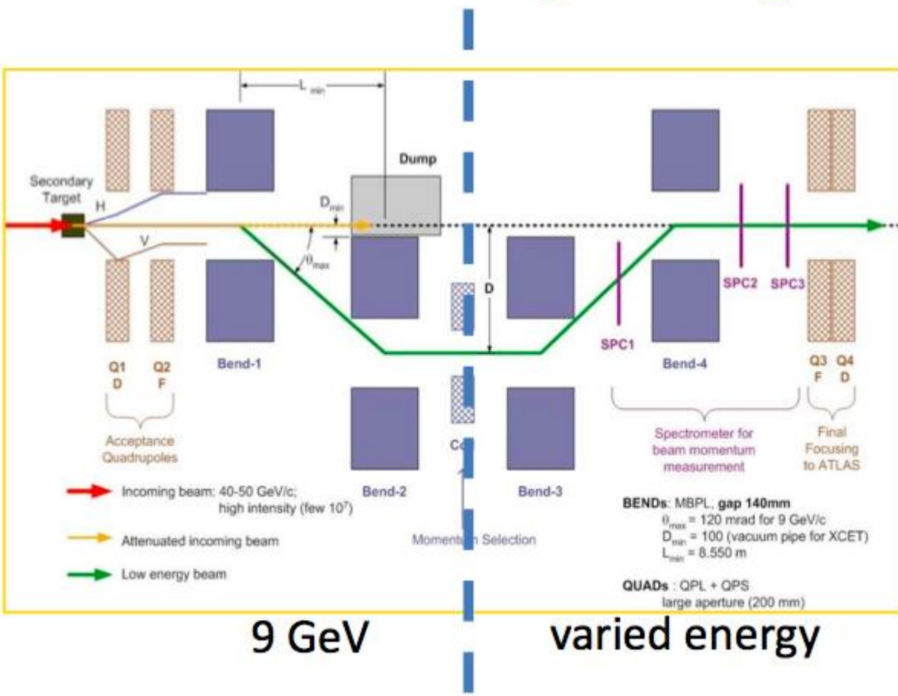


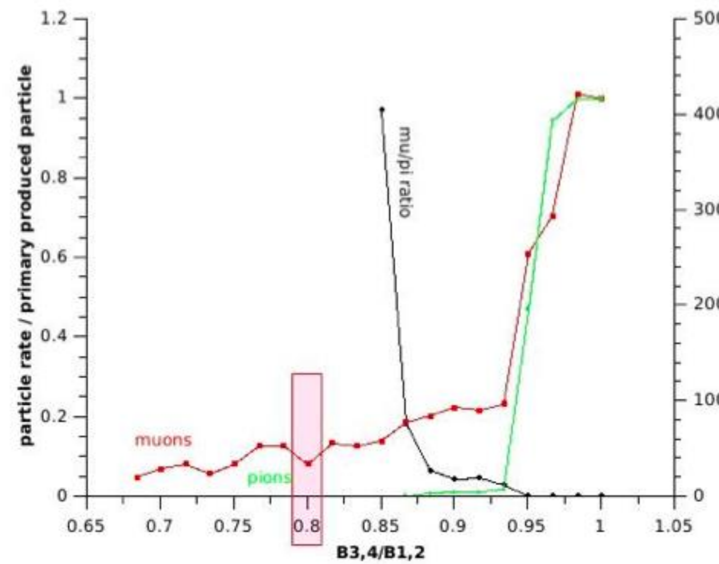
- **Three-bends layout**
  - reduces the background from the direct secondary beam – essential for ν-detectors ?
  - less straightforward to install detectors in inside the Morpurgo magnet



Muon performance

- Selecting the "tertiary" muons by setting the first and second half of the VLE spectrometer at cascading energies.

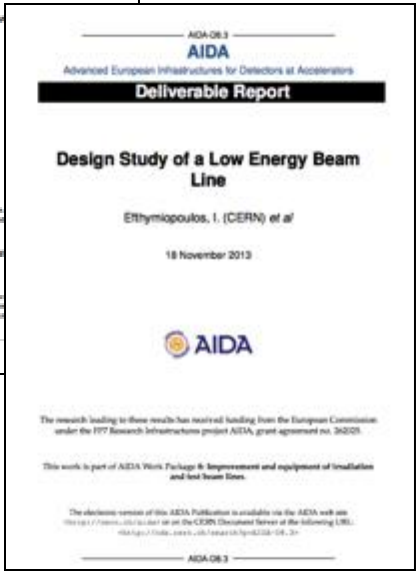




26/3/2014 A. Fabich Engineering Department CERN 9

Task 8.2.1 - Conclusion

- Status and future work
  - ✓ specifications for the beamline are fixed (see milestone report)
  - ✓ Target FLUKA simulation
  - ✓ beamline design for the 2 chosen layouts
  - ✓ beamline simulation with FLUKA
  - ✓ produce table with expected the experiment
  - ✓ produce final report by end

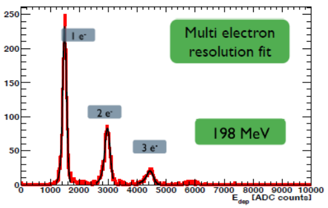


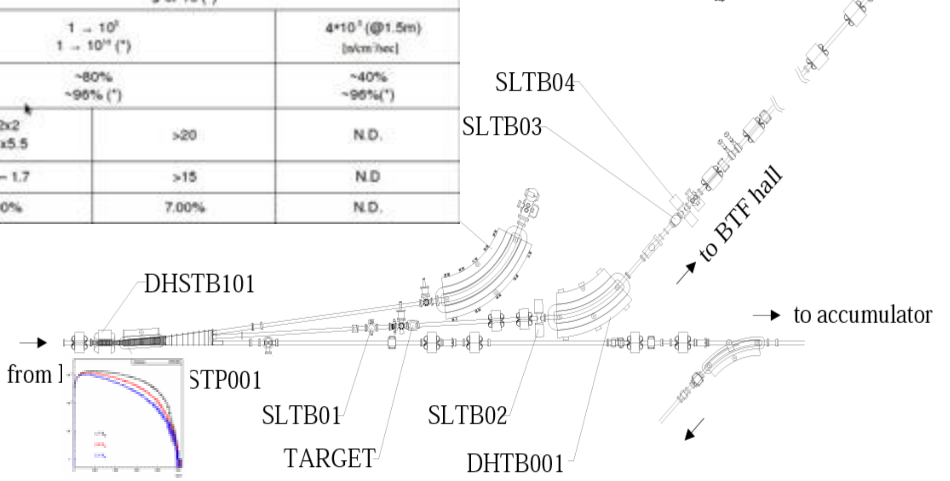
- Status of Milestones & Deliverables
  - ✓ MS27 [m12] "Specification of beamline" **done**
  - ✓ D8.3 [m26] "Design of beamline finished" delayed
    - expected in June 2013 (3 months delay)
    - reason for delay: late hiring of student performing the calculations for the study

Task 8.2.2- Frascati

- ## Upgrade of the Beam Test Facility:
  - equip the BTF with a **remote trolley**
  - equip the BTF with a **GEM** tracking chambers (res<100 μm)
  - use the **LYSO** calorimeter to measure the beam energy spread
  - improve multi purpose **DAQ**

Operation mode	e^+ / e^- beam	γ beam	Neutrons beam
Energy range [MeV]	25-500 25-750(*)	100-500 100 -750 (*)	10[illegible] – 200
Bunch Rate [Hz]	User triggered (*) 1 – 24 49 (*)		
Bunch length [nsec]	10 3 or 10 (*)		
Multiplicity [#/bunch]	$1 - 10^5$ $1 - 10^{10}$ (*)		$4 \cdot 10^5$ (@1.5m) [n/cm²/sec]
Duty cycle [%]	~80% ~98% (*)		~40% ~98%(*)
Spot size ($\sigma_x \cdot \sigma_y$) [mm]	~ 2x2 ~5.5x5.5	>20	N.D.
Divergence [mrad]	~ 1 – 1.7	>15	N.D
Energy spread	1.00%	7.00%	N.D.



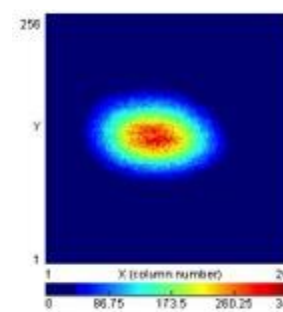


The Frascati **Beam Test Facility** infrastructure is a beam extraction line optimized to produce **electrons, positrons, photons and neutrons** mainly for HEP detector **calibration** purpose. The quality of the beam, energy and intensity is also of interest for **experiments** (~ 20% of the users) studying the **electromagnetic interaction with matter**

Remote Trolley & DAQ

disposable area	600x600 mm
min height	915 mm
max height	1250 mm
horiz. excursion	1000 mm
max load	200 Kg
accuracy	< 1 mm^2

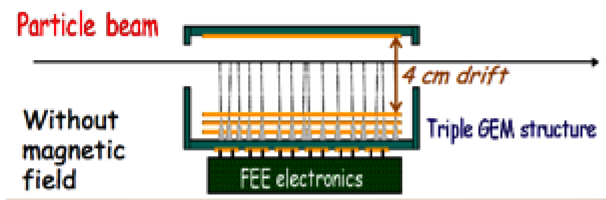
AIDA-NOTE-2012-003

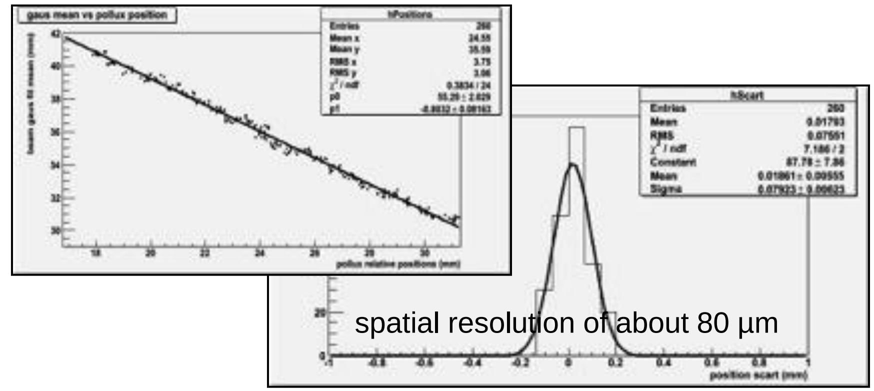


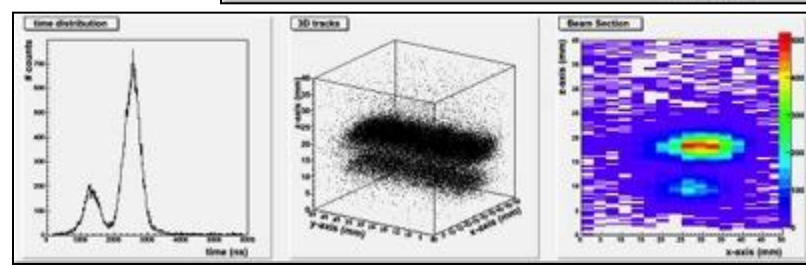
- ✓ Up to now, the DAQ system is fully operative with a standalone software now working at 25Hz bunch rate in !CHAOS MEMCACHED live data storage
- ✓ A MEDIPIX detector (Timepix) has been tested to increase transverse beam detection quality and qualify the BTF calorimeters over a wide range of multiplicity.
- ✓ Preliminary study for the porting of the BTF DAQ and the main subsystem of the BTF device in !CHAOS environments has been started.

TPC GEM tracker

✓ The prototype of the TPC GEM tracker has been replaced by a fully operative system completed of all service elements (gas system, electronics, etc).







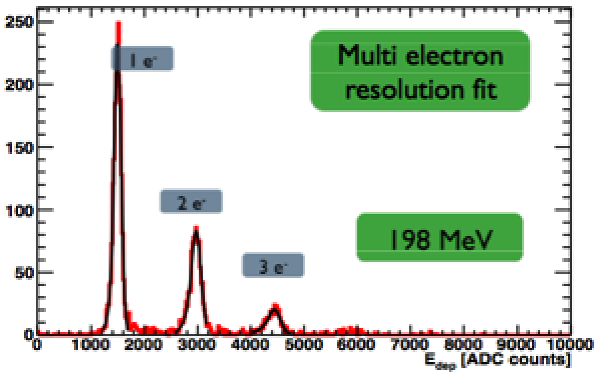
Measurement @BTF of positron beam splitting through a crystal

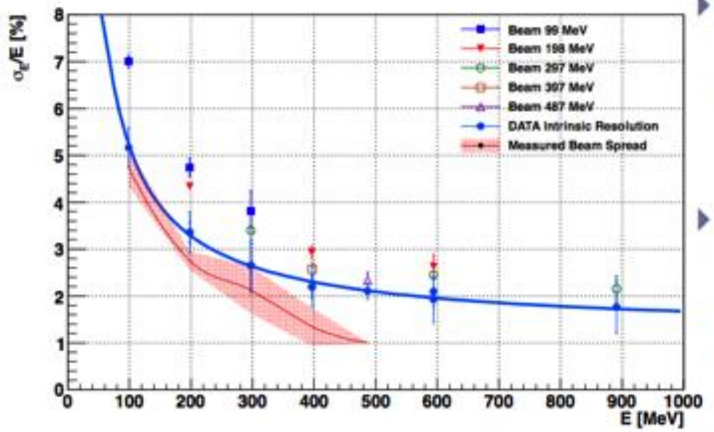
➡ Al the functionality of the GEM system (CANBUS via KVASER in HVGEM) runs temporary on virtualized environment and we are still developing of CANBUS over Ethernet software.

➡ Some preliminary test to study the relation among HVGEM currents and particle multiplicity has been started to obtain an independent beam current monitor over a wide range.

LYSO Calorimeter

✓ **Analysis** of the data collected during the test beam has been performed. A reasonable **agreement between data and Monte Carlo** has been obtained.





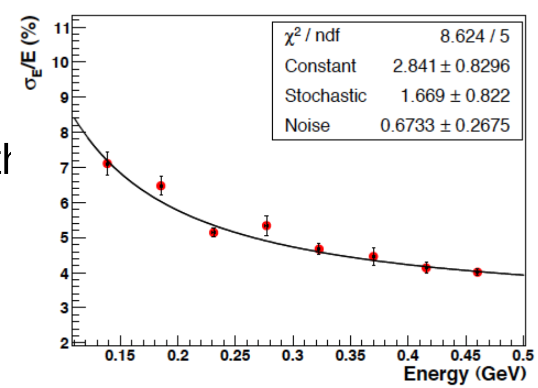
- Beam spread at 500MeV fixed at 1%
  - Only one point at this energy, BS can't be extracted
- Measured beam spread:
  - 4.8% at 100MeV
  - 2.7% at 200MeV
  - 2.1% at 300MeV
  - 1.4% at 400MeV

- LYSO matrix resolution

$$\frac{\sigma_E}{E} = \frac{1.1\%}{\sqrt{E(GeV)}} \oplus \frac{0.4\%}{E(GeV)} \oplus 1.2\%$$

✓ 9 LYSO crystals have been readout with 36 (4 per crystal) and tested at the BTF line with energy range from from 100 up to 500 MeV

✓ also in this configuration, with a **constant term of about 2%**



Task 8.2.2 - Conclusion

- Status and future work
  - ✓ **remote trolley** done (see AIDA-NOTE-2012-003)
  - ✓ **GEM tracker** with a resolution less the 100 μm **is completed:** the prototype of the TPC GEM tracker has been replaced by a fully operative system completed of all service elements
  - ✓ **LYSO** calorimeter beam energy spread measurements **is completed**: LYSO resolution data normalized by energy beam spread are fitting optimally the Monte Carlo data; UV optimized SiPM has been tested showing a reduction of SNR reproducing a ~2% of energy resolution for the beam line as previously measured.
  - ➡ multi purpose **DAQ system is in progress:** neutron detectors, environmental detectors, and beam diagnostic detectors has been implemented; GEM tracker system in under integration in the BTF controls.
- Status of Milestones & Deliverables
  - ✓ D8.8 [m48] "All equipment ready" is on schedule

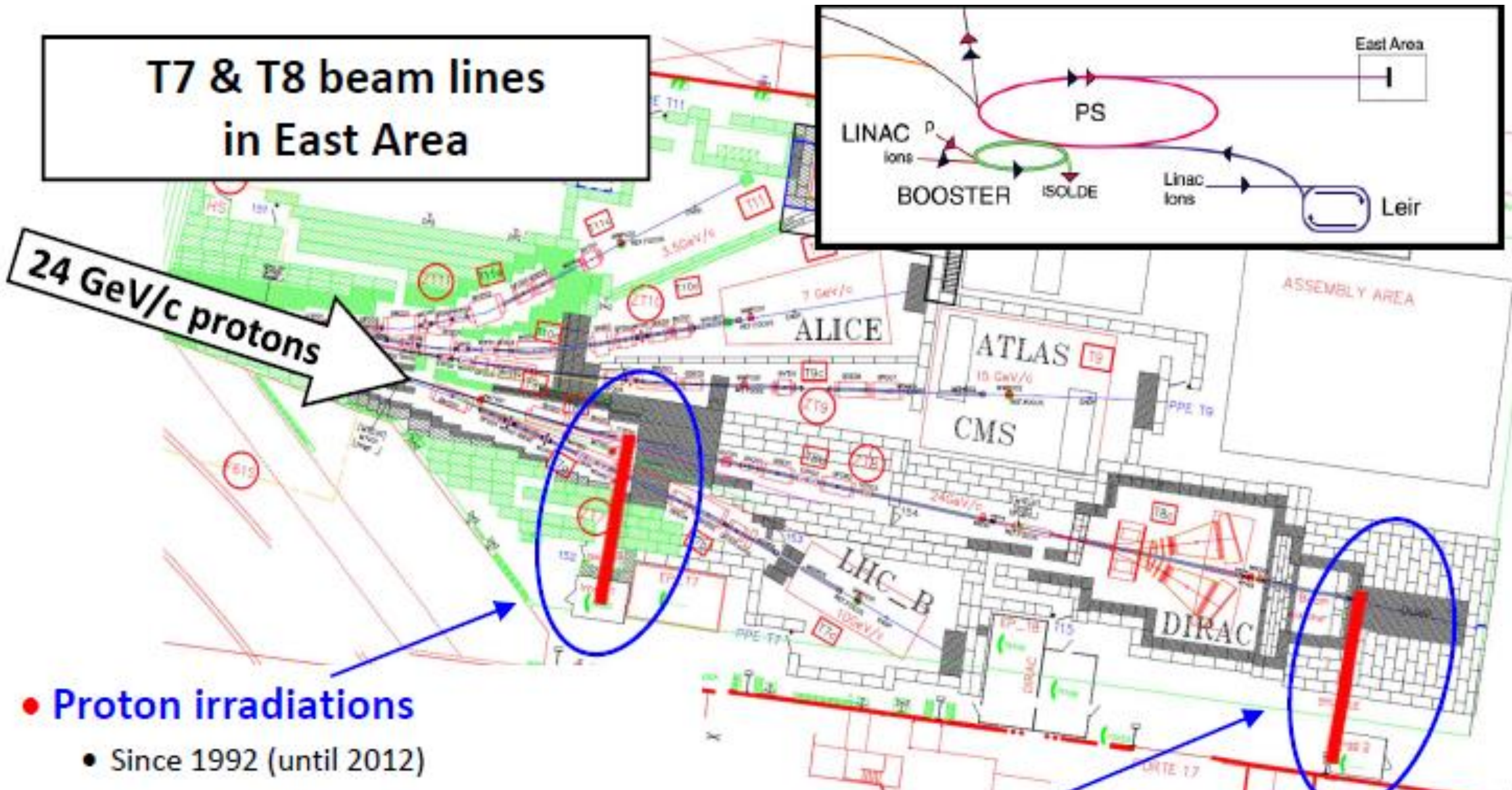
Upgrade of PS proton and neutron irradiation facilities at CERN

Task 8.3

8.3.1. Improvement of existing irradiation facilities and evaluation of upgrade proposals

8.3.2. Common infrastructure for the facilities

8.3. Upgrade of proton and mixed field irradiation facilities at CERN

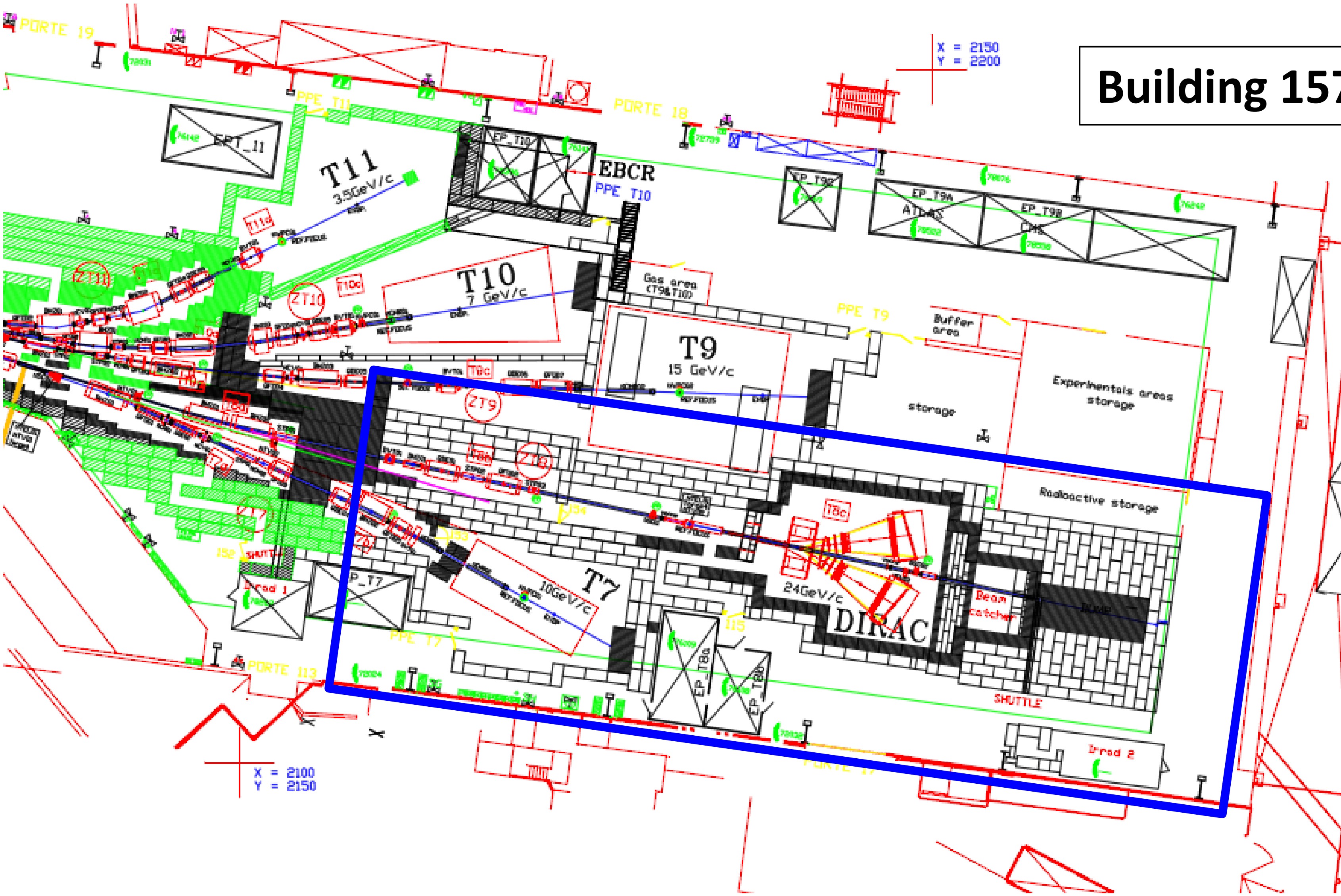


- **Proton irradiations**
  - Since 1992 (until 2012)
  - Direct exposure to 24 GeV/c protons (IRRAD1, IRRAD3, IRRAD5)
  - Low intensity radiation field of backscattered particles (SEU and Dosimeter testing) (IRRAD6)
- **Neutron (mixed field) irradiations**
  - Mixed field produced in cavity after carbon (50cm) iron (30cm) lead (5cm) 'target' (IRRAD2)

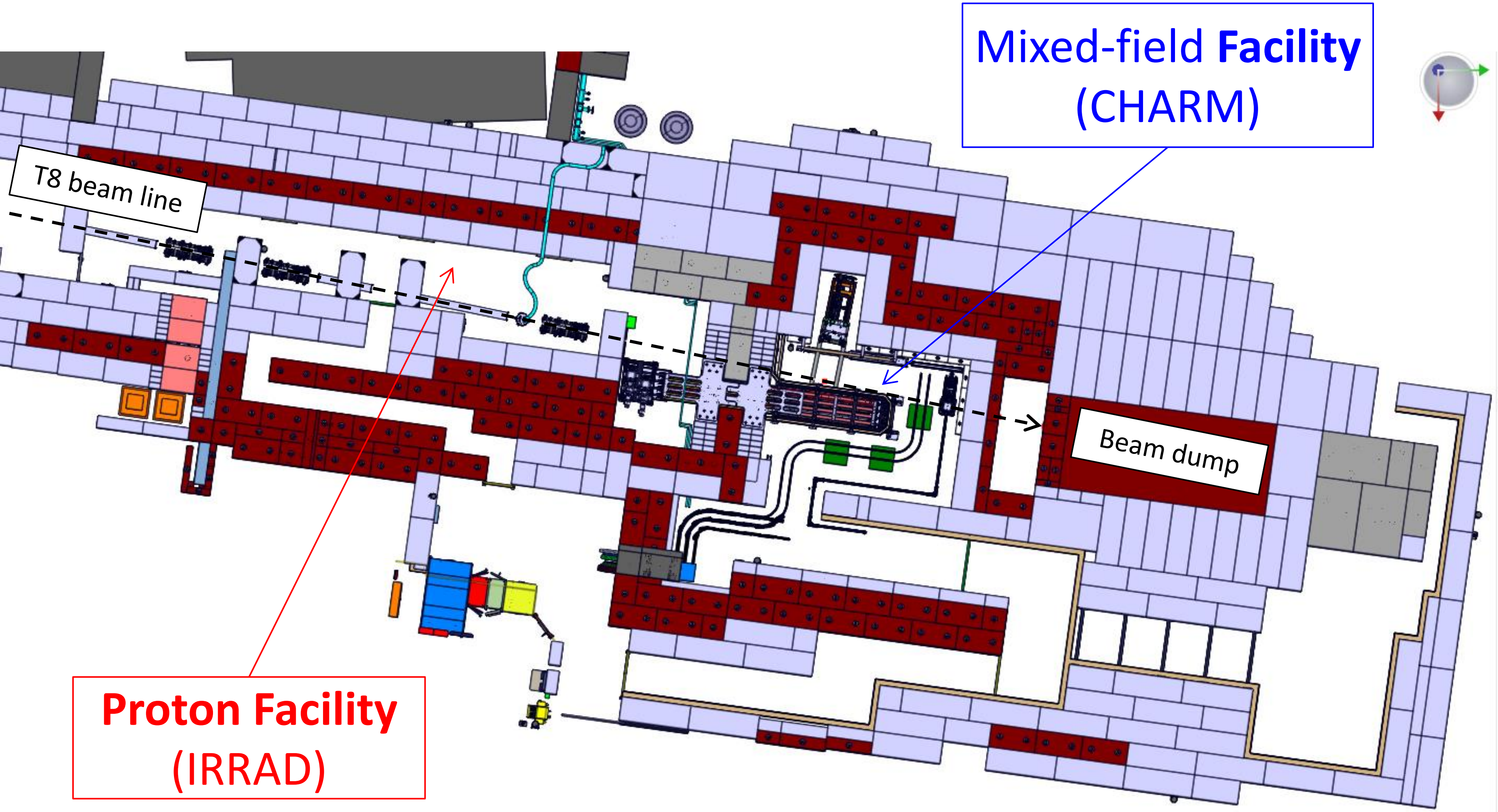
8.3.1 Improvement of existing irradiation facilities and upgrade scenarios

- **2008-2010: Working Group on Irradiation Facilities at CERN**
  - See: http://www.cern.ch/irradiation-facilities/
- **2011: Beginning of AIDA project**
  - AIDA objective: Design study of the facilities plus new infrastructure for old/new facility
- **2012: CERN management agrees on facilities upgrade**
  - AIDA was very helpful in achieving the green light for the project
- **November 2012: First technical meeting & END of DIRAC experiment**
  - CERN-EN is charged and funded to design and construct the irradiation beam line in the framework of the EA renovation plan during LS1
  - R2E project (LHC machine): Mixed-field facility & infrastructure design
  - **CERN-PH & AIDA: Proton facility & infrastructure design**
- **2013: Dismantling (DIRAC & old IRRAD facilities); start of construction**
- **2014: Construction and commissioning of new facilities**
  - First irradiation experiments toward end of the year
  - R2E project: **C**ern **H**igh-energy **A**ccele**R**ator **M**ixed-field facility (**CHARM**)
  - CERN-PH & AIDA: proton **IRRAD**iation facility (IRRAD)
- **END of 2014: First irradiations for users**

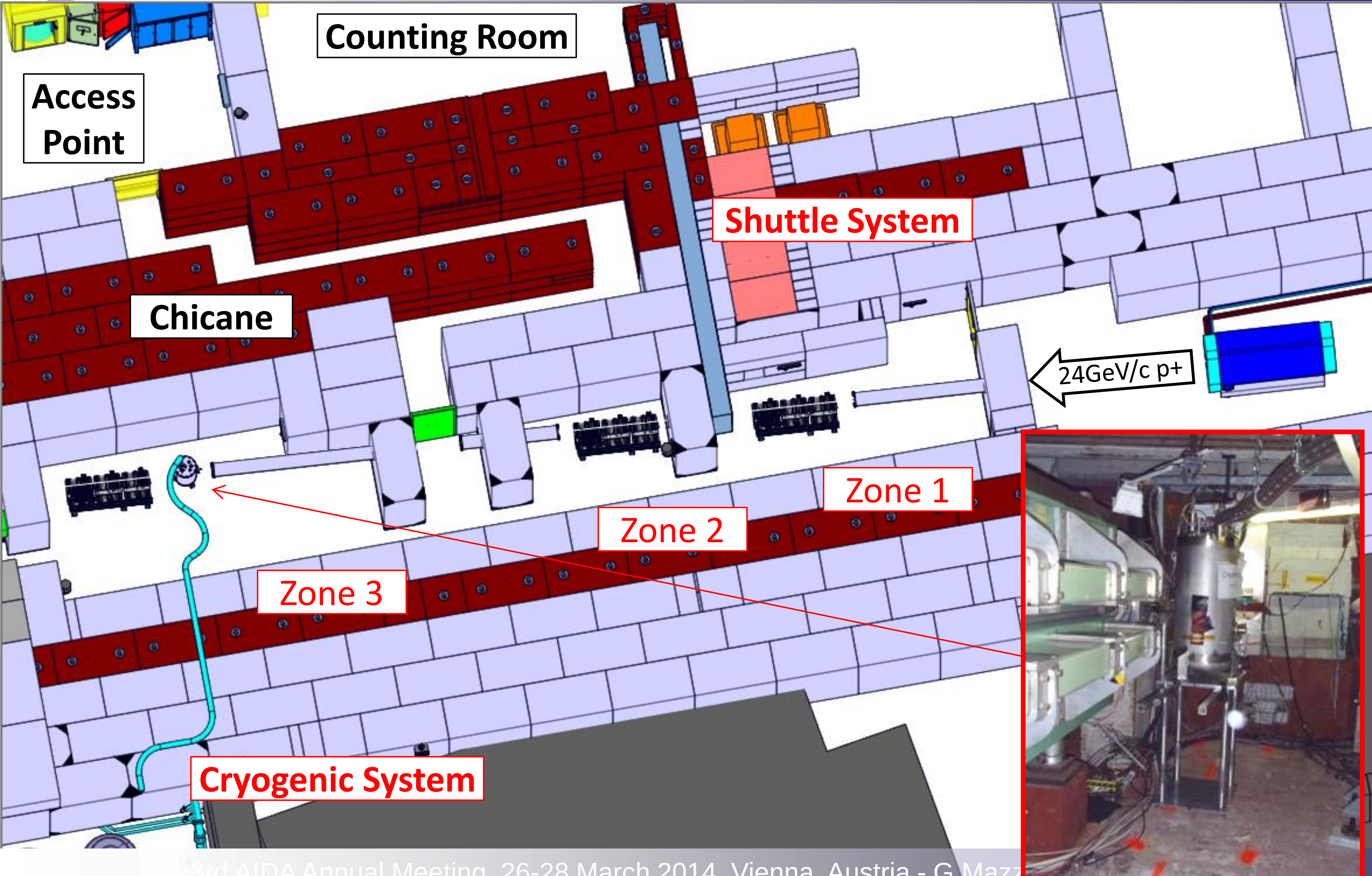
OLD East Area Layout



NEW East Area Layout

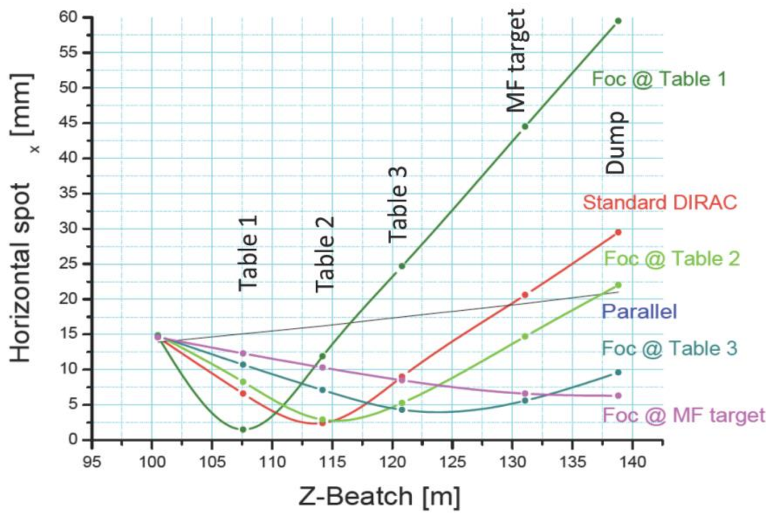


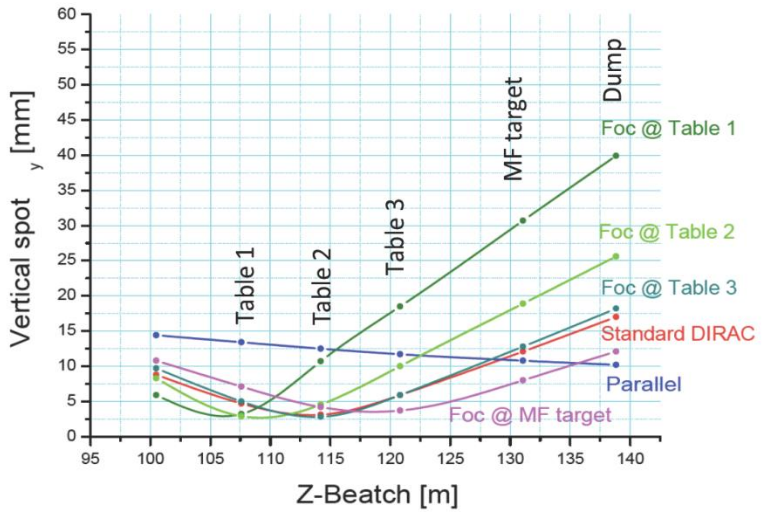
Proton IRRAD Facility (PH)



AIDA Proton Beam Parameters

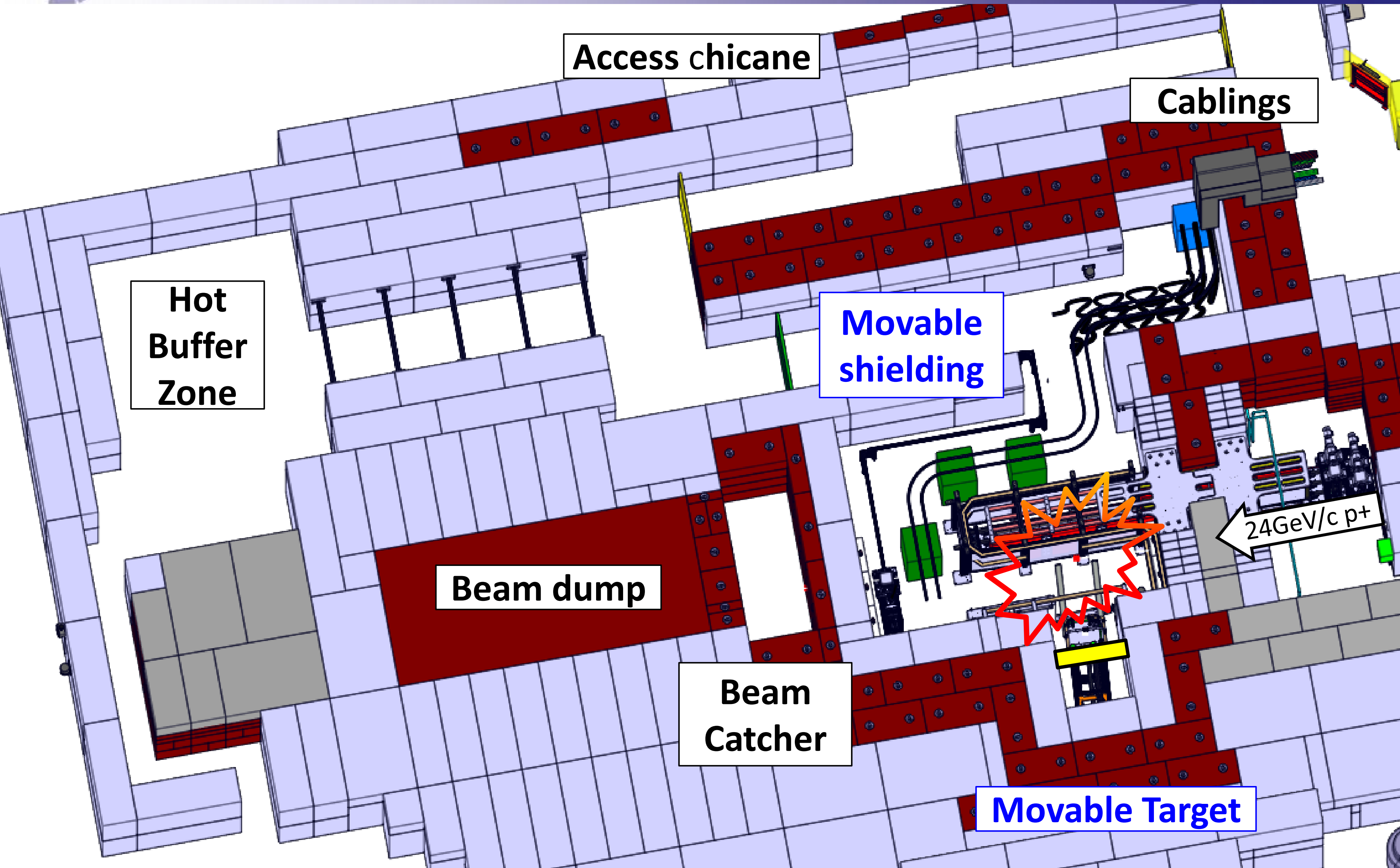
- **Beam Dimensions**
  - Several optic variants possible on T8
  - Beam spot from 5x5 mm^2 to 20x20 mm^2 (FWHM)
  - Standard size: 15x15 mm^2 (FWHM)
- **Beam Intensity**
  - p^+ are delivered in "spills" of ~5×10^{11} p
  - Number of spills/frequency depends on CPS
  - Typical CPS after LS1: 30s
  - Typical figures (High Intensity): 3 spills per CPS
    - ~1×10^{16} p cm^{-2} 5days^{-1} (15x15 mm^2 FWHM)
    - ~4x more than the old facilities
  - Design figures (maximum): 6 spills per CPS
    - ~1×10^{17} p cm^{-2} 4days^{-1} (5x5 mm^2 FWHM)



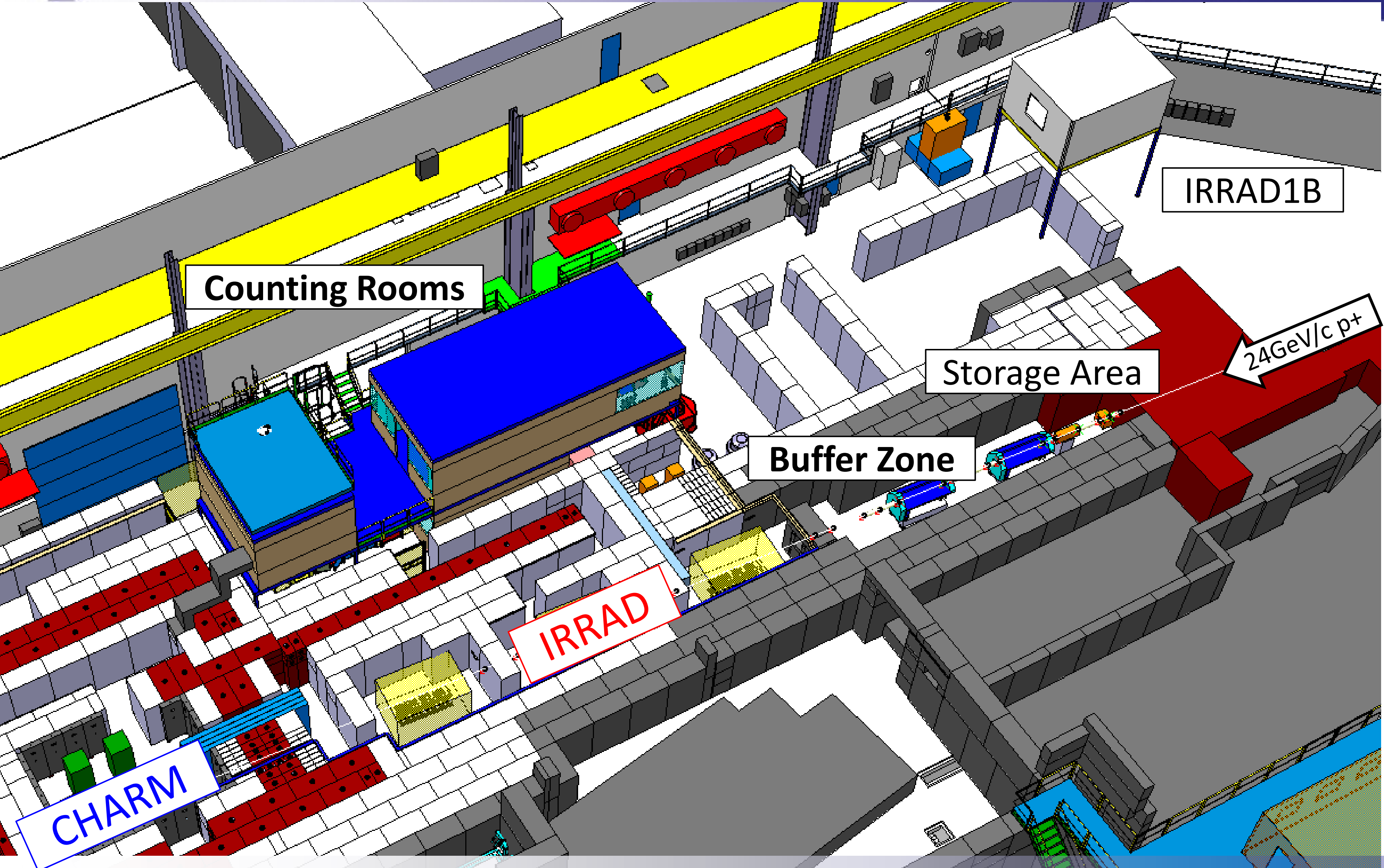


L. Gatignon, preliminary calculations (EDMS 1270807)
Here dimensions are mm (RMS)

Mixed-field CHARM Facility (EN)



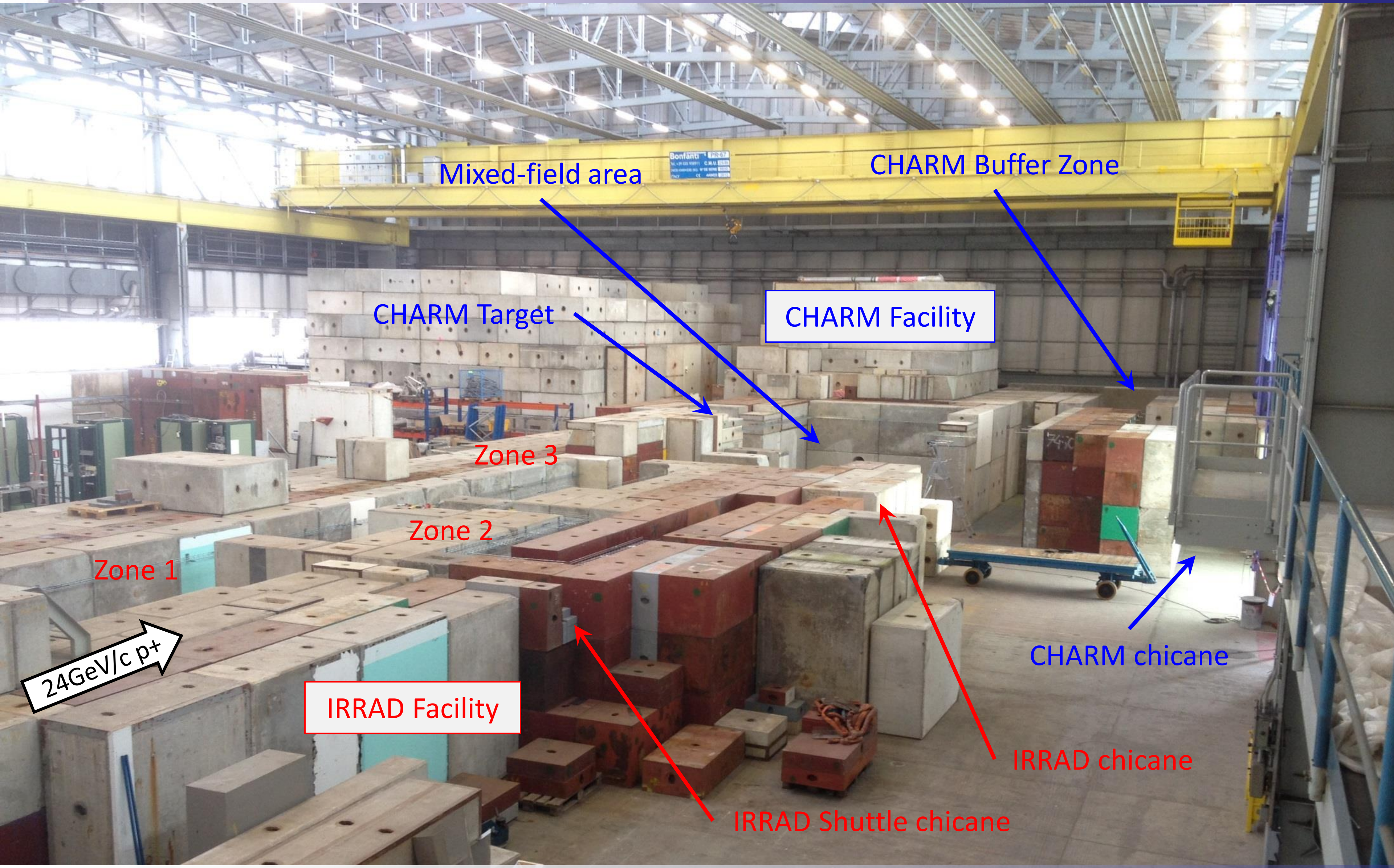
East Area EA-IRRAD Infrastructure



IRRAD Shuttle System

- IRRAD Shuttle System assembled and READY for installation!

Construction of IRRAD/CHARM

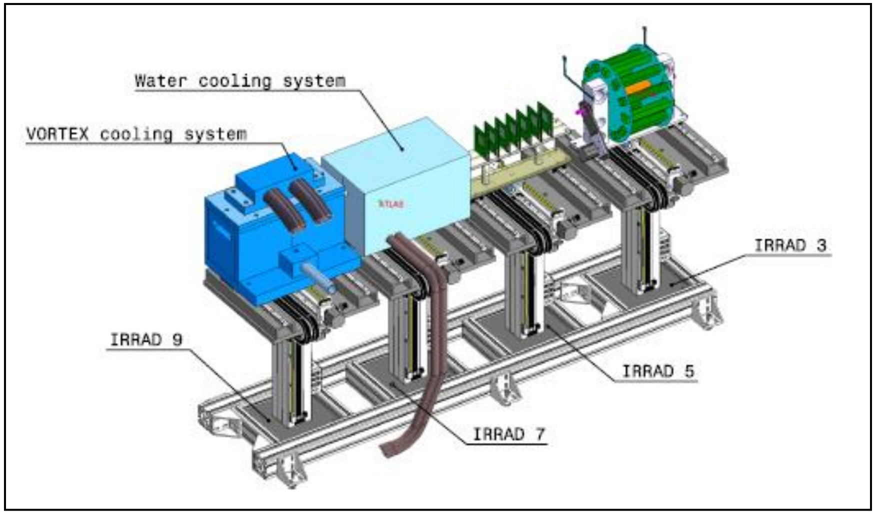


8.3.2. Common Infrastructure

- Irradiation tables and boxes
  - Sheffield, Liverpool, Birmingham, CERN
  - Irradiation tables produced and tested
    - at CERN proton irradiation facility (24 GeV/c protons)
    - at Birmingham Cyclotron 26 MeV p (up to 40 MeV)
    - 3 cold boxes produced, 2 further under assembly
      - Recirculate cold air (forced convection)
      - LN2 cooling under study

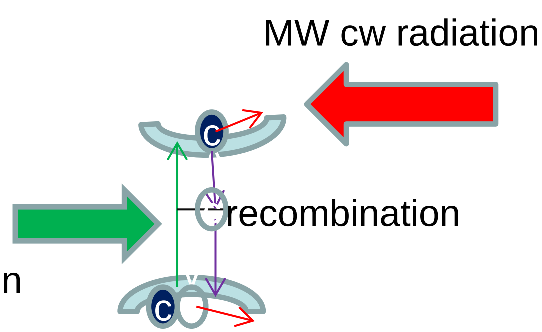
Scanning system + Thermal Chamber

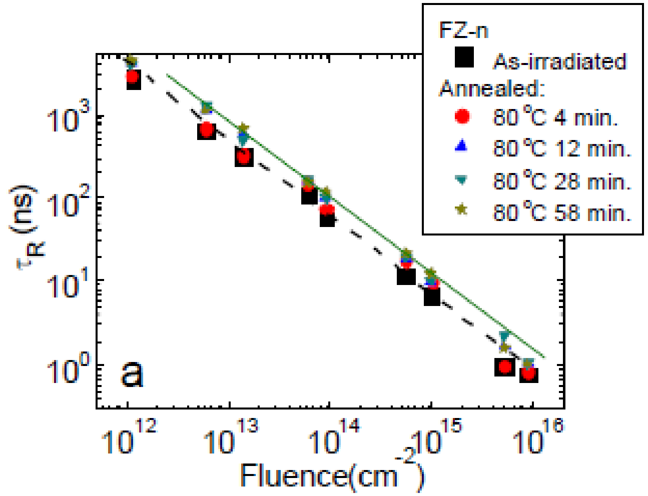
- Fully portable plug & play scanning system
- Thermal chamber using similar principle to PS irradiation facility CERN (IRRAD 5)
  - -22°C minimum operating temp
  - ~ 480W heat load removal (@ -20°C).
- Readout and control system using COTS FPGA based technology
- Networked readout allowing remote access for data analysis and real-time sample performance



8.3.2. Common Infrastructure

- Fluence monitoring system using microwave absorption
  - Vilnius University, CERN, Louvain
  - Monitoring based on carrier lifetime measurement in silicon by microwave absorption probed photoconductivity transients





  - System designed and produced in Vilnius
    - System tested at CERN in November 2012
  - System upgrade and improvements in 2013 (VUTEG-5)
    - temperature stabilization, possibility to scan sample, T & RH measurements
    - System to be transferred to CERN to be tested during facility commissioning

8.3 Summary & Outlook

- **Decommissioning of the old facilities in the East Area**
- **Proton Facility Design**
  - Finalization and validation of the area/infrastructure layout
  - Study and definition of the operational model and related aspects

  AIDA D8.4
- **Proton Facility Construction & Infrastructure installation**
  - **Shuttle system** (ready to be installed)
  - **Remote-controlled Irradiation tables**
    - Design and construction of prototype done and operation tested
    - Production & assembly of 9 tables; production & assembly of front-end control electronics
    - Cold boxes operational

    AIDA MS31

    AIDA MS35
  - **Sample management, databases and tracing**
  - **Beam Instrumentation & DAQ**
  - **Development of a multiple-devices web application for users & CCC**
  - **Radiation Monitoring (Vilnius)**
    - **Tested at CERN, Under upgrade in Vilnius now, Instrument to be transferred back to CERN**

    AIDA MS35
- **Proton Facility commissioning**
  - **Commissioning starting in July 2014**
  - **First users in end of 2014**

  AIDA D8.10

Qualification of components and common database

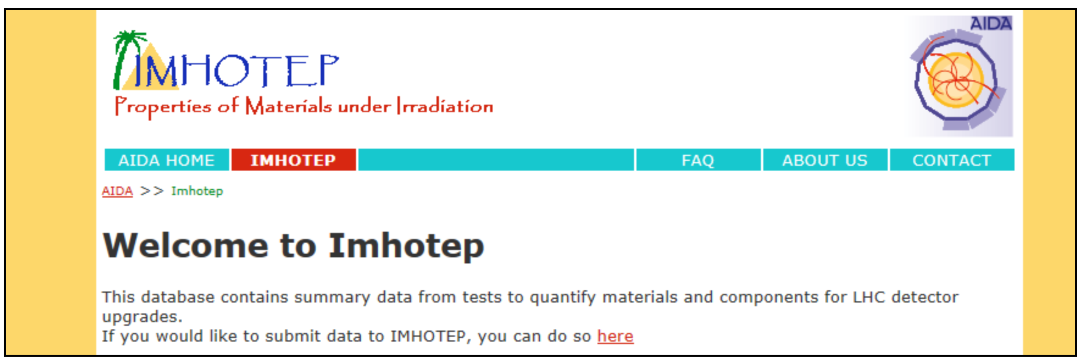
Task 8.4

8.4.1. Review existing data and experience from LHC, define test program
8.4.2. Define test procedures and conduct tests on selected components
8.4.3. Set-up and publish a WEB database compiling the information above

8.4. Qualification of components and common database

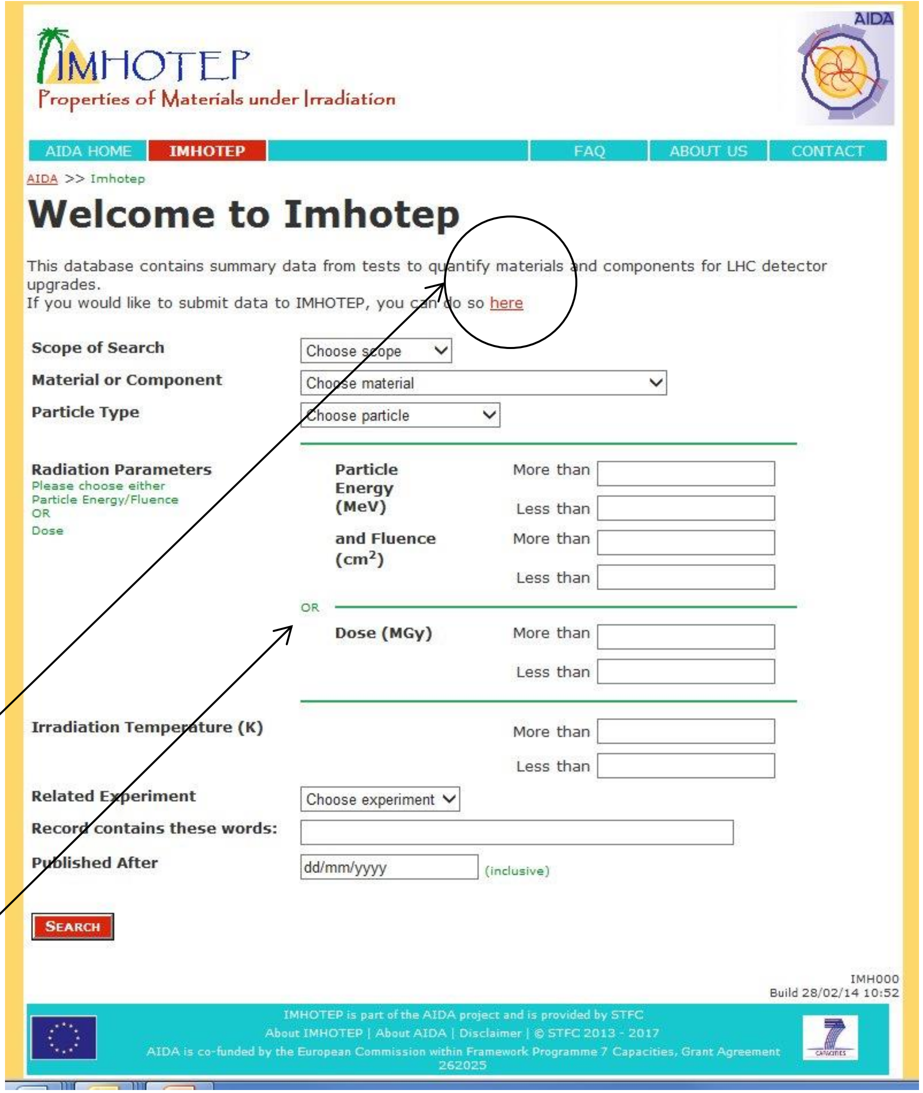
- Participants: INFN (MI, PG), STFC-RAL, UNIGE, ETHZ
  - Leader: Simon Canfer, STFC
- Sub-task:
  - 1. **Review existing data and experience from LHC, define test programme**
    - **Achieved**; See AIDA-D8.1. document on CDS
  - 2. **Define test procedures and conduct tests on selected materials & components**
    - List of tests to be performed within AIDA WP8.4. given in AIDA-MS30
    - *Material tested: inorganic scintillating crystals, electronics, APS, epoxies.(examples: next slides)*
  - 3. **Set-up and publish a WEB database compiling the information above**
    - Enquired with potential user community asking for input to database structure (done)
    - Data fields for the database have been defined within WP 8.4. participants
    - Database online from this AIDA meeting: http://tinyurl.com/aidaimhotep

IMHOTEP



8.4. Database

- Online (http://tinyurl.com/aidaimhotep)
  - Ready to take data
  - To be announced to community
  - Possibility to upload pdf
  - Robust implementation
    4 servers (backup, firewalled)
  - STFC will maintain database beyond AIDA
  - Today: 17 entries



Link to data entry page

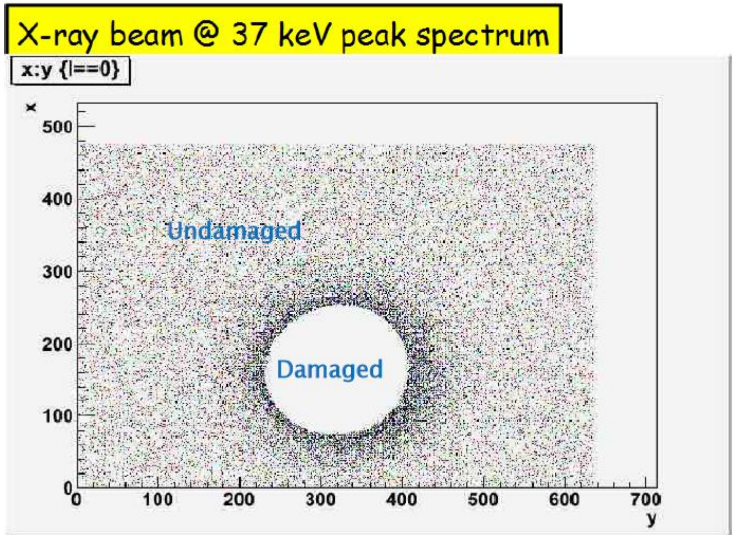
Search options

8.4. Radiation testing (examples)

- Work on electronic components (Milano, Perugia)
  - **Radiation damage test of commercial MAPS sensors (Perugia, M.Menichelli)**

MT0V011 CMOS Imager from Aptima Imaging

- very high pixel granularity (> 300000)
- thin epitaxial layer (~ 2-5 μm)
- 130 nm technology, - small pixel size (< 6 μm)
- Proton irradiation (24 MeV)
  …. imager after $6 \cdot 10^{13}$ p/cm^2
- Characterization with x-ray source and 500 MeV electron beam
- Detection efficiency in damaged region 0.24% w.r.t. undamaged region

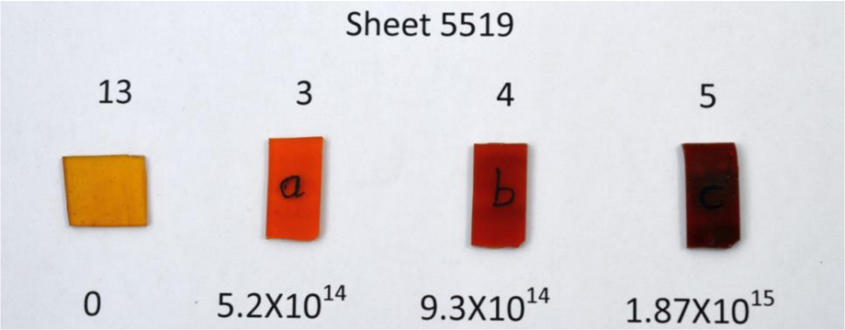


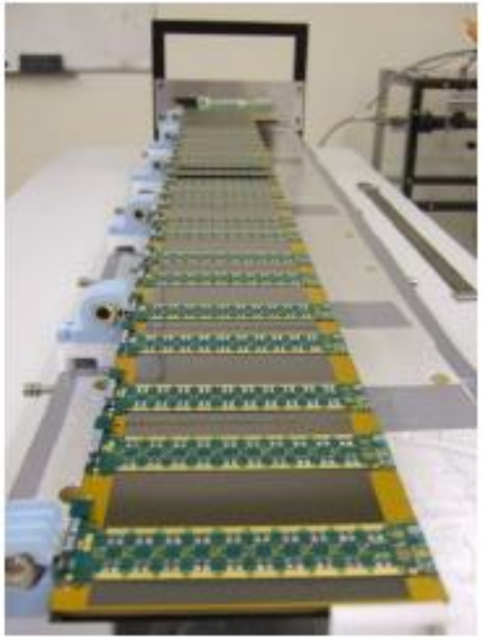
- Next tests after 24 MeV proton irradiation:

Sensori	RAPS03	MT0V011	MT9T012	MT9T013	MT9T031
Pixel size [μm]	10x10	5.6x5.6	2.2x2.2	1.75x1.75	3.2x3.2
substrate	Non-epi	Epi (4 μm)	Epi (2.5 μm)	Epi (2.5 μm)	Epi (4μm)
Technology	180 nm	130 nm	130 nm	130 nm	130 nm

8.4. Radiation testing (examples)

- Work on radiation damage in epoxy resins (STFC, Steve Robertson)
  - Application example: ATLAS stave for tracker upgrade
  - Data exists on rigid, rad-hard epoxies which tend to be highly crosslinked, high modulus and brittle.
  - Focus on characterizing the rad-hardness of more flexible epoxies and silicones (Two resins tested: 5519, 5555)
  - Irradiation: 26 MeV protons (Birmingham facility)





  - Conclusions:
    - FTIR can show some of the damage processes occurring in the resin.
    - DMA (Dynamic Mechanical Analyses) shows increasing Tg with radiation dose.
  - Next step:
    - Irradiated further samples for intermediate data points
    - Develop a flexible resin with lower cure temperature

Tg – Glass Transition Temperature

AIDA

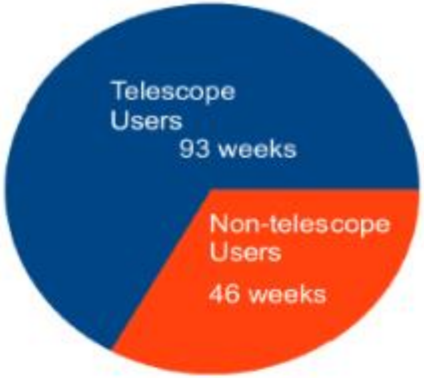
General infrastructure for test beam and irradiation lines

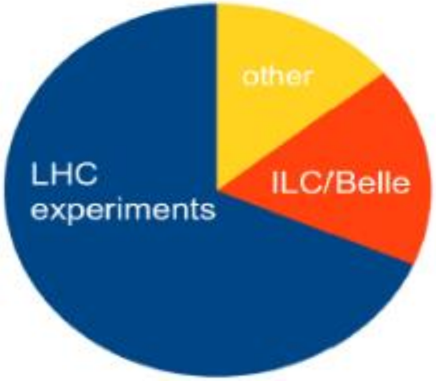
Task 8.5

8.5.1. Commission and operate beam tracking telescope
8.5.2.TASD and MIND
8.5.3.GIF++ user infrastructure

Task 8.5.1 (8.6.1) - Commission and operate beam tracking telescope (Common test beams at CERN & DESY)

Top-bottom view on the EUDET telescope sensor fixtures with a DUT box mounted in between. (Photo by CLICpix group at DESY testbeam)





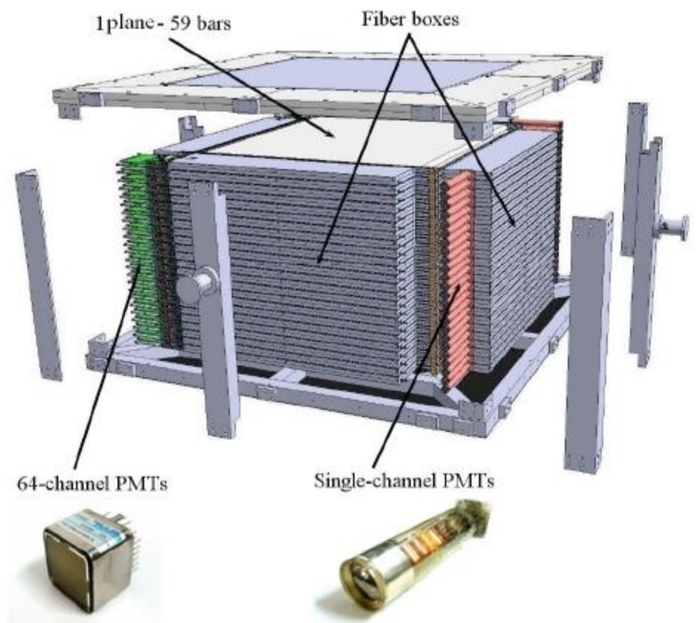
- in January 2013 - March 2014
  - 49 Calendar weeks
  - 123 User weeks in total
  - 7100 Testbeam hours
  - 400 Users in total
- DESY-II primary beam at 6.3 GeV
  - high availability time (>99%)
  - secondary e^+/e^- at 1-6 GeV
  - rates 0.1-10 kHz
- beamtests in 1 Tesla magnet
  - new telescope mechanics
  - new DUT cooling system
  - over 20 weeks in B-field

✓ D8.5 – [m40] "**Installation of tracking telescope**" is partially delayed: final integration tests have been planned at CERN in **July PS** test beam, and final assembly at **SPS H6B in October**. (see development of telescope in WP9.3)

✓ MS36 – [m44] "**Commissioning of tracking telescope**" consequently partially delayed

Task 8.5.2 – TASD and MIND

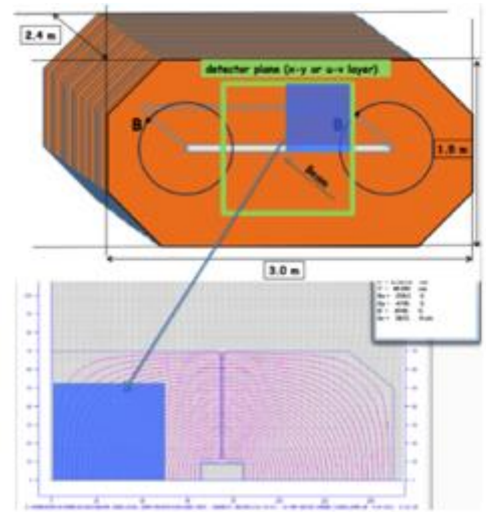
Totally Active Scintillating Detector (TASD)



- **Stopping properties** of pions and muons up to 200 MeV/c (MICE EMR);
- **Electron and muon charge separation** inside a magnetic field, in particular electron charge ID in electron neutrino interaction for the platinum channel at a neutrino factory: 0.5 to 5 GeV/c.

MS28

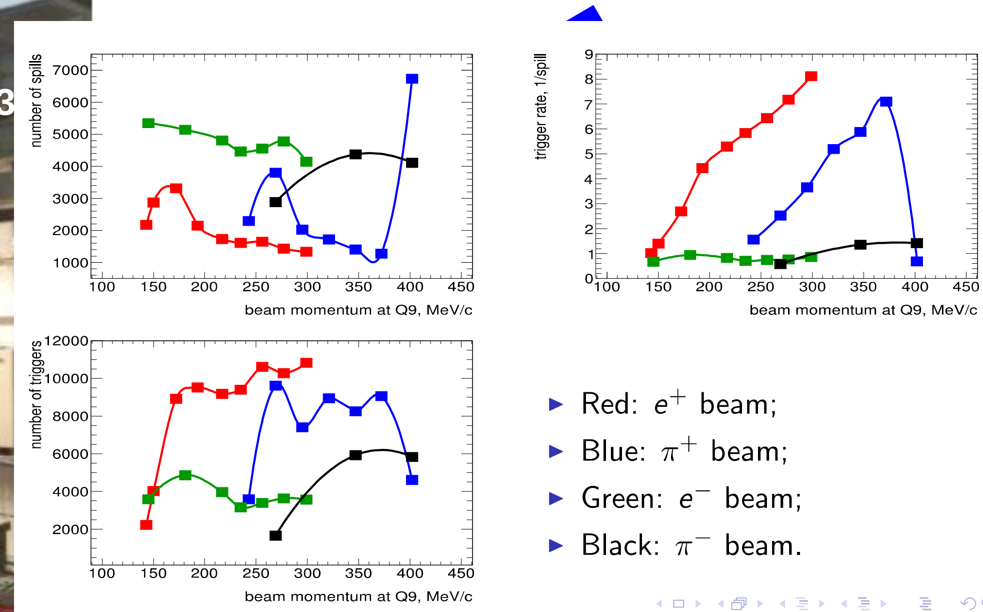
Magnetised Iron Neutrino Detector (MIND)



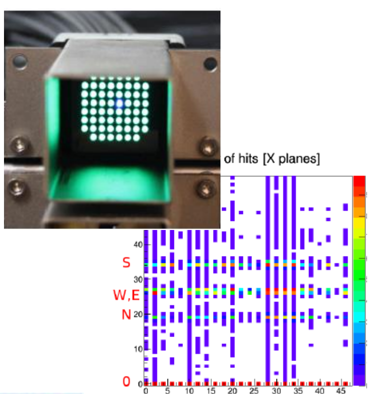
- **Muon charge identification**, for wrong sign muon signature of a neutrino oscillation event: golden channel at a NF: requires correct sign background refection of 1 in 104: test beam 0.8 to 5 GeV/c;
- **Hadronic shower reconstruction** for identification of charged current neutrino interactions and rejection of neutral current n.i.: test beam protons/pions 0.5 to 9 GeV/c

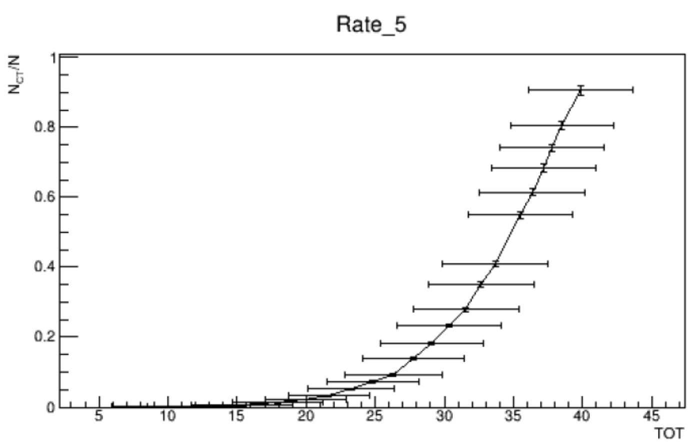
TASD integration & delivery

Installed on MICE beamline end September 2013



Online operation at RAL: October 2013



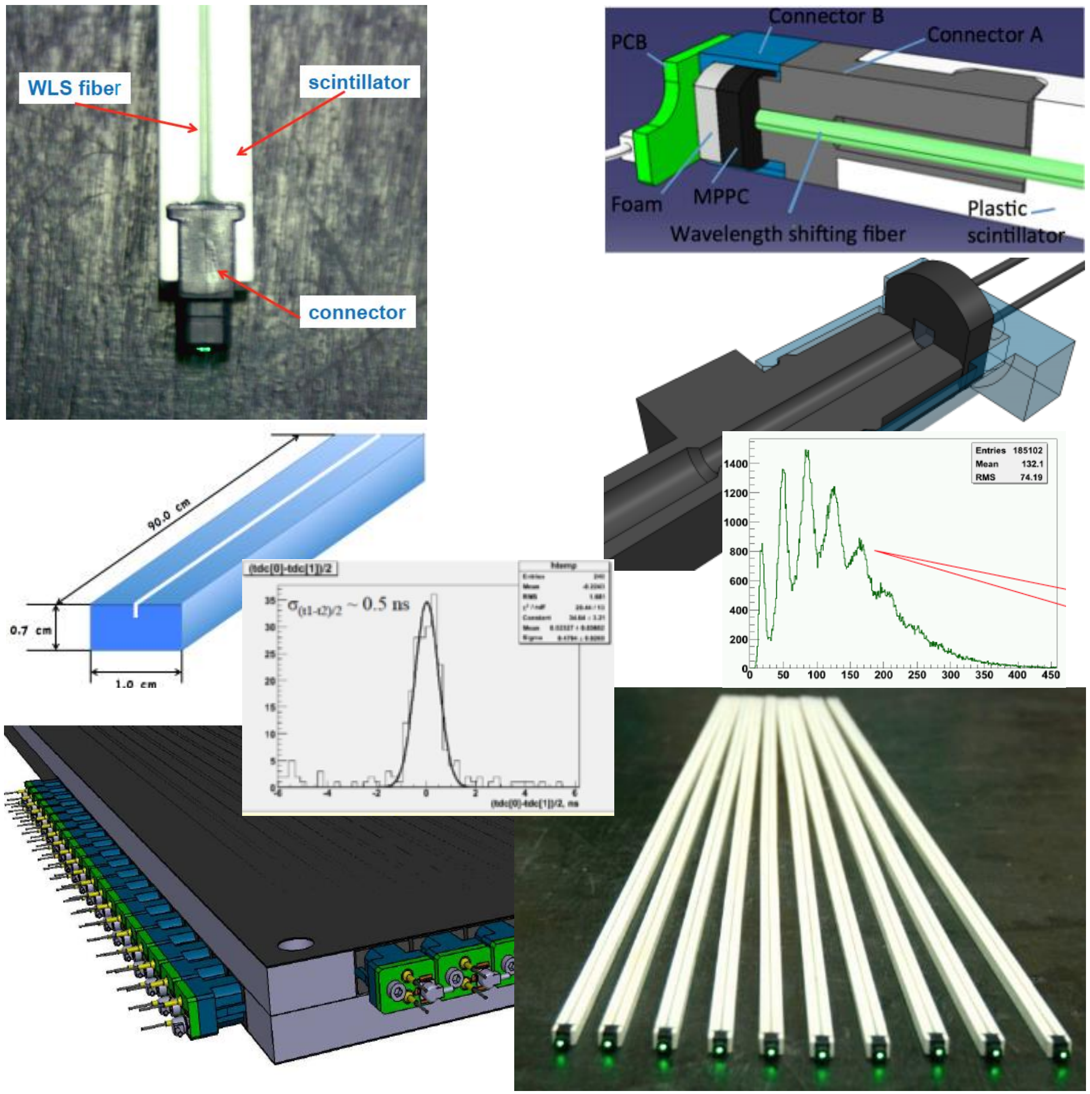


Integrated crosstalk rate for a given plane

crosstalk is under study, preliminary analysis show

- at **MIP** level crosstalk < **0.5 %**
- at **high energy** deposition **~ 100%**

MIND design & tests



- Detector module **designed**
- MIND plastic **scintillator** bars delivered from INR of Russia
- Scintillator bar **connector** designed
- Plastic **scintillators tested** with cosmics
- **Light yield** study (slabs with chemical reflector) done.
- **Timing** characteristics studied
- **Light yield** for the different **WLS** fibers studied
- **Photosensor** chosen and test done
- **Readout/electronics chosen** and Easiroc schematic and planned charge+hit measurements

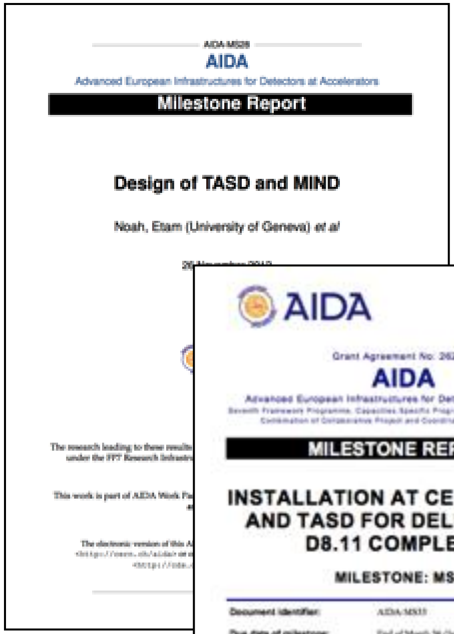
Scientific Summary

- TASD successfully tested online:
  - Assembled at the University of Geneva;
  - Installed on MICE beamline at RAL September 2013;
  - Detector performance under evaluation;
  - Data analysis ongoing.
- MIND construction underway:
  - Several component choices made (plastic scintillator, WLS fiber, optical glue);
  - Photosensor characterization ongoing for final choice in May;
  - Good progress on manufacturing of scintillator bars by INR;
  - Electronics by UniGe;
  - Steel and magnetisation in collaboration with CERN.
- Outlook for TASD and MIND:
  - Several projects plan such detectors;
  - MIND prototype foreseen for WA105 at CENF.

Task 8.5.2 - Conclusion

- Conclusion and actual status
  - ✓ Design of MIND and TASD done
  - ✓ TASD detector is under test @ RAL – MICE test beam line
  - ✓ MIND detector is under construction;

- Milestone/deliverable status:
  - ✓ MS28 [m20] “TASD & MIND design” **done**
  - ✓ MS33 [m36] “TASD & MIND installation”
    TASD done;
    MIND delayed of 10 months
  - ✓ D8.11 [m48] “neutrino telescope test & results”
    on schedule (need for appropriate beam line for testing the detectors)



AIDA-MS28

AIDA

Advanced European Infrastructures for Detectors at Accelerators

Milestone Report

Design of TASD and MIND

Noah, Etam (University of Geneva) *et al*

AIDA

Grant Agreement No: 262025

AIDA

Advanced European Infrastructures for Detectors at Accelerators

Seventh Framework Programme, Capacities Specific Programme, Research Infrastructures, Combination of Collaborative Project and Coordination and Support Action

MILESTONE REPORT

INSTALLATION AT CERN OF MIND AND TASD FOR DELIVERABLE D8.11 COMPLETED

MILESTONE: MS33

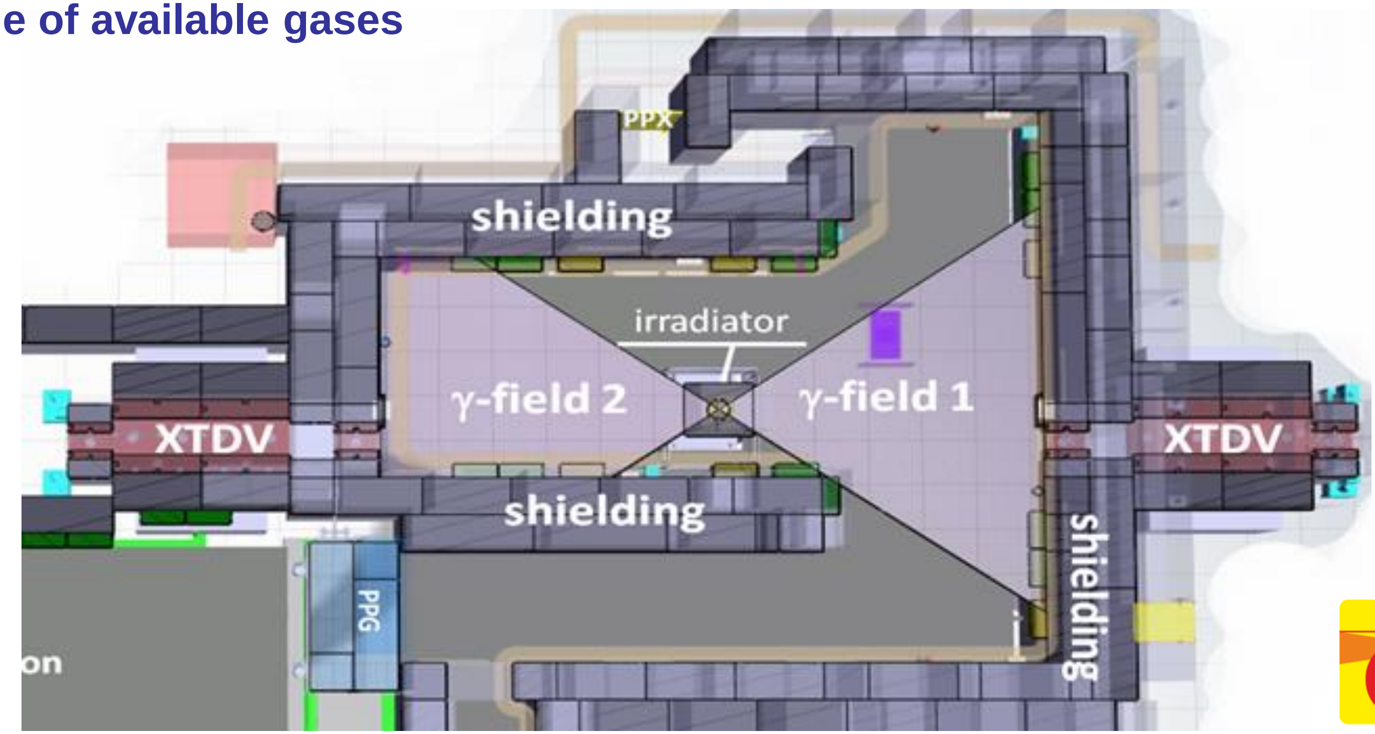
Document identifier:	AIDA-MS33
Due date of milestone:	End of Month 36 (January 2014)
Report release date:	28/02/2014
Work package:	WP8: Installation at CERN for deliverable D8.11 completed (Task 8.5)
Lead beneficiary:	UNIGE, UNIGLA
Document status:	Final

Abstract:

The Totally Active Scintillation Detector (TASD) prototype has been constructed and has been operational at the MICE test beam at the Rutherford Appleton Laboratory in Oxfordshire (UK) since October 2013. Construction of the MIND prototype has commenced but has been delayed by 10 months. Therefore, this milestone report only covers half of MS33 (the TASD construction). The second half of the MS33 milestone (MIND) will be achieved by Month 46.

The GIF++ Facility

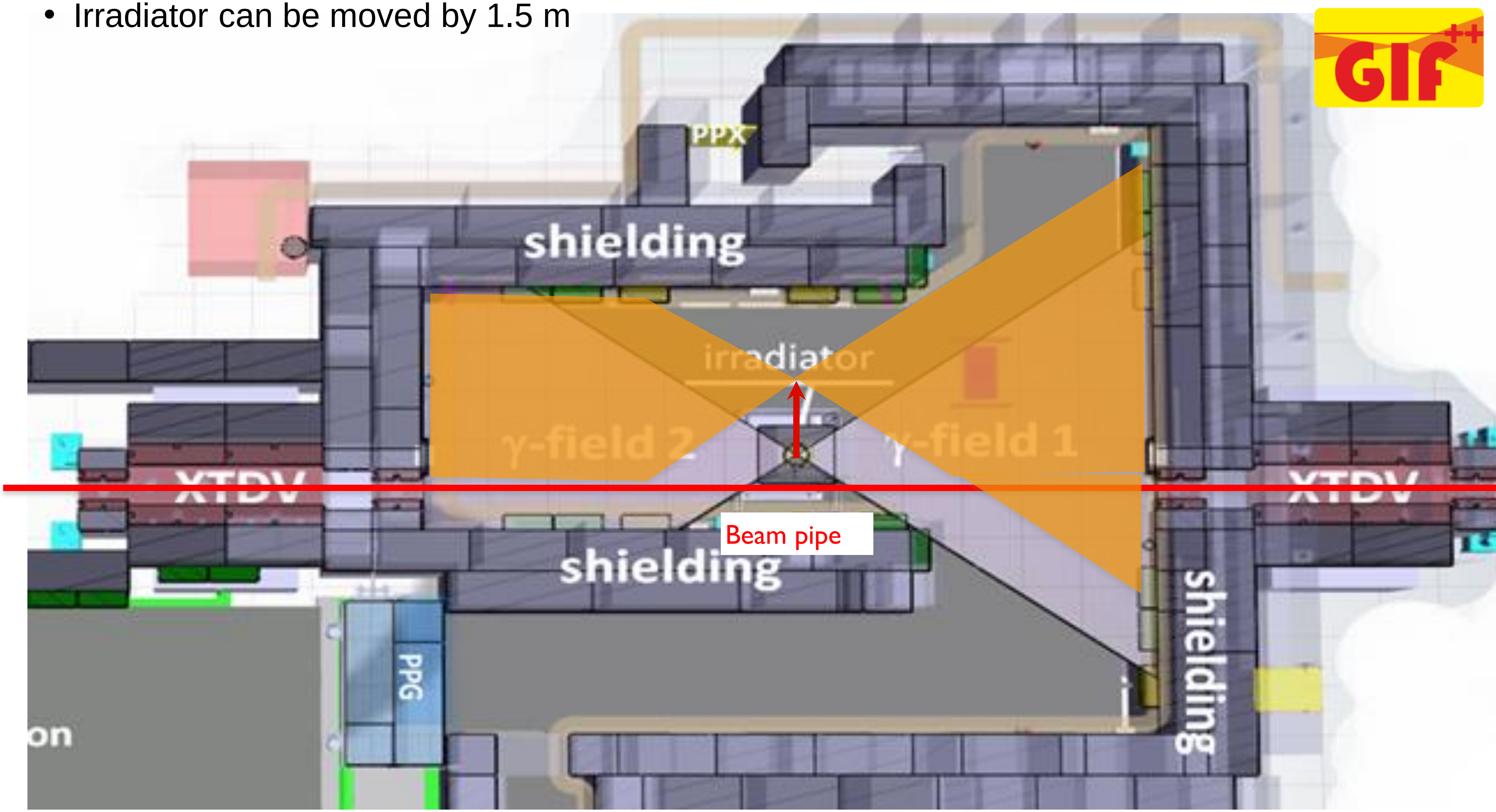
- **GIF++ Facility**: CERN is constructing the facility with strong CERN-EN & PH teams involved!
- **Location:** H4 line in SPS North Area; 100GeV muons, 10x10cm^2
- **Size:** 100 m^2 Irradiation bunker
- **Source:** ^{137}Cs, 14 TBq (~260 µGy/s at 1m; 30 times present GIF) 662 KeV, $\tau_{1/2}$= 30y
- **Irradiator & Filter :** 2 independent irradiation fields (±37°). Attenuators (up to 50.000)
- **Wide range of available gases**



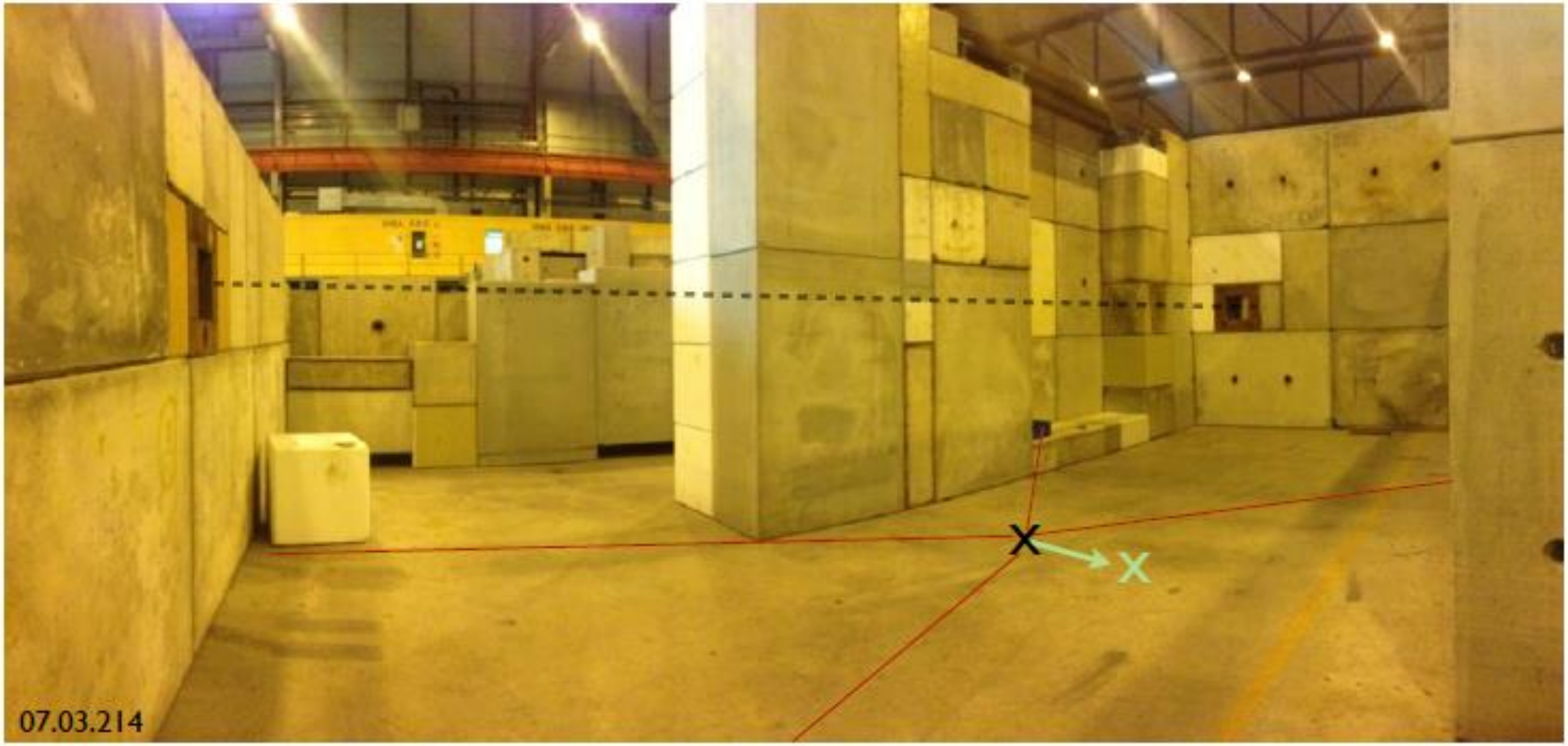
drawings provided by EN-MEF

Beam pipe – Irradiation Fields

- Irradiator can be moved by 1.5 m



GIF++ Status of Construction



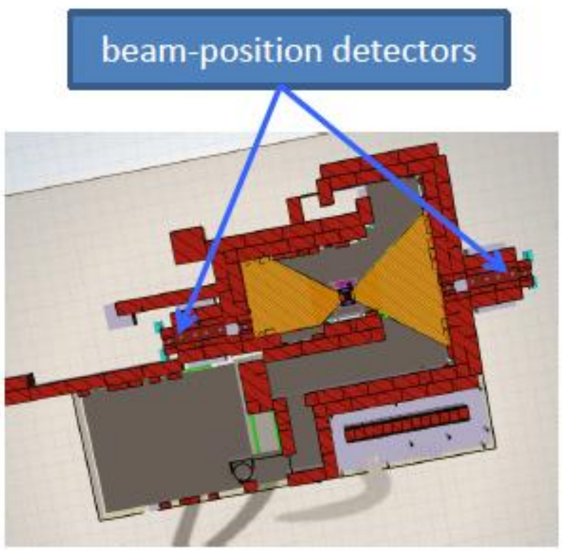
Next : gas pipes, cable trays, cables, false floor, painting....

- Commissioning: Sept-Oct.2014

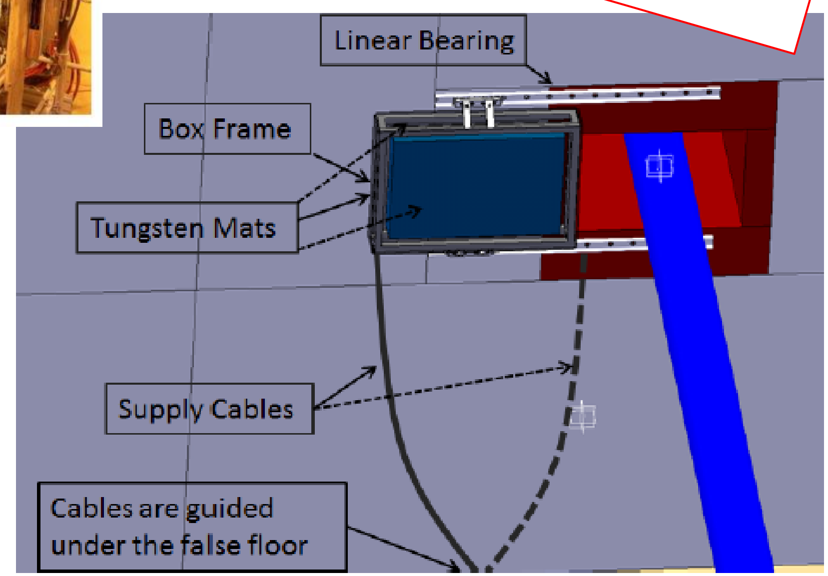
8.5.3 GIF++ user infrastructure

- **Leader**: Davide Boscherini (INFN Bologna)
- **Participants:** *Bulgaria:* INRNE; *Greece:* NTUA, AUTh, Demokritos, NCUA; *Israel:* Weizmann,Technion, Tel-Aviv; *Italy:* INFN-Bari, -Bologna, -LNF, -Rome2
- **Deliverable:** Infrastructure for the GIF++ Facility

- **Beam tracker**
  - **Detectors (TGCs) ready and tested in beam tests**

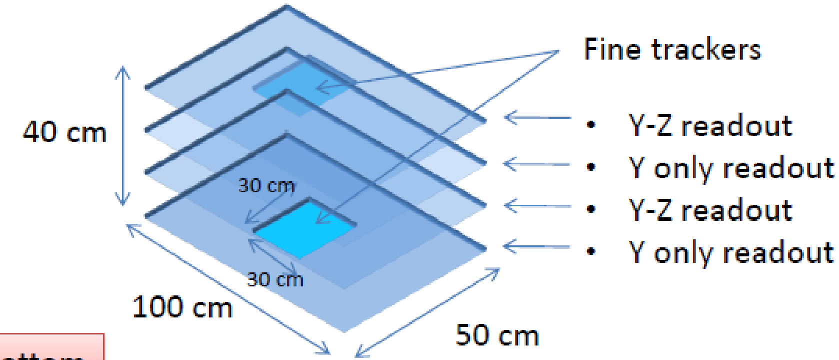


Status: Chambers ready for installation with temporary electronics



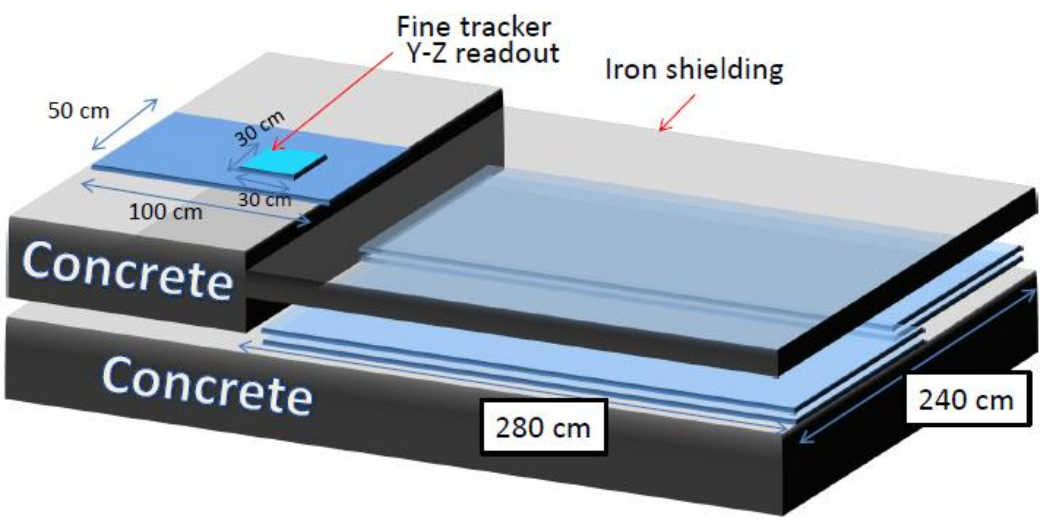
8.5.3 GIF++ user infrastructure

- **Cosmic tracker** (top)
  - **Trigger and high time resolution.**
    - 4 independent detectors area 1.0 x 0.5m2
  - **- Fine tracking.**
  - –One or 2 RPC 30x30 cm2 with 1 cm strips in both direction ; strips: 64 (128)



View from bottom

- **Cosmic tracker** (ground)
  - **Trigger and high time resolution:**
  - A 1x0.5m2 chamber as for the top tracker. Strips: 16 + 32 = 48
  - **Fine tracking:** 1 chamber 30x30 cm2 as in the previous point (# strips: 64)
  - **Underground detector**
  - –Double layer chambers: total size 2.8 x 2.4 (=2x1.2) m2 (two chambers; bi-dimensional read out with 40 mm strips, # strips: 224)



Status: Chambers expected for mid May (underground) resp. July (top/bottom)

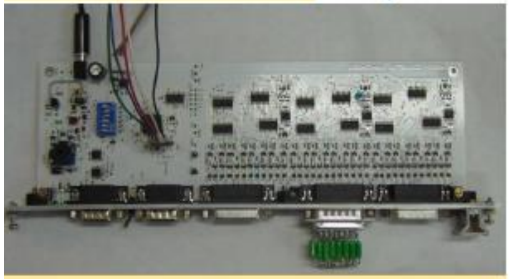
Radiation Sensors

Radiation sensors

MES – Bulgaria,
INRNE - Sofia

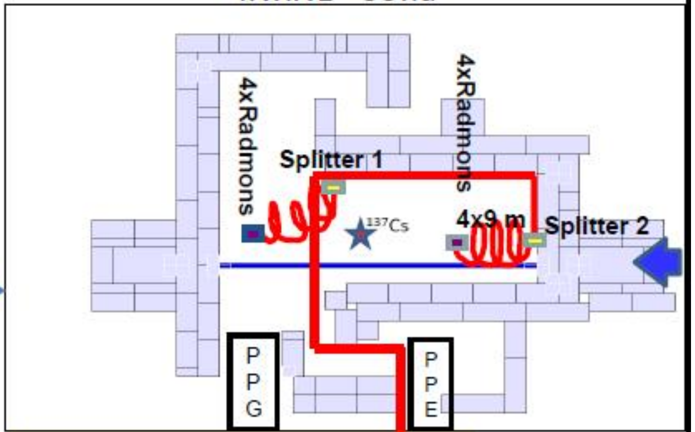
RADMON PCB BASED WITH 2 RadFETS DETECTORS
1xLAAS 1600 - till 10 Gy
1xREM 250 - till 2000 Gy

FOUR DETECTORS CAN BE CONNECTED TO ONE SPLITTER BY SHORT CABLES
THE SPLITTER IS CONNECTED TO THE DETECTOR NODE BY A LONG CABLE



MAIN CONTROLLER

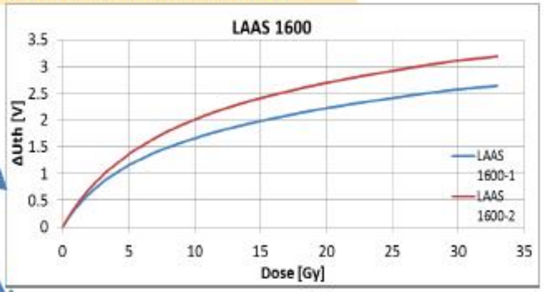
Ready for installation



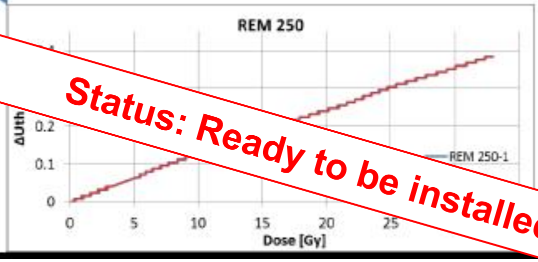
PRELIMINARY CABLING PLAN

In preparation – Radmons after the calibration test.

TEST RESULTS FOR TWO LAAS 1600 RADFETS



TEST RESULTS FOR TWO REM 250 RadFETS



Status: Ready to be installed

Status: GIF++ infrastructure

Beam tracker:
- chambers ready though with a temporary electronics until 2015

Cosmic tracker:
- chambers under construction
- expected delivery at CERN in May (underground chambers) and July (top/bottom trackers)

DCS:
- test setup in place (at old GIF) with minimal hardware infrastructure
- need detailed specifications from detectors
- plan to provide a basic version of the system by September

DAQ:
- positive results from the test-bench setup at Tel Aviv University
- TGC are already working with the proposed DAQ scheme
- need to integrate RPC
- test with real detectors planned in next June

Radiation sensors:
- dosimeters ready to be installed in the bunker area

Environmental sensors:
- sensor procurement in progress
- mechanical containers are being designed

Final remarks (Plamen laydjiev)

Installation of user infrastructure can start in next August

The items covered by the WP-8.5.3 are generally on schedule: the user infrastructure is expected to be **installed until end of September** with basic functionalities

Further commissioning of the infrastructure has to be expected in the weeks following the installation completion

Coordination of combined beam tests and common DAQ

Task 8.6

8.6.1. Common test beam experiments at CERN and DESY
8.6.2. Common DAQ

- EDMS (Engineering Data Management System)
  - Development driven by DESY with aim to provide functionality as:
    - Document and data management with version & access control, life cycle support.
    - Design and viewing features; Collaborative work including collision analyses
    - Documents: Regular, Engineering, Management
  - Two systems available: CERN EDMS and DESY EDMS with different WBS
  - EDMS for the AIDA project combining both is ready (MS34)
    - Access: http://flc-edms.desy.de/ (see also link on AIDA web site);
    - Regularly maintained by DESY
    - Most of the web pages are created dynamically from the info in the EDMS systems, via web interfaces; Collection of documents is an ongoing process
  - Outlook
    - Support for the EDMS will continue; Consolidation of existing design docs
    - Develop processes: releasing/reviewing, change control, collaborative design
    - Extend to support further PM activities: scheduling; cost estimation; risk analysis,..

- EDMS (Engineering Data Management System)
  - http://flc-edms.desy.de/

Task 8.1: Coordination and Communication

- **WP8.1.** Most of the tasks within WP8 achieved a **very good progress** within last year.
- **WP8.2** The tasks related to the test beam infrastructure at Frascati **are well on track and the anticipated milestones and deliverables** are at no risk. The CERN **deliverable D8.2.** on low energy beam line design study has been **achieved** concluding this part of task 8.2.
- **WP8.3 and 8.5** Excellent **progress was achieved in the construction of the irradiation facilities** at CERN, namely the Proton & Mixed field irradiation facility in the East Area and the **GIF++** facility in the North Area. Both projects are now **under construction at CERN!**
- **WP8.4** The irradiation testing plan for materials and components has been established (MS30) and the database on irradiated materials and components is online since this week.
- **WP8.5** TASD installed at RAL test beam line and MIND prototype under construction with delay of 10 months with respect to schedule.
- **WP8.6** AIDA EDMS system at DESY existing. **EDMS milestone MS34 reached.** Test beam support given throughout 2013 at DESY. DAQ is part of WP9

WP8 - Milestones

MS27	Specification for beam line fixed	CERN (1)	m12 Jan 2012	Final specification for the design study in task 8.2. (Task 8.2.1)	o.k. [m14]
MS28	Design of TASD and MIND	STFC (31)	m20 Sept.2012	Design for deliverable D8.11 (Task 8.5.2)	o.k.
MS29	Design of GIF++ infrastructure	INFN (18)	m20 Sept.2012	Detailed design ready for the cosmic ray tracker, the radiation measurement facility and the DCS (Task 8.5.3)	o.k.
MS30	Definition of test procedure and specification	STFC (31)	m20 Sept.2012	Common agreement of how tests for materials will be conducted and which components to test (Task 8.4)	o.k.
MS31	Installation of new equipment	CERN (1)	m26 March 2013	Movable irradiation tables operational (Task 8.3.2) CERN, UK	o.k.
MS32	First test results on selected components	STFC (31)	m26 March 2013	Intermediate result with respect to D8.7 (Task 8.4)	o.k.
MS33	Installation of TASD and MIND	STFC (31)	m36 Jan.2014	Installation at CERN for deliverable D8.11 completed (Task 8.5.2)	o.k. TASD: 2/14 MIND:12/14
MS34	Test beam, EDMS and DAQ commissioning	DESY (9)	m36 Jan.2014	Intermediate stage for deliverable D8.8 (Task 8.6. 1&2)	o.k., EDMS delay DAQ
MS35	Installation of infrastructure	(34)	m37 Feb. 2014	Cold boxes and Fluence monitoring system operational (Task 8.3.2) CERN, UK, VU	Need to wait for facility to exist
MS36	Commissioning of tracking telescope	DESY (9)	m44 Sept.2014	Start of operation of telescope delivered in D8.5 (Task 8.5.1)	

WP8 - Deliverables

D8.1	**Experience at LHC and definition of test programme: Based on the experience and expectations for the LHC test programme is defined and described in a document.**	[m12] Jan. 2012	Task 8.4	o.k. [m18]
D8.2	**Publication of specification documents for the DAQ and for the central documentation facilities: Description of common infrastructures and interfaces for the linear collider test beams.**	[m20] Sept. 2012	Task 8.6. 1&2	o.k. [m30]
D8.3	**Design study on low energy beamline: Design and implementation study on a low energy beam to the range of 1 (or possibly less) to 10 GeV**	[m26] March 2013	Task 8.2.1 CERN	o.k. [m33]
D8.4	**Upgrade scenarios for irradiation lines: Design study on new or upgraded irradiation facilities at CERN based on slow extracted proton beams. Containing a proton and – if feasible – a mixed field irradiation facility.**	[m 37] Feb. 2014	Task 8.3.1 CERN	…writing report
D8.5	**Installation of tracking telescope: The tracking telescope is installed in the beam line and operational.**	[month 40] May 2014	Task 8.5.1	
D8.6	**Detector and detector control system operational: Cosmic ray tracker including front end electronics, power and gas systems. Detector for radiation measurement. Detector Control System monitoring the tracker working and the environment parameters.**	[month 44] Sept. 2014	Task 8.5.3	
D8.7	**Populated data base of components qualification: The materials and components database is online and populated with data.**	[month 46] Nov. 2014	**Task 8.4.1**.	
D8.8	**DAQ performance and test beam utilization: Report on the performances and use of the integrated DAQ setup, and of the common test beam facilities at DESY and CERN**	[month 46] Nov. 2014	Task 8.6 1&2	
D8.9	**Performance of beamline and infrastructure: Report on performance of beamline and infrastructure including GEM based beam profile and tracking detector**	[month 48] January 2015	Task 8.2.2 Frascati	
D8.10	**Commissioning of new facility equipment: Report on commissioning of shuttle systems, movable irradiation tables with cold boxes and a fluence monitoring system based on a microwave absorption technique in silicon.**	[month 48] January 2015	Task 8.3.2 CERN, UK, VU	
D8.11	**Infrastructure performance and utilization: TASD and MIND are constructed and tested for their performance.**	[month 48] Jan. 2015	Task 8.5.2	