

WP8 – Improvement and equipment of irradiation beam lines

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Contents:

- WP8 – Task overview
- WP8 – Status of tasks
- Summary
- Annex: Table on status of milestones and deliverables

color code: ✓ done; ✓ in progress; ✓ seriously delayed; ✓ on schedule

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

Test beams infrastructure at CERN and Frascati

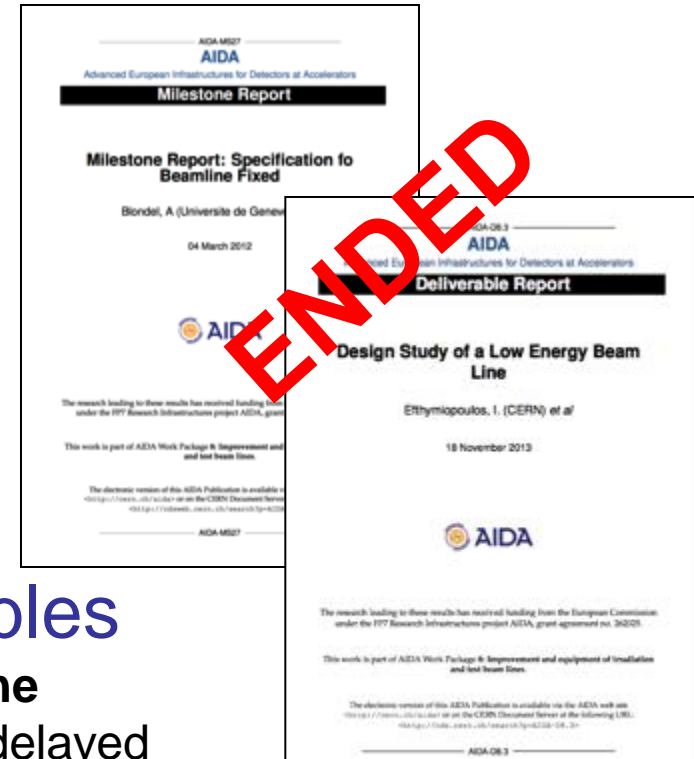
Task 8.2

8.2.1 CERN

8.2.2 Frascati

• 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 rates for the experiment
- ✓ produce final report by end of June 2013



• 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

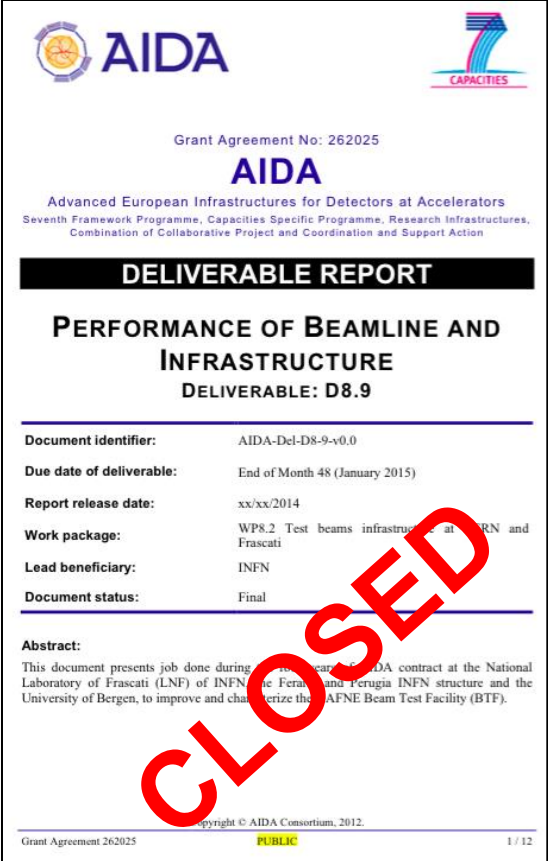
The Task 8.2.1 can be considered closed: all the milestone foreseen as been reached and only the integration of the of new device is still in progress:



- ✓ design and put in operation a remotely controlled trolley for detector test
- ✓ equip the BTF with a GEM chambers for monitoring with a resolution of about 100 μm high resolution device
- ✓ equip the BTF with LYSO calorimeter as monitor the beam energy
- ✓ DAQ interface complete and available for users.

The deliverable report is submitted for review of AIDA Coordinator and WP8 Coordinator

•Status of Milestones & Deliverables

- ✓ D8.9 [m48] is on schedule and deliverable document is submitted



 **AIDA** 

Grant Agreement No: 262025

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Advanced European Infrastructures for Detectors at Accelerators
Seventh Framework Programme, Capacities Specific Programme, Research Infrastructures,
Combination of Collaborative Project and Coordination and Support Action

DELIVERABLE REPORT

**PERFORMANCE OF BEAMLINE AND
INFRASTRUCTURE**
DELIVERABLE: D8.9

Document identifier:	AIDA-Del-D8-9-v0.0
Due date of deliverable:	End of Month 48 (January 2015)
Report release date:	xx/xx/2014
Work package:	WP8.2 Test beams infrastructure at INFN and Frascati
Lead beneficiary:	INFN
Document status:	Final

Abstract:
This document presents job done during the year of AIDA contract at the National Laboratory of Frascati (LNF) of INFN (the Frascati and Perugia INFN structure and the University of Bergen, to improve and characterize the INFN Beam Test Facility (BTF).

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Grant Agreement 262025 **PUBLIC** 1 / 12

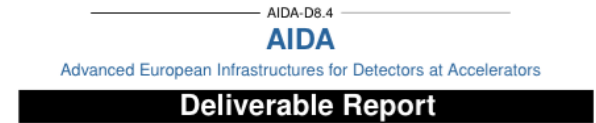
Upgrade of PS proton and neutron irradiation facilities at CERN

Task 8.3

- 8.3.1. Improvement of existing irradiation facilities and evaluation of upgrade proposals
- 8.3.2. Common infrastructure for the facilities

- **Status and future work**

- ✓ Excellent progress during 2012
- ✓ Upgrade project “officially” started in November 2012
- ✓ Construction and Commissioning of new facilities done July 2013 to December 2014 – be ready to perform proton irradiations at end of Long Shutdown (LS1)



Upgrade scenarios for irradiation lines:

Ravotti, F. (CERN) *et al*

26 September 2014



ENDED

The research leading to these results has received funding from the European Commission under the FP7 Research Infrastructures project AIDA, grant agreement no. 262025.

This work is part of AIDA Work Package 8: **Improvement and equipment of irradiation and test beam lines.**

The electronic version of this AIDA Publication is available via the AIDA web site <http://cern.ch/aida> or on the CERN Document Server at the following URL: <http://cds.cern.ch/search?p=AIDA-D8.4>

AIDA-D8.4

- **Status of Deliverables & Milestones**

- ✓ D8.4 [m37] “Complete the design of the facility” ended



- **Conclusion and actual status**

- ✓ Movable irradiation tables and cold boxes designed, constructed, tested and operational
- ✓ absolute fluence monitor designed, constructed and tested (operational!)
- ✓ optimization of fluence monitor is in progress (temperature stabilization and possibility to scan samples for beam profiling)

- **Milestone/deliverable status:**

To do!!

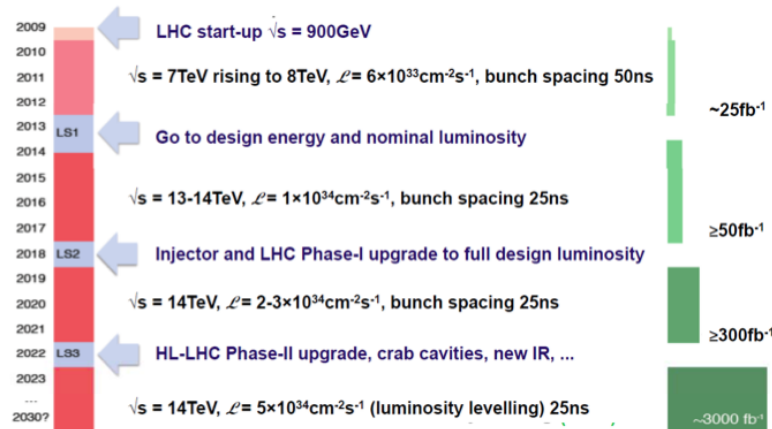
- ✓ MS31 [m26] “Movable irradiation tables operational” has been **achieved**;
- ✓ MS35 [m34] “Installation of cold boxes and fluence monitor” done, milestone report to be done
- ✓ D8.10 [m48] “Equipment fully operational” is on schedule
Commissioning of facility ongoing now

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

- ✓ Review existing data and experience from LHC, define test programme - **achieved**; See **AIDA-D8.1** document on CDS



- ✓ The plans for upgrading ATLAS and CMS have been reviewed and summarized.
- ✓ Radiation tests are advanced for some detector elements such as silicon detectors.
- ✓ Other elements, such as glues necessary to make a practical detector structure, are less well characterized and are expected to form part of a radiation test plan

AIDA-D8.1
AIDA
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Deliverable Report

Experience at LHC and definition of test programme

Canfer, Simon (STFC)
27 July 2014

 **AIDA**

System	Existing technology or material used	Proposed technology or materials	Advantages	Upgrade Phase	Reference
Pixel	BPIX and FPIX	4-layer barrel, 3-disk	Higher channel count. Redundancy. Trigger capability	1	[19] [20]
Pixel support		Ultra-lightweight, CO ₂ cooling, new readout chips, links and DC-DC converters	Can cope with lumi above $1 \times 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$		
Trigger and DAQ	VME	uTCA	Handle higher data rates and event sizes		
ECAL crystals	Lead Tungstate	Cerium Fluoride + heavy absorber sandwich calorimeter	far more radiation resistant	LS3	[19, 21]
ECAL crystals	Lead Tungstate	LYSo + heavy absorber sandwich calorimeter	slightly more radiation resistant	LS3	[19] [22] [23]
HCAL front end electronics	HPDs and PMTs	SIPM, thinner PMTs			
Muon detector	Cathode strip Chambers CSC (wire chambers) in end cap				
	Barrel muon	FPGA	BTIM early	0	(or [19])

The research leading to this under the FP7 Research

This work is part of AIDA

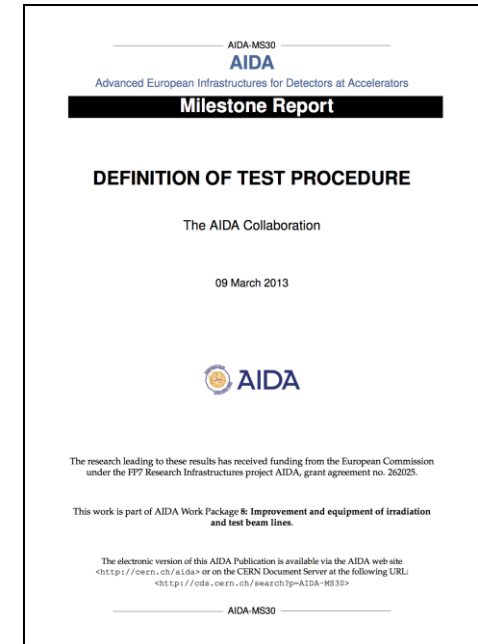
The electronic version <<http://cern.ch/a-ida>>

- **Conclusion and actual status**

- ✓ Test procedures and tests on selected materials & components started;
- ✓ Report on definition of test procedures written
- ✓ Campaign of irradiation of more than 16 different electronics devices on 2013

- **Milestone/deliverable status:**

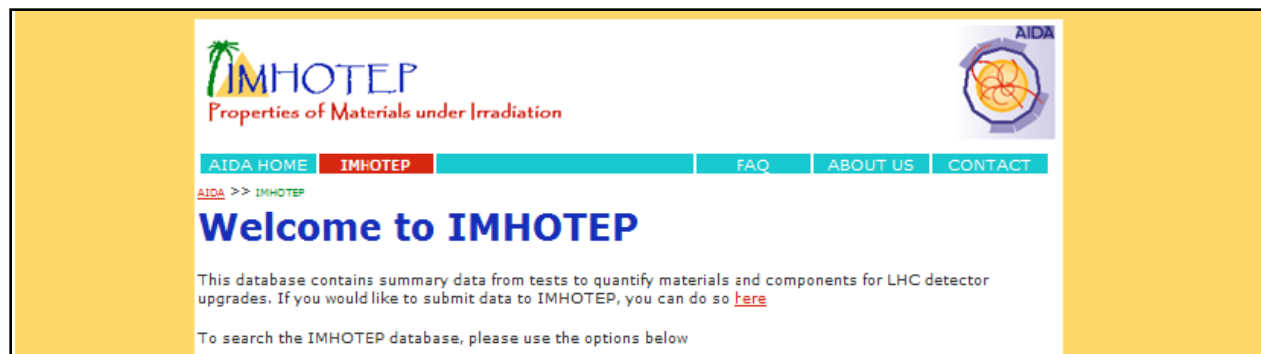
- ✓ MS30 [m20] “Definition of test procedure” achieved
- ✓ MS32 [m26] “first results on selected components” has been achieved



Closed!



- Conclusion and actual status
 - ✓ WEB database produced and online “IMHOTEP”
 - ✓ ..filling of database ongoing



To do!!

- Milestone/deliverable status:
 - ✓ D8.7 – [m48] “populated database” is on schedule

General infrastructure for test beam and irradiation lines

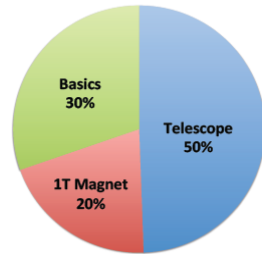
Task 8.5

8.5.1. Commission and operate beam tracking telescope

8.5.2. *TASD and MIND*

8.5.3. *GIF++ user infrastructure*

- ✓ After the end of the SPS test beam period 2012 the basic version of the EUDET/AIDA telescope was **relocated to DESY**.



50% of transnational access users requires the AIDA telescope

- ✓ During the extended shutdown of SPS until 2014 the telescope will stay at DESY to be **available for AIDA transnational access** users as well to work on the upgrade of the telescope towards the final AIDA telescope.

- ✓ Telescope is now at CERN with the core functionality [EUDAQ2 + miniTLU + Offline Software]

- ✓ D8.5 – [m40] “Installation of tracking telescope” is on schedule (**built in WP9.3**)

- ✓ MS36 – [m44] “Commissioning of tracking telescope” in on schedule



Telescope built during the FP6-EUDET project that AIDA is maintaining and operating both at DESY/CERN test beam

~~EUDET~~ Telescope
AIDA

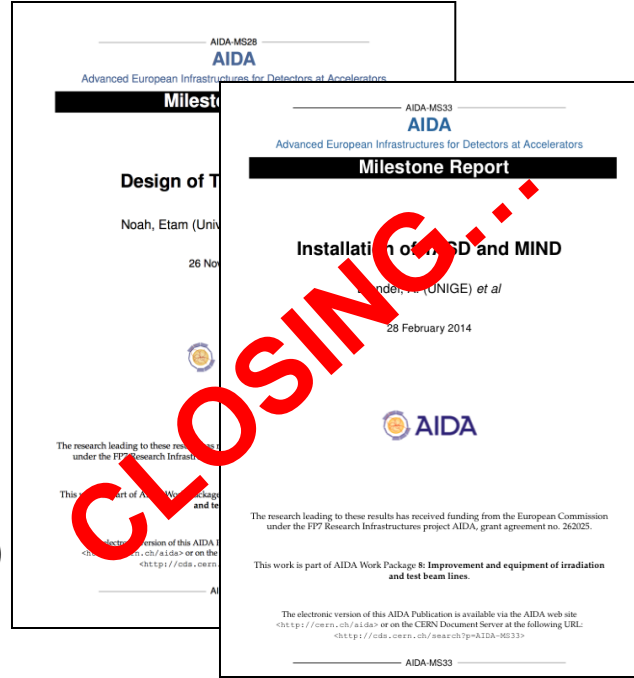
CLOSING...

- **Conclusion and actual status**

- ✓ Design of MIND and T ASD done
- ✓ component choices made (plastic scintillator, WLS fiber, optical glue);
- ✓ T ASD installed and tested at RAL
- ✓ Baby-MIND design and under construction
- ✓ Baby-MIND now recognised as one of the Neutrino Platform activities at CERN (2014)

- **Milestone/deliverable status:**

- ✓ MS28 [m20] “T ASD & MIND design” **done**
- ✓ MS33 [m36] “T ASD & MIND installation” on schedule
- ✓ D8.11 [m48] “neutrino telescope test & results” on schedule (need for appropriate beam line for testing the detectors)



- Status and future work

- ✓ Detectors

- ✓ setup for beam and cosmic trackers done
- ✓ detectors for beam tracker already constructed
- ✓ detector for cosmic tracker to be constructed within this year
- ✓ electronics for all detectors being developed

- ✓ DCS

- ✓ baseline design available (CAEN Easy, other ; PVSS; GUI)
- ✓ cost estimation is in progress

- ✓ DAQ



- ✓ several systems are being considered
- ✓ a final decision is underway

- Status of milestone & deliverables

- ✓ MS29 [m20] “GIF++ design” **done**

- ✓ D8.6 [m48] “Detectors and detector control systems operational” on schedule

To do!!



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MILESTONE REPORT

GIF++ USER INFRASTRUCTURE

MILESTONE: MS29

Document identifier:	AIDA-MS29
Due date of milestone:	End of Month 18 (July 2012)
Report release date:	01/08/2012
Work package:	WP8: Improvement and equipment of irradiation and beam lines
Lead beneficiary:	CERN
Document status:	Draft

Abstract:

This is the design report of the user infrastructure for the new Gamma Irradiation Facility (GIF++) at CERN, due by the end of July 2012, eighteen months after the start-up of the AIDA project. The user infrastructure consisting of a beam telescope, a cosmic ray telescope, radiation monitoring, gas and environmental monitoring, detector control system and DAQ system is described.

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 (moved to WP9)

- **Status and future work**

- ✓ Trigger & tracking telescope, W-stack and Fe-tailcatcher successfully used again in 2012.
- ✓ Extensive beam tests performed with several HCAL technologies.
- ✓ General information and documentation system is getting into shape.
- ✓ Implementation EDMS web site is in progress
- ✓ Feeding the EDMS systems with the relevant documents is underway

- **Status of deliverables and milestones**

- ✓ MS34 [m36] “Test beam, EDMS and DAQ commissioning” EDMS part done

WP8 part done!!

MS27	Specification for beam line fixed	CERN (1)	m12 <u>Jan 2012</u>	Final specification for the design study in task 8.2. (Task 8.2.1)	o.k.
MS28	Design of TASD and MIND	STFC (31)	m20 <u>Sept.2012</u>	Design for deliverable D8.11 (Task 8.5.2)	o.k.
MS29	Design of GIF++ infrastructure	INFN (18)	m20 <u>Sept.2012</u>	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 <u>Jan.2014</u>	Installation at CERN for deliverable D8.11 completed (Task 8.5.2)	TASD: o.k. MIND: Expect 12/2014
MS34	Test beam, EDMS and DAQ commissioning	DESY (9)	m36 <u>Jan.2014</u>	Intermediate stage for deliverable D8.8 (Task 8.6. 1&2)	EDMS, o.k. DAQ→WP9
MS35	Installation of infrastructure	(34)	m37 <u>Feb. 2014</u>	Cold boxes and Fluence monitoring system operational (Task 8.3.2) CERN, UK, VU	Delayed, expect: end November
MS36	Commissioning of tracking telescope	DESY (9)	m44 <u>Sept.2014</u>	Start of operation of telescope delivered in D8.5 (Task 8.5.1)	Expect: November

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.	[month 12] Jan. 2012	Task 8.4	<u>o.k.</u>
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.	[month 20] Sept. 2012	Task 8.6. 1&2	<u>o.k.</u>
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	[month 26] March 2013	Task 8.2.1 CERN	<u>o.k.</u> (9m delay)
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.	[month 37] Feb. 2014	Task 8.3.1 CERN	<u>o.k.</u>
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	Delayed October
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	Work on report started
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.	Work on report started
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	→WP9
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	Document ready for AIDA review
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	<u>Operation to start in 11/14</u>
D8.11	Infrastructure performance and utilization: TASD and MIND are constructed and tested for their performance.	[month 48] Jan. 2015	Task 8.5.2	