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WP15.5–CERN Proton Facility Upgrade

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Outline

- ❖ **CERN Milestones & Deliverables**
- ❖ **Irradiation Facilities Database**
- ❖ **IRRAD Data Manager**
- ❖ **IRRAD Technical Area Upgrade**



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CERN Milestones & Deliverables

❖ CERN Proton Facility (IRRAD)

- Online database on EU irradiation facilities of interest for HEP
- Improve IRRAD infrastr. / user friendliness
 - equip area to store/handle activated materials
 - sample and user management software system
 - upgrade contactless fluence monitoring
-Vilnius University
 - high-granularity & fast Beam Profile Monitor
 - test sample holders for extremely high fluence
 - thermal box to -40°C for CERN & Birmingham
-University of Sheffield



} See Dovile Meskauskaite's talk

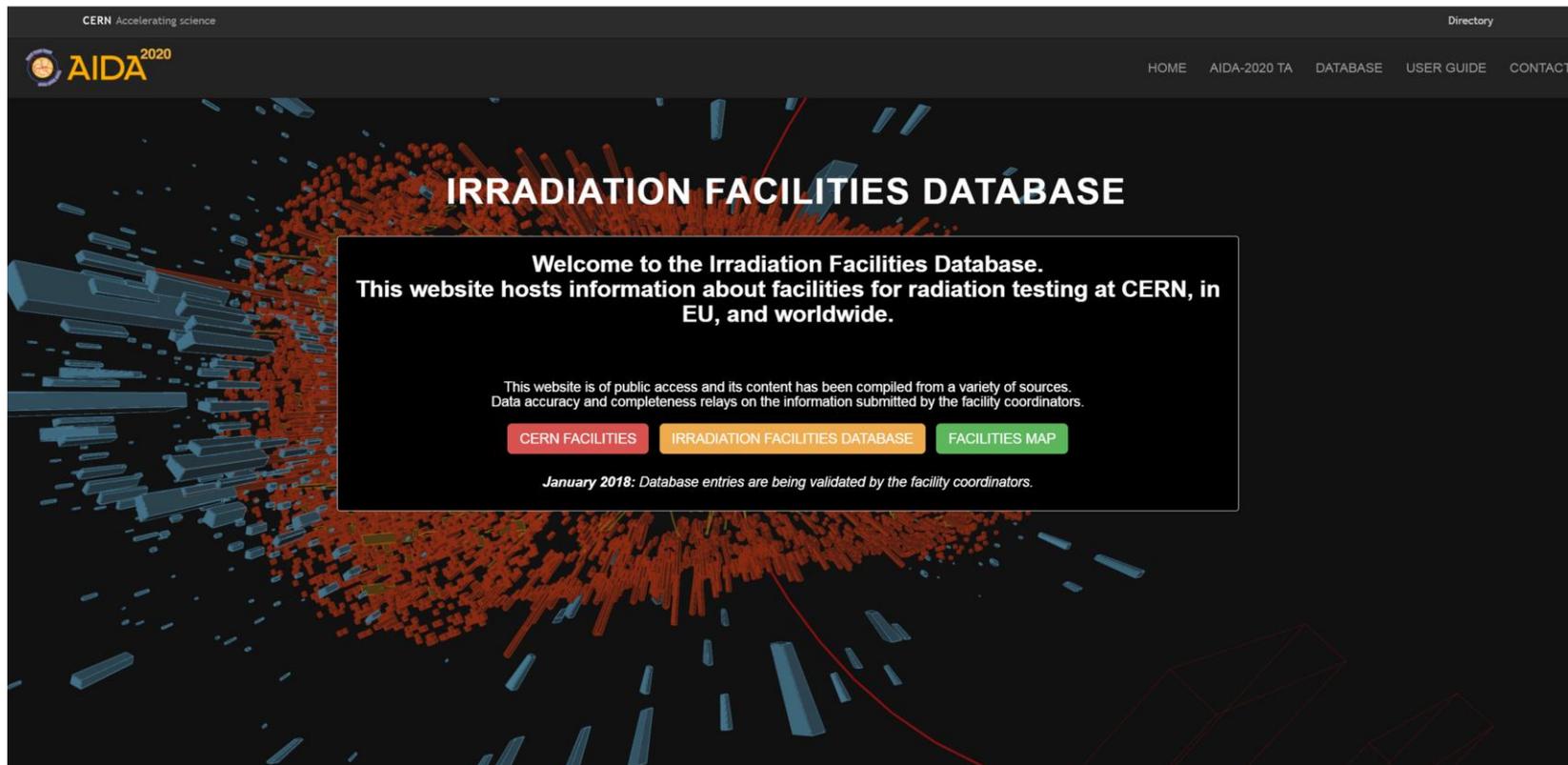
} See Isidre Mateu Suau's talk

❖ CERN Gamma Irradiation Facility (GIF++)

- Extension / upgrade of GIF++ Gas system
 - New online dose-rate monitor (INRNE)
 - Extension of the cosmic ray tracker on the side walls (INFN)
 - Demonstrator for an augmented reality event display (INFN)

} See Isidre Mateu Suau's talk

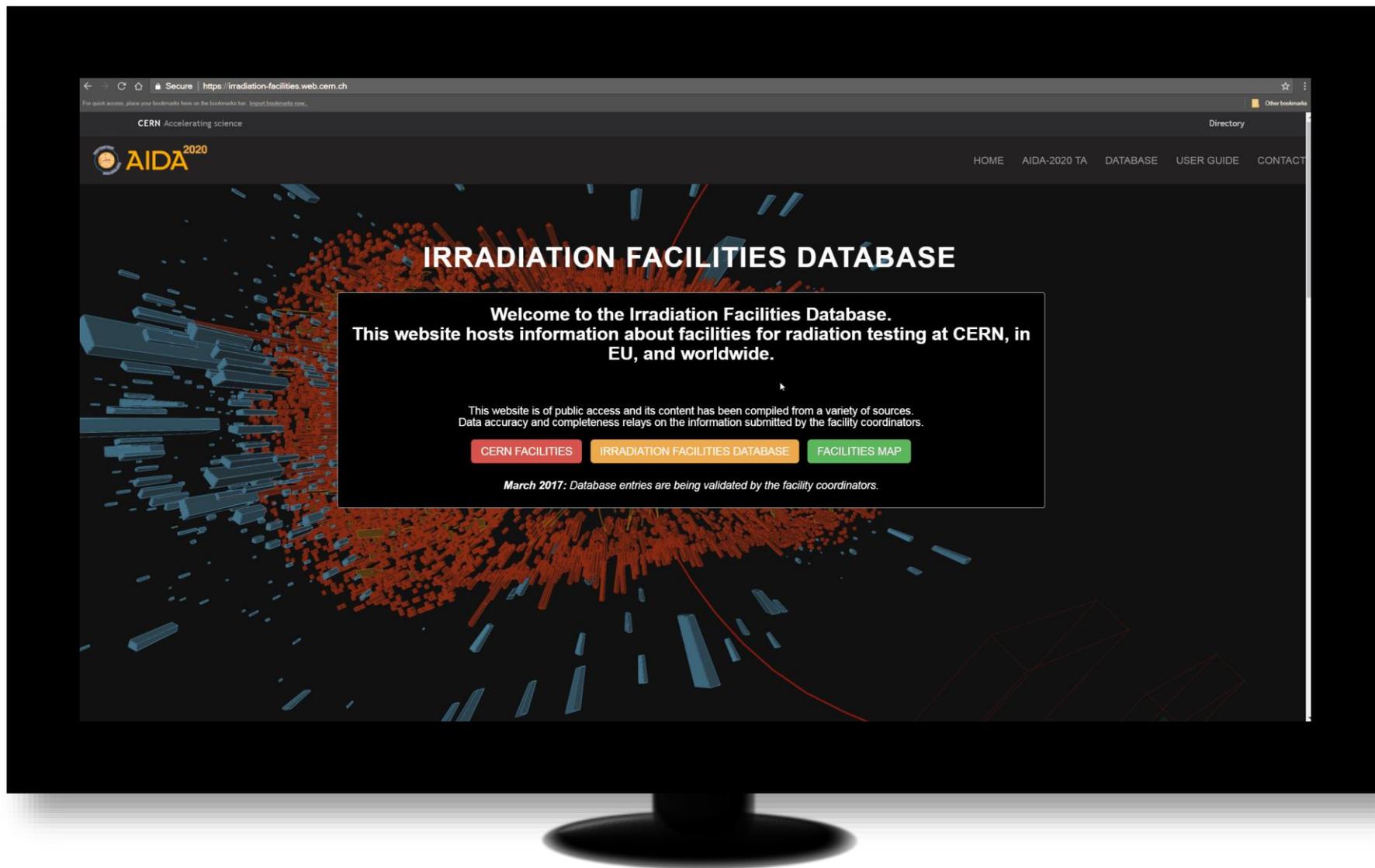




The screenshot shows the homepage of the Irradiation Facilities Database. At the top left is the CERN logo with the tagline 'Accelerating science'. To its right is the AIDA 2020 logo. On the top right, there is a 'Directory' link and a navigation menu with links for 'HOME', 'AIDA-2020 TA', 'DATABASE', 'USER GUIDE', and 'CONTACT'. The main content area features a large, abstract 3D visualization of data points in orange and blue. The title 'IRRADIATION FACILITIES DATABASE' is centered in large white letters. Below the title is a white text box with a black background containing the following text: 'Welcome to the Irradiation Facilities Database. This website hosts information about facilities for radiation testing at CERN, in EU, and worldwide.' Below this is a smaller line of text: 'This website is of public access and its content has been compiled from a variety of sources. Data accuracy and completeness relies on the information submitted by the facility coordinators.' At the bottom of the text box are three buttons: 'CERN FACILITIES' (red), 'IRRADIATION FACILITIES DATABASE' (orange), and 'FACILITIES MAP' (green). Below the buttons is a note: 'January 2018: Database entries are being validated by the facility coordinators.'

A unified entry point for irradiation facilities
at CERN and worldwide with a collection of key information

<https://irradiation-facilities.web.cern.ch/>



Statistics & Outlook

- 207 Irradiation Facilities Entries
- 1300 visits in 2017



Follow up:

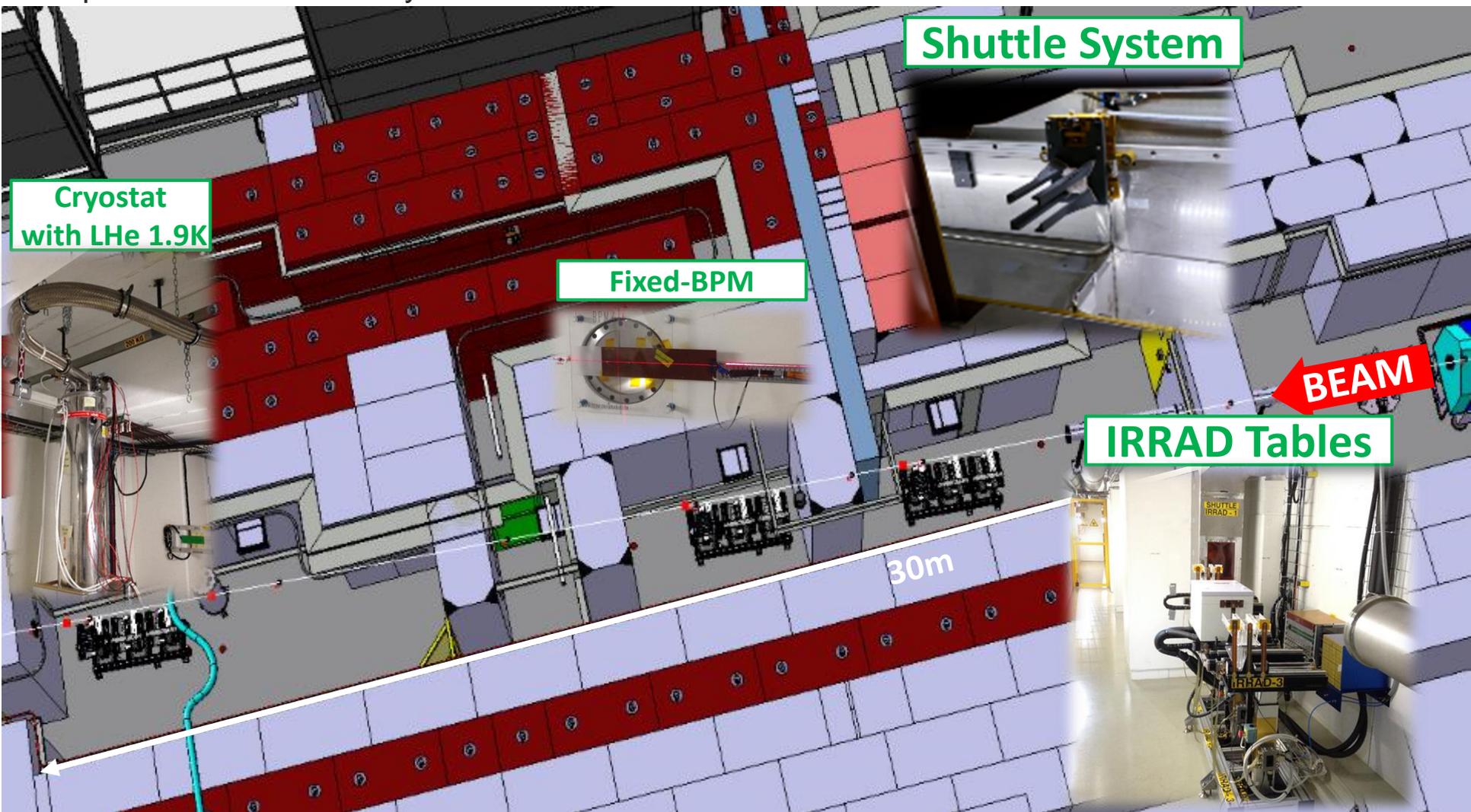
- Send annual reminder to facilities coordinators to update their data if needed
- Contact CERN colleagues to remove outdated information from old CERN websites

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Proton Irradiation Facility (IRRAD)

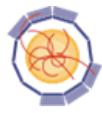
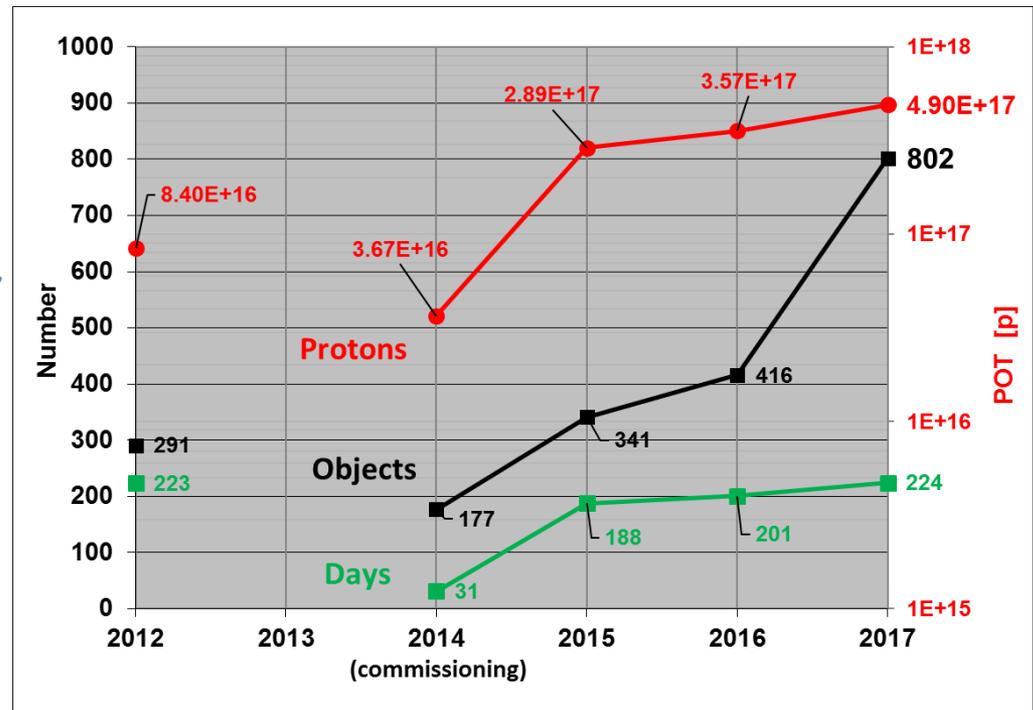
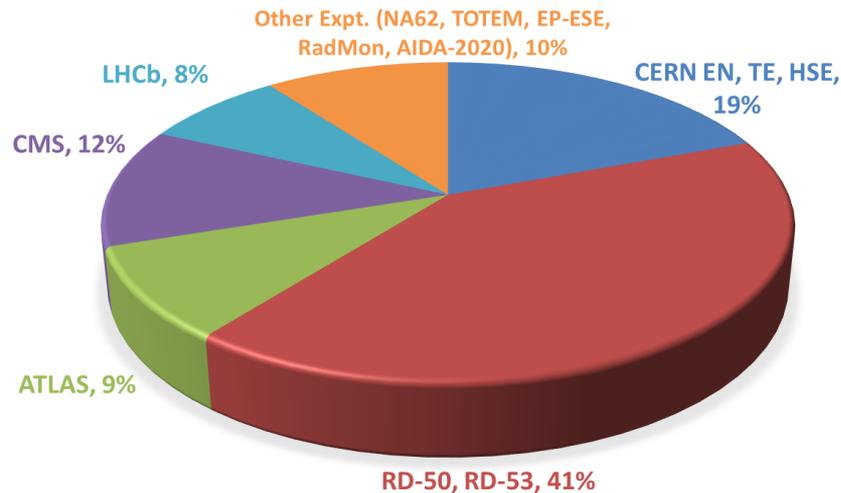
- Testing components of the **HEP experiments**
- Beam of **24 GeV/c** and size of **12×12 mm²**
- Spills of **400 msec** every **~10 sec**
- Fluence of **1×10¹⁶ p/cm²** in **14 days**
- **Scanning** also in dimensions of **10×10cm²**
- **Low temperature** irradiation (**-25°C**)



2017 Statistics

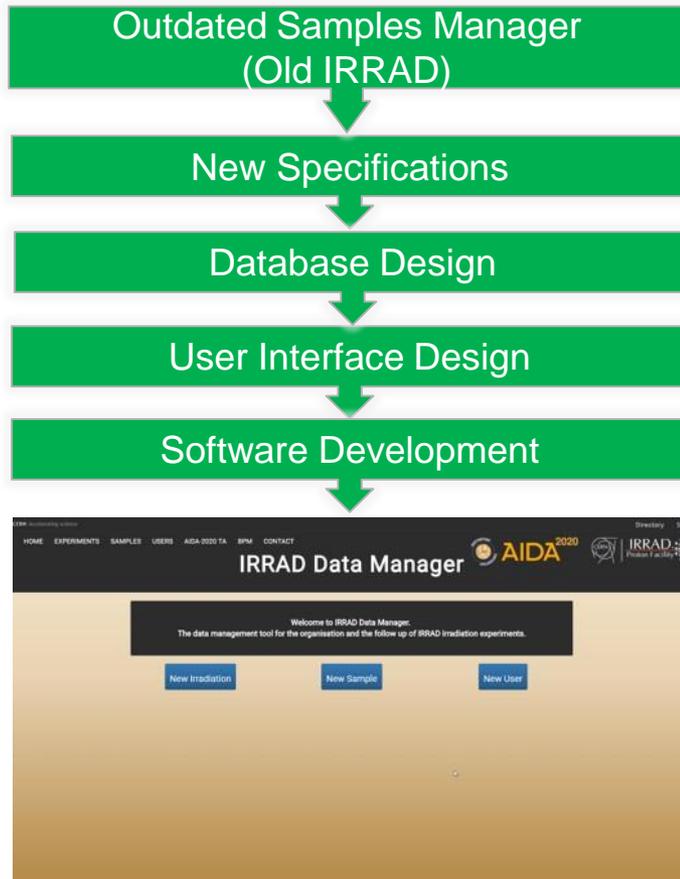
Registered experiments	46 (3 postponed)
Users / user teams	32
User institutes	19
Irradiated objects	802
Measured Al-foils dosimeters	>600
Max requested fluence	1×10^{17} p/cm ²

- Low T (< -20°C) experiments
- «Scanning» experiments
- **12** irradiations supported via **AIDA-2020 Transnational Access Program**

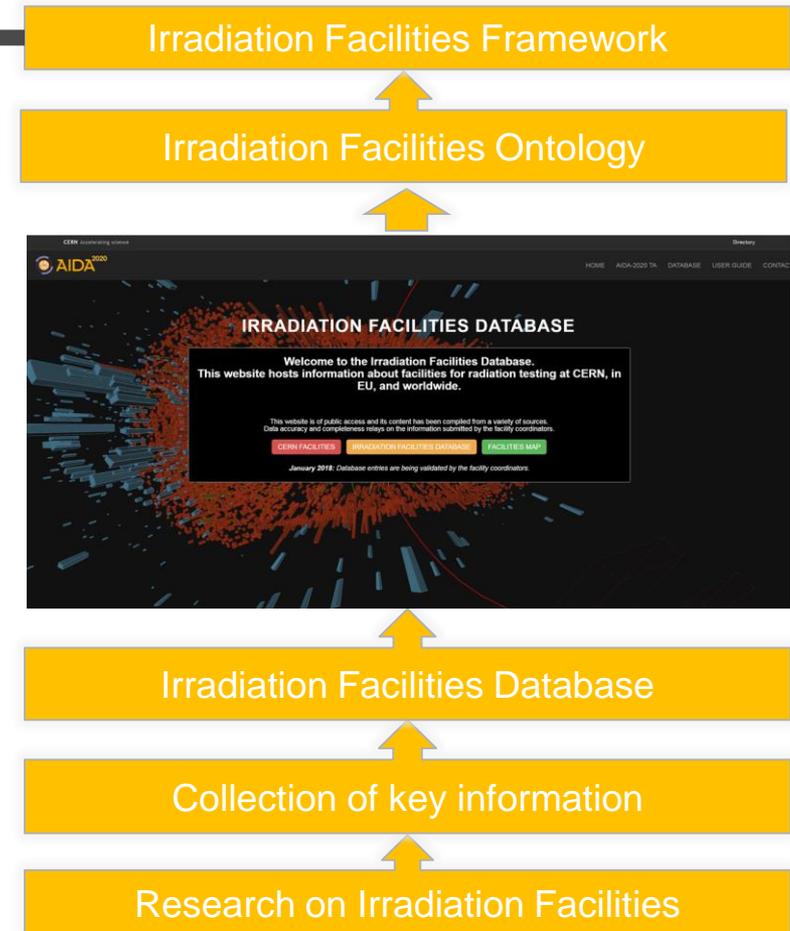


PhD Thesis Overview

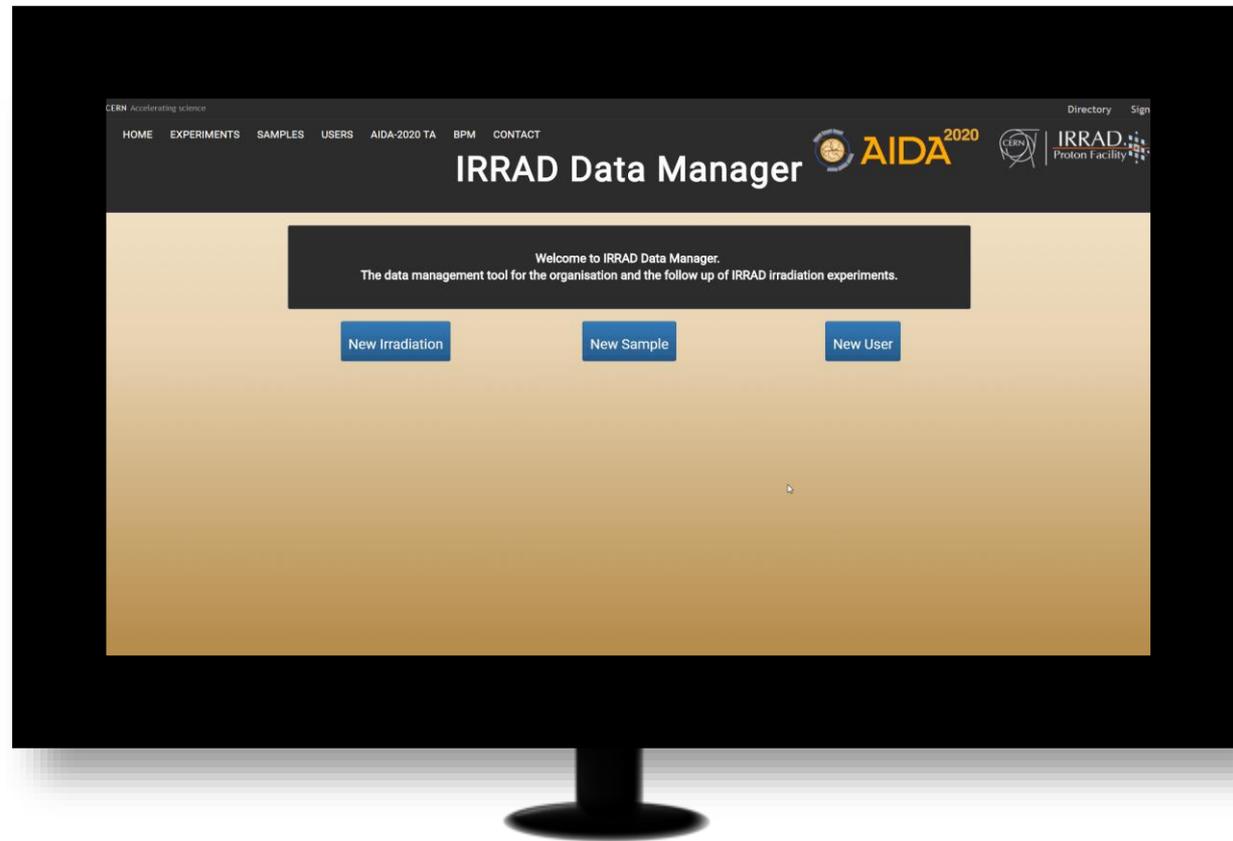
New IRRAD Facility



Worldwide Irradiation Facilities

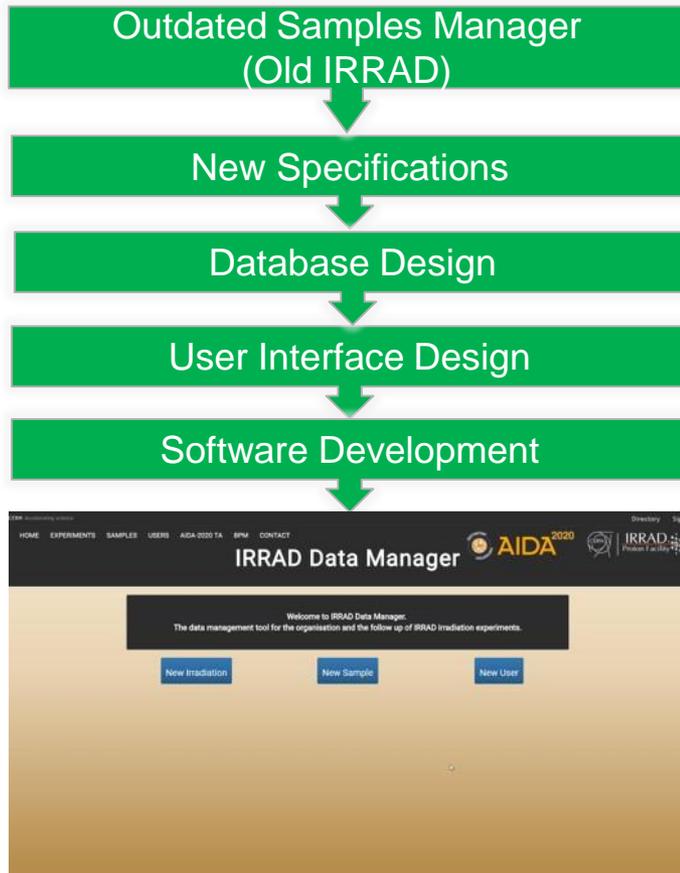


- **Centralised system** for the registration and handling of IRRAD data (Irradiation experiments, Samples, Users,...)
- Compatibility with **CERN IT infrastructure** (Openshift, Django framework, Oracle)
- **Data exchange** with CERN **traceability system (TREC)**
- **User Interface customisation** according to the users and irradiation experiment
- Based on User Experience (UX) principles

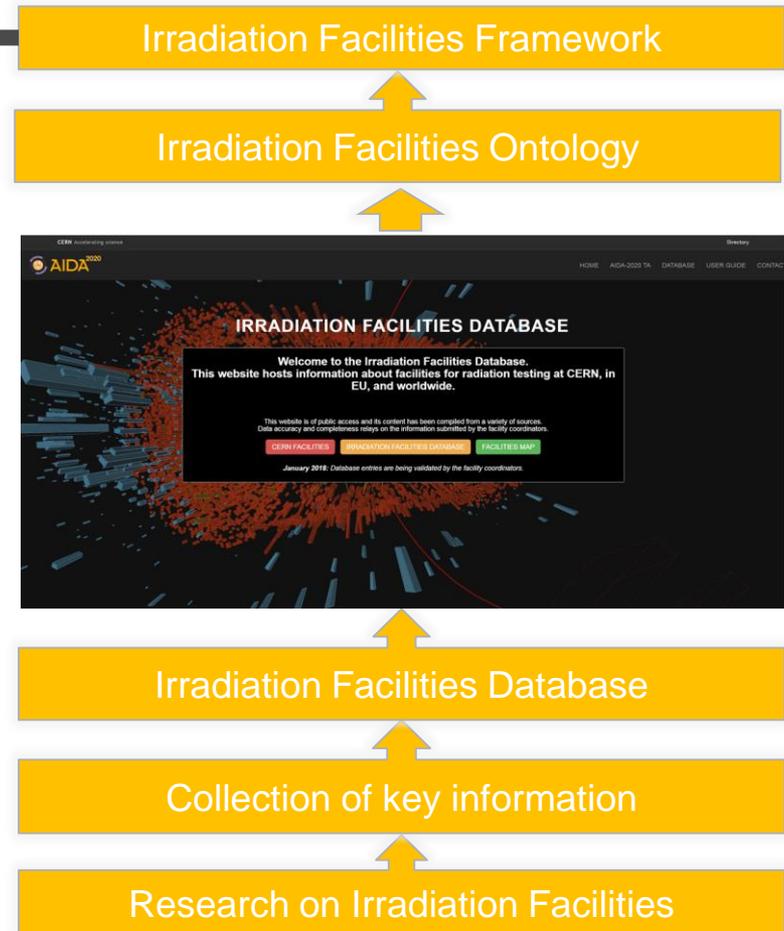


PhD Thesis Overview

New IRRAD Facility

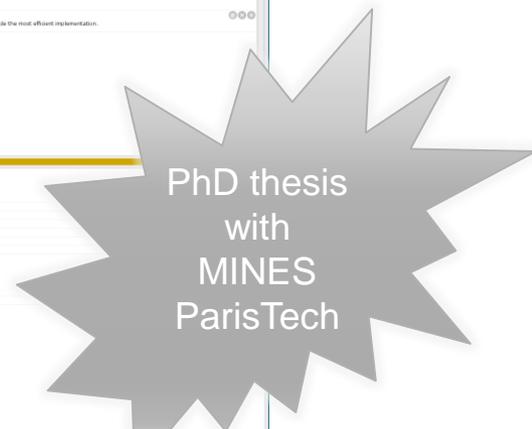
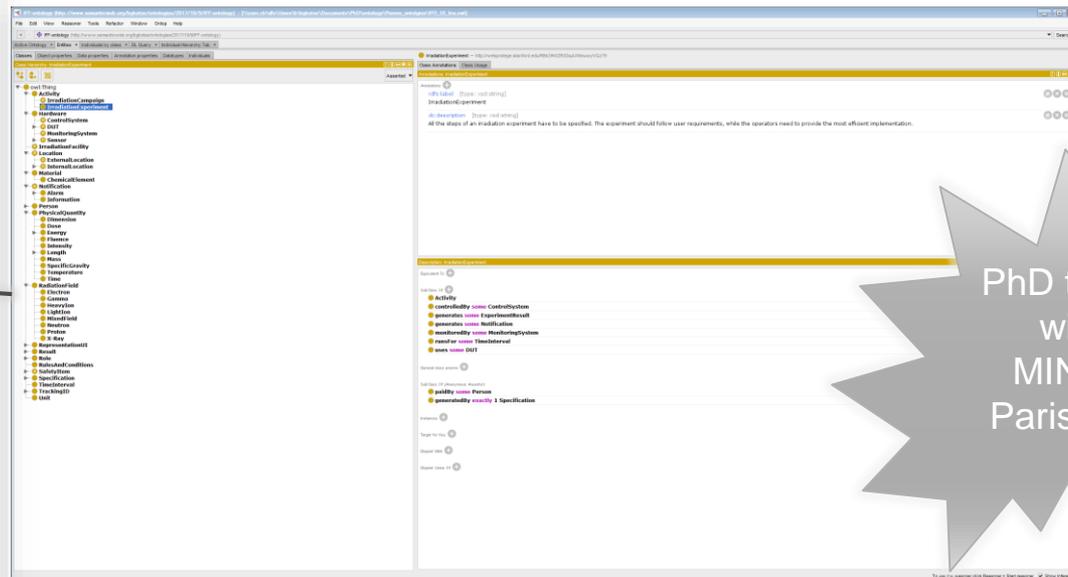
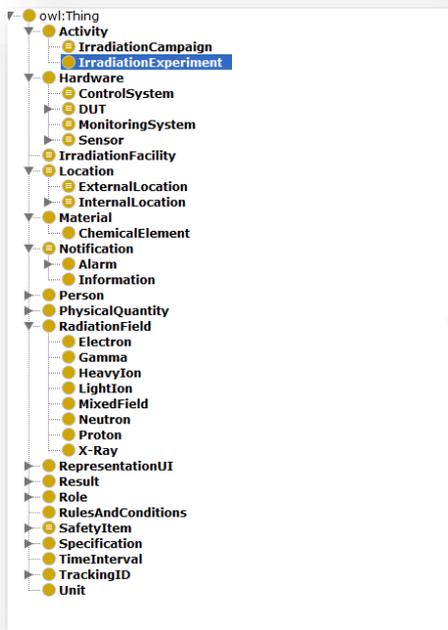


Worldwide Irradiation Facilities



Irradiation Facilities Framework (IFF)

- Following a bottom-up approach, we intend to describe a **general model of irradiation facilities** by defining an irradiation facilities **ontology**
- **An ontology is a specification of conceptualisation describing a specific domain**
- **Objective:** The framework will automatically **generate user interfaces** based on the irradiation facilities ontology, depending on the irradiation facilities characteristics
 - To be applied to the **IRRAD Data Manager**



Protégé Irradiation Facilities Ontology development

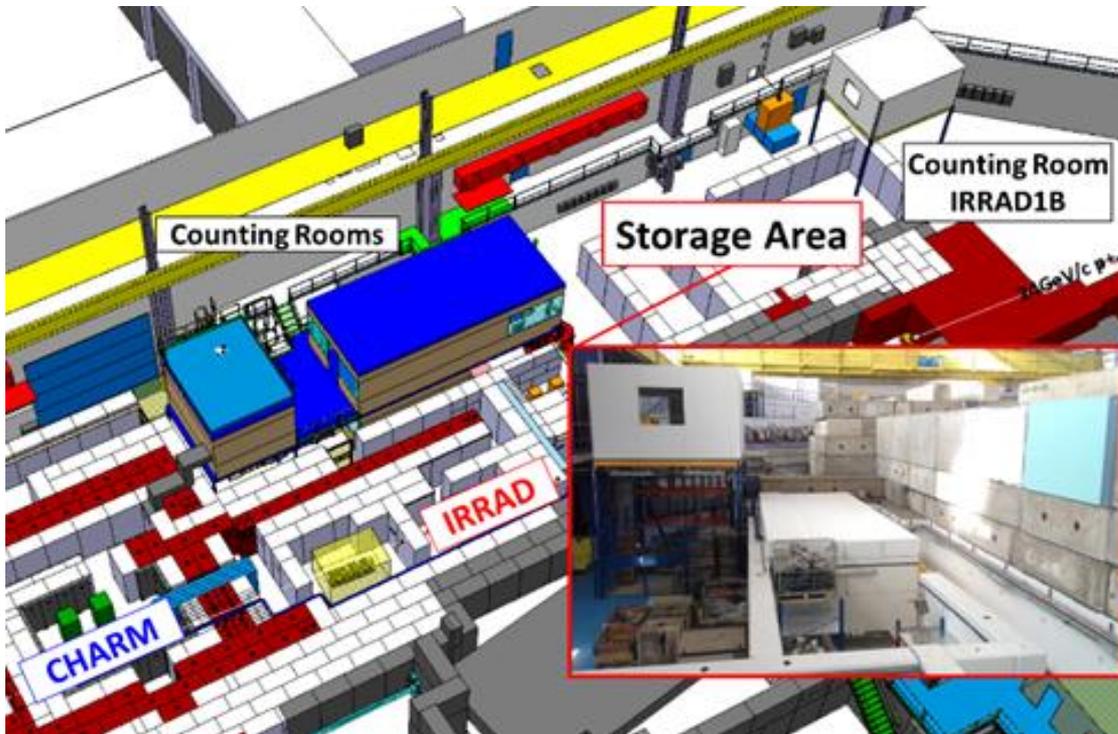
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Improvements of IRRAD Storage Area

- 2x shielded zones for **cool-down** and **storage** at **room and low temperatures**
- 1x **workspace** equipped to handle and characterize irradiated samples
 - Dedicated **cabling infrastructure** from workspace to counting room IRRAD1B
 - Inspection microscope, oven for annealing, etc.



IRRAD Storage area

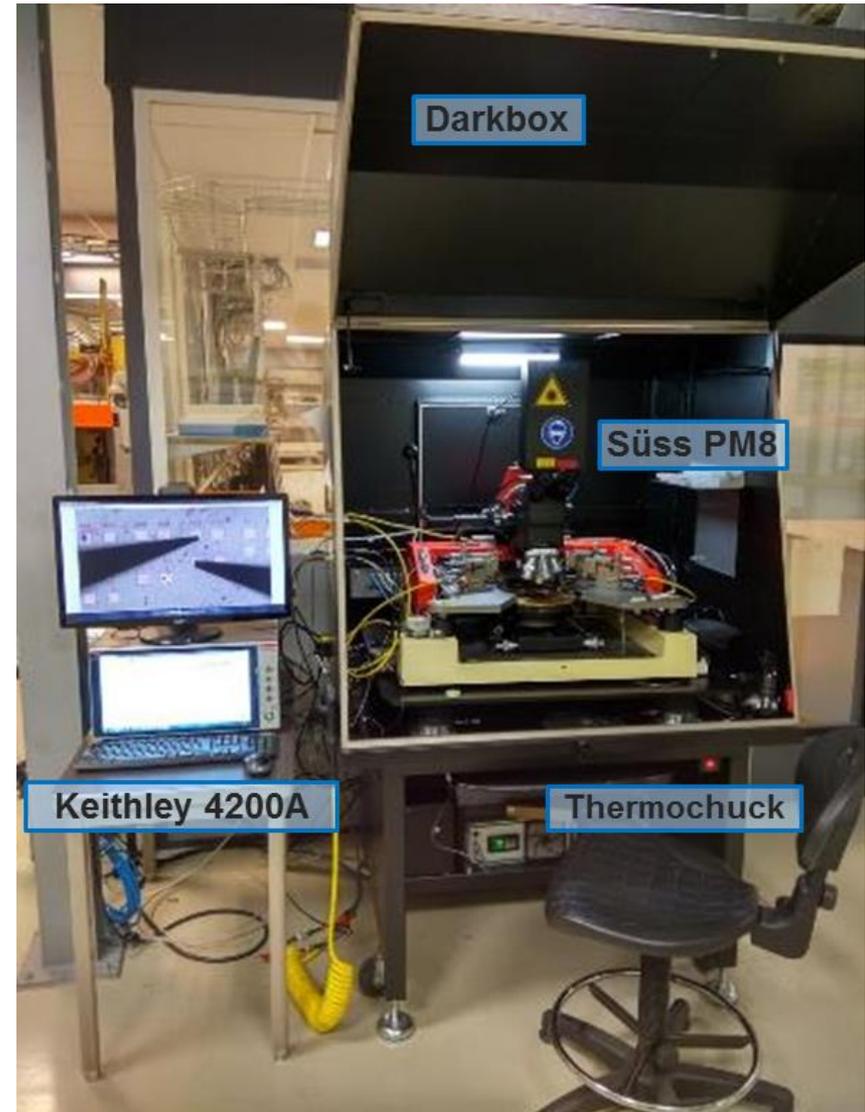


Workplace

Characterization test-bench

New state-of-the-art electrical characterization tools available in IRRAD:

- **Süss PM8 Probe Station:**
 - 4 manipulators
 - ThermoChuck from 5°C to 125°C
 - Vibration-isolated table in EM-isolated darkbox
- **Keithley 4200A Semiconductor Parameter Analyzer:**
 - 4 SMU + 2 Pre-Amplifiers
 - Current range from 10 nA to 1A
 - Voltage range from 0.2 μ V to 210 V
 - CV unit [1 kHz to 10 MHz] with up to \pm 210 DC bias
 - Automatic CVIV Multi Switch unit
- **Partially funded by R&D for FCC**
- **Tool available to all IRRAD users with prior booking**





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irradiation-facilities.web.cern.ch

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