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Gkotse, Blerina (CERN and MINES ParisTech PSL Research
University,) *et al*

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Software Upgrades of Beam and Irradiation Test Infrastructures in AIDA-2020

Blerina Gkotse^{1,2}, Georgi Gorine², Pierre Jouvelot¹, G. Pezzullo² and Federico Ravotti²

¹MINES ParisTech, PSL University, Paris, France

²Experimental Physics Department, CERN, Geneva 23, CH-1211, Switzerland
Blerina.Gkotse@cern.ch

Abstract. AIDA-2020 is an EU-funded project about Advanced European Infrastructures for Detectors at Accelerators involving about 60 institutes in 24 EU countries. Within this project, the Work Package 15 (WP15) deals with beam and irradiation test facilities, infrastructures dedicated to the qualification of particle detectors, materials, and components prior to their installation in High-Energy Physics (HEP) experiments. In this paper, we present the contributions of our team at CERN to the WP15 activities. These activities involve online databases of irradiation and test beam facilities, a dedicated web application for the data management of the CERN proton irradiation facility (IRRAD) and an ontology for irradiation experiments and their data management (IEDM).

Keywords: AIDA-2020, Ontology, Data Management, Irradiation Experiment.

1 AIDA-2020

Advanced European Infrastructures for Detectors at Accelerators (AIDA-2020) is an EU-funded project that unites important European research infrastructures in the field of detector development and testing. In total, 24 countries and CERN (the European Organization for Particle Physics) are participating in a coordinated program of Networking Activities (NAs), Transnational Access (TAs) and Joint Research Activities (JRAs) [1], in line with the priorities of the European Strategy for Particle Physics [2] and structured in 15 different Work Packages (WPs). The work presented here focuses on the JRA Work Package 15 related to the upgrade of beam and irradiation test infrastructures or facilities (WP15).

2 AIDA-2020 WP15 Goals and Objectives

Beam and irradiation test facilities are essential infrastructures for the qualification of particle detectors, material, and components prior to their installation in High-Energy Physics (HEP) experiments such as those performed at CERN. The main goal of AIDA-2020 WP15 is to improve the infrastructures of such test beam and irradiation facilities

at various European institutes. More precisely, the aim is to promote qualitative and quantitative upgrades of the facilities' design as well as to provide enhanced services to the facilities' users.

3 Software Development Activities in WP15

Databases of irradiation and test beam facilities. Within WP15, an irradiation-facilities online database (DB) was developed [3]. This database contains information about irradiation facilities worldwide. In total, 211 entries of irradiation facilities are registered nowadays. Data are organized in a structured way and maintained up to date by the facility coordinators. Following the success of this first development, a second one will be developed to gather information about test beam facilities.

IRRAD Data Manager (IDM). One of the tasks of WP15 deals with the upgrade of the CERN proton irradiation facility (IRRAD). In addition to the improvements to the facility equipment and beam instrumentation, this task also includes the upgrade of the software handling the data related to the several hundreds of samples irradiated every year in this CERN facility (~800 in 2018). This new data management application, put in service during 2018, is the IRRAD Data Manager (IDM) [4].

Irradiation Experiment Data Management Ontology (IEDM). Building upon the insights acquired during the development of DB, the subsequent analysis of the set of DB-registered irradiation facilities, their operational models (Section 3.1), and the development of IDM (Section 3.2), we decided, to foster further collaboration, to formalize the shared knowledge provided by all these facilities. IEDM is the resulting ontology that describes common concepts and relations in the field of irradiation experiments and their data management [5]. In addition to its foundational impact, this ontology will later be used for the automatic generation of web applications.

4 Acknowledgements

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