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CERN-GIF++: a new irradiation facility to test large-area particle detectors for the high-luminosity LHC program

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The high-luminosity LHC (HL-LHC) upgrade is setting a new challenge for particle detector technologies. The increase in luminosity will produce a higher particle background with respect to present conditions. Performance and stability of detectors at LHC and future upgrade systems will remain the subject of extensive studies. The current CERN-Gamma Irradiation Facility (GIF) has been intensively used to simultaneously expose detectors to the photons from a 137Cesium source and to high energy particles from the X5 beam line in SPS West Area for many years. From 2004 onwards, only the 137Cesium source is available for irradiations and the shutdown of the present facility is scheduled for the end of 2014.

The present contribution describes a joint project between CERN-EN and CERN-PH departments to design and build the new CERN GIF++ facility. GIF++ will be a unique place where high energy charged particle beams (mainly muon beam with momentum up to 100 GeV/c) are combined with a 14 TBq 137Cesium source. The higher source activity will produce a background gamma field which is a factor 30 more intense than that at GIF, allowing to cumulate doses equivalent to HL-LHC experimental conditions in a reasonable time.
The 100 m2 GIF++ irradiation bunker has two independent irradiation zones making it possible to test real size detectors, of up to several m2, as well as a broad range of smaller prototype detectors and electronic components. The photon flux of each irradiation zone will be tuned using a set of Lead filters with attenuation factors from zero to 50000.
Flexible services and infrastructure including electronic racks, gas systems, radiation and environmental monitoring systems, and ample preparation zone will allow time effective installation of detectors.
A dedicated control system will provide the overview of the status of the facility and archive relevant information.
The collaboration between CERN and the users'detector community, the latter providing detector specific infrastructures within the framework of the FP7 AIDA project, will bring the new facility to operation by the end of 2014.

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