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Design options for the upgrade of the CMS electromagnetic calorimeter

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The CMS scintillating lead-tungstate calorimeter was designed to operate for at least ten years at the LHC, assuming an instantaneous luminosity of $2 \times 10^{34} \text{ cm}^{-2}/\text{s}$. According to our measurements, the detector has performed according to design specifications and will survive with excellent performance through the lifetime of the LHC. However, plans for an upgrade of the LHC (the High Luminosity LHC, HL-LHC, project) aim at accumulating a much higher integrated luminosity, up to 3000/fb in ten years. This will expose the detector to a total irradiation of about six times higher with respect to the design specifications.

An intense campaign of activities is then started to define the improvements needed to survive such an increase in irradiation levels. The activities carried out include both irradiation studies, simulations, design, realisation and test of prototypes of new detectors that may substitute at least part of the current one if needed, especially at large pseudorapidity.

We will show the current options under study and the results obtained so far on the subjects outlined above.

Summary

Primary author(s) : MEYER, Arnd (RWTH Aachen University); Dr. PARAMATTI, Riccardo (INFN - Rome)

Presenter(s) : Dr. PARAMATTI, Riccardo (INFN - Rome)

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