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Studies of radiation effects on the hadronic calorimeters at CMS

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In this talk, we present studies on the longevity of both the current and potential alternative active materials to be used in the backing hadronic calorimeters of the CMS detector for the High Luminosity LHC upgrades. We will also present a proof of concept data-driven method to systematically extrapolate dose rate dependent model parameters from high dose rate regime (0.3 to 500 krad/h in which several controlled irradiations are discussed in this talk) into more realistic HL-LHC regime (0.1 to 20 rad/h in which a controlled irradiation is impractical). The method serves as a guidance to implement relevant inputs into GEANT4 simulation in order to provide a more realistic prediction of light yield reduction due to radiation damage, and additionally allows one to compare light output performance between different geometry designs of active material.

Secondary topics

Radiation tolerance, simulation

Applications

Other

Primary topic

Scintillators

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