

Neutron induced radiation damage of plastic scintillators for the upgrade of the Tile Calorimeter of the ATLAS detector.

With the prediction that the plastic scintillators in the Gap region of the Tile Calorimeter will sustain a significantly large amount of radiation damage during the HL-LHC run time, the current plastic scintillators will need to be replaced during the phase 2 upgrade in 2018. The scintillators in the gap region were exposed to a radiation environment of up to 10 kGy/year during the first run of data taking and with the luminosity being increased by a factor of 10, the radiation environment will be extremely harsh.

We report on the radiation damage to the optical properties of plastic scintillators following irradiation using a neutron beam of the IBR-2 pulsed reactor in Joint Institute for Nuclear Research (JINR), Dubna. A comparative is drawn between polyvinyl toluene based commercial scintillators EJ200, EJ208 and EJ260 as well as polystyrene based scintillator from Kharkov. The samples were subjected to irradiation with neutrons of energy >1 MeV and a flux density range of $1 \cdot 10^6 - 7.7 \cdot 10^6$.

Light transmission, Raman spectroscopy, fluorescence spectroscopy and light yield testing was performed to characterize the damage induced in the samples. Preliminary results from the tests done indicate a change in the optical properties of the scintillators, further studies are underway to gain a better understanding of the interaction between neutrons with plastic scintillators.

I intend to submit my contribution for the proceedings

Yes

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