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Impact of dose rate on radiation damage of plastics scintillators for the Tile Calorimeter of ATLAS.

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Abstract content ** ** (Max 300 words) **
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ATLAS (A Toroidal LHC Apparatus) is a particle physics experiment at the Large Hadron Collider at CERN that is involved in the search of new particles through the head-on collisions of protons of extraordinarily high energy. The Tile Calorimeter (TileCal), the central section of the hadronic calorimeter of the ATLAS experiment, detects hadrons, jets and taus and measures the missing transverse energy. TileCal is built of steel and scintillating tiles, which were chosen due to their properties of high optical transmission. Plastic scintillators suffer radiation damage due to the highly ionising nature of the particles to be detected. The effects of radiation dose rates on the light transmission properties of two different types of scintillators were investigated. The two different types of plastic scintillators were the EJ208, which was provided by ELJEN technologies and the Protvino samples, which was sourced from the Tile calorimeter of the ATLAS detector. Twelve small square samples (5mm by 5mm) from each plastic scintillator went through light transmission testing before and after being irradiated. The radiation of the samples took place at the Tandem accelerator of iThemba LABS in Gauteng. Samples were irradiated to a dose of approximately 1 Mega Gray with dose rates of approximately 50 Gray/s, 150 Gray/s, 750 Gray/s and 3kGray/s. The results obtained generally showed slight differences in the transmittance spectra of the irradiated and unirradiated samples. These preliminary results will be presented in a poster.

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