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Evaluating the Radiation Damage to Quartz Rods in the ATLAS Zero Degree Calorimeter KATHRYN GOODALE, UIUC — At the Large Hadron Collider, the ATLAS experiment studies particle collisions to explore the fundamental particles of nature. A key instrumentation technology used by the ATLAS experiment are calorimeters for particle energy measurements. UIUC is developing a new Zero-Degree Calorimeter; a hadronic calorimeter located at zero-degrees from the collision axis. It consists of alternating layers of tungsten and oil; passive and active layers, respectively. The passive layers cause intense showers of secondary particles. These particles then produce Cherenkov radiation in the active layer. The oil in the active layer is replaced at a constant rate allowing for very high radiation doses in the detector without deteriorating the radiator material. The active layer includes wavelength shifters that absorb and re-emit isotropically the Cherenkov radiation. In this way, some of the photons arrive at two, hollow quartz rods which are filled by a second stage wavelength shifter. Here the light is absorbed and re-directed to a Silicon Photomultiplier for detection. In this paper, the impact of ionizing radiation on quartz rods will be discussed and the results from attenuation measurements will be presented.

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