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A Characterisation and Reconstruction of Radial Strip Sensors in Preparation for a Higher Radiation Environment in the ATLAS Detector at CERN

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The upgrade of the Large Hadron Collider (LHC) to the high luminosity LHC (HL-LHC) will result in far more collisions occurring per particle bunch crossing, in turn producing more particles per second. Consequently, the current detectors will need to be upgraded to accommodate for the large increase in radiation and data acquisition as well as a need to improve the tracking efficiency for the increased occupancy environment. One of the main upgrades to the ATLAS detector is the complete overhaul of the inner detector (ID) by replacing it with an all silicon Inner Tracker (ITk). A simulation of the ITk will also be required for performance simulations as well as for testing sample sensors in testbeams. The current testbeam simulation and reconstruction software are written completely using Cartesian definitions. However, some of the geometries in the ITk have radial definitions. In particular, the geometry of the R0 sensor in the strip end-cap is in need of a radial description. Presented is the work behind characterising a radial geometry for the R0 sensor in these testbeam software. The simulated data was reconstructed and analysed with post-reconstruction software and then compared to the reconstructed and analysed data from the EUDET testbeam telescope at DESY, Hamburg.

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