11th International "Hiroshima" Symposium on the Development and Application of Semiconductor Tracking Detectors (HSTD11) in conjunction with 2nd Workshop on SOI Pixel Detectors (SOIPIX2017) at OIST, Okinawa, Japan

Contribution ID: **76** Type: **ORAL**

Measurement of charge collection in irradiated miniature sensors for the upgrade of ATLAS Phase-II Strip tracker

Tuesday 12 December 2017 17:10 (20 minutes)

Miniature sensors with outer dimension of 10 mm x 10 mm have been produced together with full size sensors for the innermost ring (R0) of the end-cap part in the upgraded ATLAS inner tracker (ITk). AC and DC coupled n-type strips with three different pitches (wide, default and narrow) were processed on high resistivity p-type FZ silicon substrates by Hamamatsu Photonics. Miniature sensors were irradiated with 70 MeV protons at CYRIC at Tohoku University (Japan) and reactor neutrons at Jožef Stefan Institute (Slovenia) to three different 1 MeV neutron equivalent fluences: 0.5, 1 and 2 x 1015 neqcm-2. The upper fluence range exceeds the highest anticipated in the inner-most part of the ATLAS ITk-Strips over the HL-LHC lifetime (˜1.5 x 1015 neqcm2). Charge collection in test sensors has been evaluated systematically using 90Sr β-source and Alibava analogue readout system at reverse bias voltages up to 1000 V.

The presentation is on behalf of the ATLAS ITK Strip Sensor Collaboration.

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Session Classification: Session8

Track Classification: Strip sensors