Contribution ID: **21** Type: **Oral presentation**

R&D on detector components using 3D IC for LHC upgrades and other future detectors

Friday 16 May 2014 09:00 (30 minutes)

Three dimensional integrated circuit technologies offer the possibility of fabricating large area arrays of sensors integrated with complex electronics with minimal dead area, which makes them ideally suited for applications at the LHC upgraded detectors and other future detectors. We describe the ongoing R&D efforts to demonstrate functionality of components of such detectors. This includes testing of TSV technology, fabrication and testing of silicon or glass interposer structures to assemble arrays that integrate and match the pitch of large area sensors with arrays of readout integrated circuits, as well as the study of integrated 3D electronics with active edge sensors to produce “active tiles” which can be tested and assembled in to arrays of arbitrary size with high yield. The latter includes studies of possible post-processing to achieve active edges without the complexity of silicon-on-insulator sensor assemblies.

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