

3D Irradiation Results

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The unique structure of 3D silicon radiation sensors, featuring columnar electrodes penetrating all the way through the substrate, enables to decouple the active thickness from the electrode distance, offering important advantages in terms of low operation voltage, fast time response and radiation hardness.

In the past few years, very important progress has been made in the development of 3D sensors, passing from the earlier R&D phase with performance demonstration on a few prototypes (1997-2006) to more systematic studies (2007-2010) and finally to an industrialization phase (2011-2012), which led to the first production of 3D sensors to cover 25% of the forward and backward parts of the ATLAS Insertable B-Layer (IBL) staves.

A great deal of experimental work has been carried out within the ATLAS 3D Sensor Collaboration for the IBL qualification. 3D pixel sensors compatible with the new FE-I4 read-out and fabricated at CNM (Barcelona, Spain) and FBK (Trento, Italy) have been extensively characterized in laboratory and beam tests at CERN and DESY, demonstrating that they safely meet the IBL specifications.

Selected results will be presented at the conference, with emphasis on the performance of irradiated assemblies.