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Experience on 3D Silicon Sensors for ATLAS IBL

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To extend the physics reach of the Large Hadron Collider (LHC), upgrades to the accelerator are planned which will increase the peak luminosity by a factor 5-10. To cope with the increased occupancy and radiation damage, the ATLAS experiment plans to introduce an all-silicon inner tracker with the high luminosity upgrade (HL-LHC). The detector proximity to the interaction point will require new radiation hard technologies for both sensors and front end electronics. 3D silicon sensors, where plasma micromachining is used to etch deep narrow apertures in the silicon substrate to form electrodes of PIN junctions, represent possible solutions for inner layers.

Based on the gained experience with 3D silicon sensors for the ATLAS IBL project and the on-going developments on light materials, interconnectivity and cooling, we will discuss possible solutions to these requirements as well as

key design aspects and device fabrication plans.

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