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## Assembly and Testing of HGTD Modules

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With the High Luminosity LHC (HL-LHC) upgrade scheduled for 2029, the ATLAS experiment will face increased challenges from higher pile-up and radiation damage. To address this, the High Granularity Timing Detector (HGTD) will be installed in front of the ATLAS end-cap calorimeter, significantly enhancing vertex reconstruction through precise timing information. The HGTD will consist of around 8000 modules, with approximately 2000 being assembled at IJCLab in France. These modules are composed of LGAD sensors, ALTIROC read-out chips, and module flexes, integrated to ensure reliable performance under challenging conditions.

Through extensive R&D, various iterations of the modules have undergone rigorous testing, including electrical validation, verification with radioactive sources, and thermal cycling. These tests contributed to the finalization of the specifications for the preproduction phase. As we approach this critical stage, efforts at IJCLab are also focused on optimizing assembly techniques to improve production rates and ensure the timely delivery of the required modules. Given France's significant role in this international effort, these developments will contribute substantially to the overall success of the HGTD project.

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