

# The High-Granularity Timing Detector module flex design and simulation for the ATLAS Phase-II upgrade

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The High-Granularity Timing Detector(HGTD), based on low gain avalanche detector technology, is proposed for the ATLAS Phase-II upgrade. HGTD is proposed in front of the Liquid Argon end-cap calorimeters for pile-up mitigation and improve forward performance by combing high-precision time measurement and ITk (new ATLAS tracker) position information.

The basic component of the HGTD is the module. A detector module consists of a sensor bump-bonded to two readout chips which are in turn connected to a module flex and flex tail. Module flex is a kind of flexible PCB which need to transfer signals, ground, power and controls between module flex and bare module(sensor+2ASICs). The module flex needs to have good performance in order to meet the requirements of HGTD excellent time resolution (~30-50 ps/track) and multi-channel readout (450 channel/module).

IHEP fully undertakes the design and production task of HGTD module flex (~10000 module flex). Three kinds of module flex with different ground and power configuration are designed. At the same time, the power integration simulation of module flex was also done to ensure the performance of module flex at the simulation level.

## Summary

Module flex is very important for sensor(Low Gain Avalanche Detector, LGAD) signal transmission and peripheral electronic readout. In this poster, we will show the design of module flex (wire bonding, grounding option, PCB design) and the results of power integrity simulation.

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