

A Verified Thermo-Mechanical Prototype and Model for Integrated Local Supports in the ATLAS ITk Pixel Detector Upgrade

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The first integrated coupled-layer local/global support structure for ATLAS ITK Pixels is the I-beam design, originally conceived in 2010. It has proven mechanical stability and low mass. This I-beam prototype has now been modelled within Ansys and compared to measurements in a dry box under CO₂ cooling at CERN. It shows that in many cases the Thermal Figure of Merit specification can be met already with the existing design, but that for the most stringent cases, special attention must be paid to the interfaces between facesheets and carbon foam, and between carbon foam and titanium pipe. Using graphite loaded adhesives developed under an LBNL research program last year, it should be possible to meet all Thermal Requirements of the ITK Pixel Detector with this simple, single-assembly design.

Summary

Presenter: HARTMAN, Neal David (Lawrence Berkeley National Lab. (US))