Contribution ID: **3** Type: **Parallel session talk**

Evidence for mitigated thermal stress with interposers in extended thermocycling of ATLAS ITk strip modules

Wednesday 8 October 2025 11:00 (20 minutes)

The ATLAS Inner Tracker (ITk) project saw unexpected sensor fracturing when thermocycling strip modules during pre-production. This critical mechanical failure delayed production worldwide, motivating an innovative test-to-destruction study for diagnosis. Five pre-production modules are thermocycled at progressively wider temperatures, raising sensor bow by 146 ± 27 μm after cycling between +40C and −35C. Thermal stress fractures four such modules after lowering to −44C. To solve this problem, interposers comprising Kapton and stress-mitigating silicone are prototyped onto three modules. Negligible sensor bow change of 1 ± 10 μm and no sensor fractures are observed after extended thermocyling. This significant reduction in sensor deformation provides evidence that interposers mitigate thermal stress. This reopens the path to production, while highlighting important lessons for future collider detector development. Based on recent paper: https://arxiv.org/abs/2507.12586

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Session Classification: RDC 3 Solid State Tracking

Track Classification: RDC 3 Solid State Tracking