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Electrical defects in co-cured bus tapes and quality control strategies

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Bus tapes are flexible solutions for powering and extracting data from compact detectors such as silicon trackers. A common strategy for assembling the bus tape is to co-cure it over carbon fiber facings that serve as tracker modules' support. The process of co-curing can introduce defects in the bus tape due to different thermal expansion between the tape material and the carbon fiber. These defects can prevent the proper operation of modules and, due to the integration of the bus tape in the CFRP core structure, would necessitate a complete replacement of a fully loaded tracker support. As such, it is important to understand these failure modes and to develop strategies to identify them in early stages of the tracker assembly.

In this talk we will discuss the failures observed in the co-cured bus tapes that will be used in the future ATLAS ITk Strips detector as well as the strategies for quality control being pursued. The large surface area of the bus tapes that will be used in this strip detector prevents manual inspection. We describe the design of a fully automated system for visual and electrical inspections of bus tapes. The techniques developed can be used for quality control of general high-density bus tapes of detectors that use similar strategy for data extraction.

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