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## Mechanics and Construction of the LHCb Upstream Tracker Detector

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The LHCb Detector will undergo an upgrade during the current LHC shutdown. The Upgrade Tracker (UT) is a silicon strip tracking detector being constructed as part of this upgrade. The UT will provide a fast momentum measurement for the trigger as well as function as part of the overall tracking system where it will severely reduce the presence of “ghost” tracks.

The UT Tracker consists of  $\sim 1000$   $\sim 10 \times 10$  cm<sup>2</sup> silicon strip sensors, with custom ASIC readout chips (SALT) arranged as modules containing flex hybrid circuits and ceramic substrates. These modules are to be mounted on staves, which are lightweight CFRP and foam sandwich structure supports having integrated CO<sub>2</sub> cooling. The cooling tube follows a snake-shaped routing which allows the tube to run under all ASICs and provide efficient cooling.

The design details of the UT Tracker staves and modules will be presented, as well as construction procedures and plans. Construction is now underway and is proceeding in four phases. Bare staff construction has been completed. Attachment of data flex cables, module construction and module mounting are ongoing. Precision mechanics is used for all phases of construction, through means of custom fixturing and optical QA feedback. Techniques and useful metrics for the construction processes will be presented. These include machining methods, tube bending procedure, fixture design, assembly techniques, handling of critical surfaces, role of reference datum, tolerance geometry, epoxy application, repair strategies, etc. Issues that arose during construction and solutions implemented will be detailed.

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