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The Upstream Tracker for the LHCb Upgrade

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The LHCb experiment is a forward spectrometer at the Large Hadron Collider designed to study the decays of beauty and charm hadrons. During the data taking phase recently concluded, it produced a vast array of data, in flavour physics and in additional physics topics that take advantage of the forward acceptance of the LHCb experiment. In the current LHC's second long shutdown, a major upgrade of the LHCb detector is being installed and commissioned. The upgraded detector will take data at higher luminosity and will implement a flexible software trigger that requires all the detector components to push out their information at 40 MHz. The Upstream Tracker is a new silicon strip detector placed upstream of the LHCb bending magnet. It is composed of four planes of silicon microstrip detectors mounted on both sides of vertical structures called staves, providing mechanical support and CO_2 evaporative cooling. Four different silicon sensor designs are used to handle the varying occupancy over the detector acceptance. The innermost sensors are shaped to optimize the acceptance near the beam pipe, reaching an inner radius 3.5 cm away from the beam axis. A novel embedded pitch adapter design allows direct wire bonding of the sensor strips to front end electronics input channels. A dedicated front-end ASIC, the SALT chip, provides pulse shaping with fast baseline restoration, digitization via 6-bit ADCs, and digital signal processing providing pedestal and common-mode noise subtraction as well as zero-suppression. Near detector electronics organizes the data transmission to the remote data acquisition system and regulated low-voltage power distribution. In this contribution, the performance of the individual detector components is reviewed, with particular emphasis to studies of the sensor-SALT hybrid modules, in test bench studies of modules and instrumented staves. Moreover system studies performed on pre-series staves will be discussed.

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