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Hybrid circuits and substrate technologies for the CMS Tracker upgrade

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The upgrade of the CMS tracker at the HL-LHC will require the design of new front-end modules. These tracker modules will embed new front-end flip-chip ASICs that will be bump bonded to high density substrates, and those will be directly wire bonded to the tracker sensors. The resulting hybrid circuits will concentrate the module data flow and feed an optical transmitter module (GBT) that will be located on an adjacent service board. To achieve this degree of integration, the hybrid circuits have to be designed in large formats using high density substrate technologies that are commonly used for integrated circuits packaging. The different technologies that have been identified will be presented with their respective merits and constraints. Different circuits arrangements will be proposed for the assembly of the module electronics, aiming for a cost effective and reliable manufacturability of the CMS tracker modules.

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