



Contribution ID: 41

Type: **not specified**

A hybrid module architecture for a prompt momentum discriminating tracker at HL-LHC

Thursday, May 3, 2012 3:00 PM (30 minutes)

The capability of performing quick recognition of particles with high transverse momentum (more than a few GeV/c) in the inner tracker is deemed essential to keep the CMS trigger rate at an acceptable level at a higher luminosity LHC ($L > 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$). We present an architecture for a novel tracking module based on a combination of a pixelated sensor with a short strip sensor that would offer such capability. The critical aspects of the design such as the projected power consumption, the resulting material budget, and the data flow model are discussed and estimates are given. It is also shown that a manufacturable module of this type is well within the capabilities of currently available microelectronic and packaging-assembly technologies.

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Session Classification: Application of intelligent detectors / Coupled sensors and monolithic architectures

Track Classification: Coupled sensors and monolithic architectures