

Fast Front-End Electronics for Semiconductor Tracking Detectors: Trends and Perspectives

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Deep submicron CMOS technologies of the 130 nm generation are now the baseline choice to implement front-end electronics for tracking detectors, while the R&D in the 65 nm node is starting. In such technologies, new analogue to digital converters achieving 8-10 bit resolution, 50-100 MHz sampling frequency and 1mW of power have been demonstrated both by the industry and in the academia. This makes it possible to design front-end ASICs in which a prompt digitization of the amplifier output is followed by digital signal processing within the tight power budget allowable in high granularity tracking systems. At the same time, the interest is growing around tracking detectors embedding also high resolution timing capabilities. These applications require high performance discriminators and low power Time to Digital Converters. In the presentation, the developments in these areas will be discussed, emphasizing in particular the challenges and perspectives of high resolution timing systems.

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