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Analytic expressions for time resolution of silicon pixel sensors

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Silicon sensors with high precision timing are used in present experiments, like the NA62 Gigatracker, or planned to be used for the LHC PhaseII upgrade, like the LGAD development. Trackers with 10um position and 10ps time resolution are quoted as a long term goal for these developments. This report will discuss analytic expressions for the time resolution of silicon sensors, with focus on the key contributions to the time resolution, namely Landau fluctuations, noise and variations of the weighting field. The impact of amplifier bandwidth is discussed as well.

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