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## Design of 3D silicon sensors for high resolution time measurements

In future high luminosity LHC experiments, planned over the next 10 years, the number of collisions per unit of time is expected to increase by more than a factor of 2. The new experimental conditions require new detector systems with increased performances compared to the current state of the art. In this context, spatial and especially time resolution play an increasingly important role. The TIMESPOT project, an INFN financed initiative, is focused in the development of a time and space (4D) tracking detector based on a silicon and diamond sensor with a requested resolution around  $50\ \mu\text{m}$  in space and better than  $50\ \text{ps}$  in time. The 3D sensor technology has been chosen for the pixel technology.

In order to optimize the timing response of the single pixel sensor, different geometry solutions have been explored and simulated. The one with the best electric field performance in terms of coverage and amplitude was selected for further investigations. The behavior of the sensor when crossed by a high energy particle was also simulated and the output signal was collected in order to have first timing information regarding the charge collection time. Simulations were performed using Sentaurus Technology CAD with Geant4 support for a better energy deposit and modelling of the particle track.

Results concerning sensor response will be illustrated.

**Primary author:** LOI, Angelo (INFN - National Institute for Nuclear Physics)

**Presenter:** LOI, Angelo (INFN - National Institute for Nuclear Physics)