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## The operation and performance of Current Injected Detector (CID)

Radiation hardness up to  $1 \times 10^{16} \text{ cm}^{-2}$  is required in the future HEP experiments. This is well beyond the radiation tolerance of even the most advanced semiconductor detectors fabricated by commonly adopted technologies. The Current Injected Detector (CID) is a concept where the current is limited by the space charge. The injected carriers will be trapped by the deep levels. This induces a stable electric field through the entire bulk regardless of the irradiation fluence the detector has been exposed. The steady state density of the trapped charge is defined by the balance between the trapping and emission rates of charge carriers (detrapping). Thus, the amount of charge injection needed for electric field stabilisation depends on the temperature. The threshold voltage of the space charge saturation ( $V_T$ ) is proportional to the irradiation fluence. The  $V_T$  increases with respect of irradiation fluence extending the range of operation voltage.

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