

# Simulations of Hadron Irradiation Effects for Si Sensors Using Effective Bulk Damage Model

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In order to address the expected radiation damage problems in the future generations of colliders, there have been constant efforts to understand the basic mechanism of radiation damage and its effects on the Si sensor properties. Extensive studies based on device measurements and performance simulations have been carried out. Despite these efforts, many interesting problem remain unsolved or sometime, are not tackled properly. For example, peculiar behavior of  $1/C^2$  curves for irradiated diodes have not been explained properly, the meaning of full depletion voltage can be given differently for different bulk damage model.

In the present work, device simulations have been carried out for n<sup>+</sup>-in-p and p<sup>+</sup>-in-n of sensors using effective bulk damage model. It has been shown that a coherent interpretation of various sensor properties like leakage current, full depletion voltage and charge collection efficiency simulations can be achieved. The absolute value of full depletion voltage can be very useful in extracting the information about electric fields inside the Si sensor. Further, it will be shown that observed donor removal and acceptor removal effects can be interpreted in terms of double junction effect.

**Author:** RANJEET, Ranjeet (University of Delhi (IN))

**Co-authors:** BHARDWAJ, Ashutosh (University of Delhi (IN)); Ms JAIN, Geetika (University of Delhi); Mr NEUGEBAUER, Hannes (CERN); RANJAN, Kirti (University of Delhi (IN)); MOLL, Michael (CERN)

**Presenter:** RANJEET, Ranjeet (University of Delhi (IN))

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