Contribution ID: **22** Type: **Standard (20 min including discussion)**

Signal formation in segmented Si planar detectors: TCAD simulated effect of SiO2 passivation layer

Wednesday 24 June 2015 11:40 (20 minutes)

Measurements have shown a reversal of the pulse polarity in the detector response to short-range charge injection
[V. Eremin et al., NIM A 500 (2003) & E. Verbitskaya et al., IEEE TNS 52 (2005) NO. 5]. Since the measured negative
signal is about 30–60% of the peak positive signal, the effect strongly reduces the CCE even in non-irradiated detectors.
For further investigation of the phenomenon the measurements have been reproduced by TCAD simulations. Similar to
the measurement, the simulation study was applied for the p-on-n strip detectors with each strip having a window
in the metallization covering the p+ implant allowing the generation of electron-hole pairs under the strip implant.
Red laser scans across the strips and the interstrip gap with varying laser diameters and Si-SiO2 interface charge
densities were carried out. The scans were repeated with an IR laser and for the n-on-p strip detectors. The simulation
results offer a further insight to the role of the oxide charge density in the signal formation. Also results of the dependence on the charge injection depth and sensor polarity will be presented.

Summary

The effect of SiO2 passivation layer to the signal formation in segmented Si p-on-n and n-on-p detectors was TCAD simulated by both red (670 nm) and infrared (1060 nm) laser injections.

Author: PELTOLA, Timo Hannu Tapani (Helsinki Institute of Physics (FI))

Co-authors: VERBITSKAYA, Elena (Ioffe Physical Technical Institute of Russian Academy of Scienc); HAERKOENEN, Jasu (Helsinki Institute of Physics (FI)); EREMIN, Vladimir (Ioffe Physical Technical Institute of Russian Academy of Scienc)

Presenter: PELTOLA, Timo Hannu Tapani (Helsinki Institute of Physics (FI))

Session Classification: Simulations