Contribution ID: **109** Type: **Poster**

Modeling of Radiation Damage Effects in Silicon Detectors at High Fluences HL LHC with Sentaurus TCAD

Thursday, 28 May 2015 09:22 (0 minutes)

In this work we propose the application of an enhanced radiation damage model based on the introduction of deep level traps / recombination centers suitable for device level numerical simulation of silicon detectors at very high fluences (e.g. 1÷2×10E16 1 MeV equivalent neutrons).
The model is based on a past modeling scheme featuring three levels with donor removal and slightly increased introduction rate which was successfully adopted for the optimization of the silicon detectors operating at LHC.
The new fluences expected at HL LHC impose new challenges and the extension of the model (valid up to 1×10E15 n/cm2) is not straightforward. New effects have to be taken into account (e.g. avalanche multiplications and deep-level capture cross section dependencies on electric field, temperature and fluences), at the same time keeping the solid physically based approach of the modeling (e.g. by using no fitting parameters). This will preserve the generality of the approach, allowing its application to the optimization of different kind of detectors.
We present the comparison between simulation results and experimental data for p-type substrate structures in different operating conditions (temperature and biasing voltages) for fluences up to 2.2×10E16 n/cm2. The good agreement between simulation findings and experimental measurements fosters the application of this modeling scheme to the optimization of the next silicon detectors to be used at HL LHC.

Primary author: PASSERI, Daniele (University and INFN Perugia)

Co-authors: MOROZZI, Arianna (University of Perugia); Dr MOSCATELLI, Francesco (CNR IMM Bologna); BILEI, Gian Mario (INFN Perugia)

Presenter: PASSERI, Daniele (University and INFN Perugia)

Session Classification: Solid State Detectors - Poster Session

Track Classification: S6 - Solid State Detectors