Contribution ID: **51** Type: **POSTER**

Modeling and Simulation of Radiation Effects on Si PIN Photodetectors Induced by Neutron Beams and γ Ionization Pulses

Saturday 26 September 2015 19:43 (1 minute)

A method is presented for modeling and simulation of radiation effects on Si PIN photodetectors irradiated by neutron beams and γ ionization pulses. To focus on the modeling and simulation process, the device model, radiation models, and solution methods are described in detail. The mechanism of dark current increase of the PIN photodetectors induced by neutron radiation is analyzed. The device physics modeling and neutron radiation modeling is established to simulate the dark current of the PIN photodetectors by the device simulator. The dark current increase versus 1-MeV-equivalent neutron fluence in the range from 1×10ˆ10 to 1×10ˆ14 cmˆ-2 is presented. The γ ionization pulse radiation model is established to simulate the photocurrent of Si PIN photodetectors with the dose rates ranging from 1 to 10ˆ9 Gy(Si)/s. The tendency of the simulation results is in agreement with the experimental results of correlative literatures.

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Session Classification: After dinner POSTER session, with drinks: (All presenters are requested/encouraged to attend their posters; All participants are requested to participate the session, with drinks!)

Track Classification: Radiation damage, Environmental radiation monitoring