11th ”Trento” Workshop on Advanced Silicon Radiation Detectors

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LPNHE

Book of Abstracts

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Investigation on the radiation resistance of HV-CMOS and pin diodes using a Transient Current Technique based on the Two-Photon-Absortion Process

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Transient Current Techniques (TCT) based on laser-induced photo-currents produced by Single Photon Absorption (SPA) processes have been extensively used during the last two decades as a powerful tool to study many of the properties relevant to operation of semiconductor detectors.

Very recently, an innovative Transient Current Technique was introduced where the free charge carriers are created in a Two-Photon-Absorption (TPA) process induced by a focused femto-second laser pulse with a wavelength of 1300nm. The fact that in a TPA process the absorption of the light depends on the square of the intensity of the light beam used for the current generation allows a localized TPA-induced electron-hole pair creation in a micrometric scale voxel centered on the laser

waist. As a consequence, this new technique opens the possibility to carry out a 3D mapping of the sensor's space-charge properties with micrometric resolution.

Due to its intrinsic spatial resolution, the TPA-TCT technique should be a very appropriate choice for the characterization of the alterations of the sensor's active (charge collecting) volume induced by radiation damage and especially for the case of partially depleted sensors as it is the case of the carrier collecting n-well implemented in HV-CMOS sensors.

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Low Gain Avalanche Detectors TCAD Radiation Damage Analysis

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Where we present our last results on radiation damage analysis of Low Gain Avalanche Detectors using the Synopsys TCAD suite and different well established radiation damage models. Our main conclusions point to this device could work reasonably well up to ~1e14 n_eq/cm2.

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Status of LGAD CNM fabrications

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