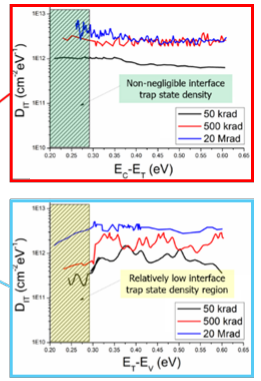
WG4 – INFN and University of Perugia

DRD3

- **Perugia Unit:**
  Tommaso Croci, Alessandro Fondacci, Arianna Morozzi, Francesco Moscatelli, Daniele Passeri
- **Expertise:**
  - Development of the combined surface and bulk "New University of Perugia" TCAD radiation damage modeling scheme for silicon detectors up to HL-LHC fluences.
  - Development of ad-hoc numerical models for device-/circuit-level simulation of solid-state detectors manufactured with innovative materials.
  - Development of robust TCAD simulation flows for planar, 3D and LGAD-based silicon sensors → performance optimization.
- **Research interests:**
  - Extension of the "New University of Perugia" TCAD radiation damage modeling scheme to extreme fluences.
  - Design, simulation and characterization of planar, 3D silicon sensors, (DC-)RSD LGADs and compensated LGADs.
  - Innovative materials modeling and characterization: diamond, SiC, a-Si:H.

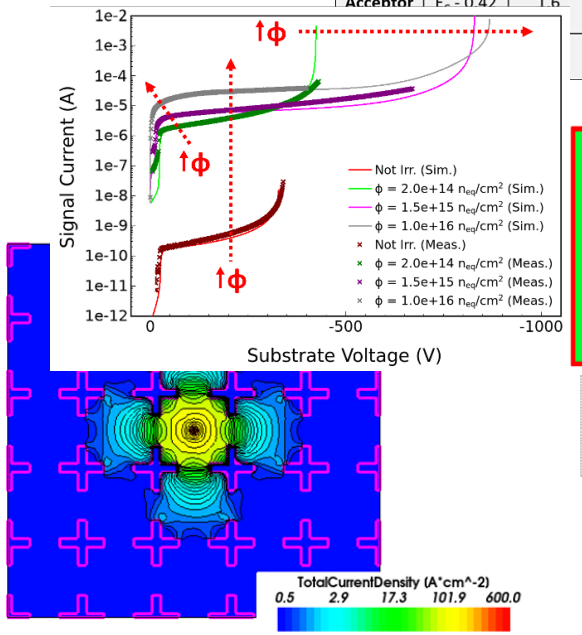
√ Surface damage (+ Q_{OX})

Type	Energy (eV)	Band width (eV)	Conc. (cm^{-2})
Acceptor	$E_C \le E_T \le E_C$-0.56	0.56	$D_{IT} = D_{IT}(\Phi)$
Donor	$E_V \le E_T \le E_V$+0.6	0.60	$D_{IT} = D_{IT}(\Phi)$

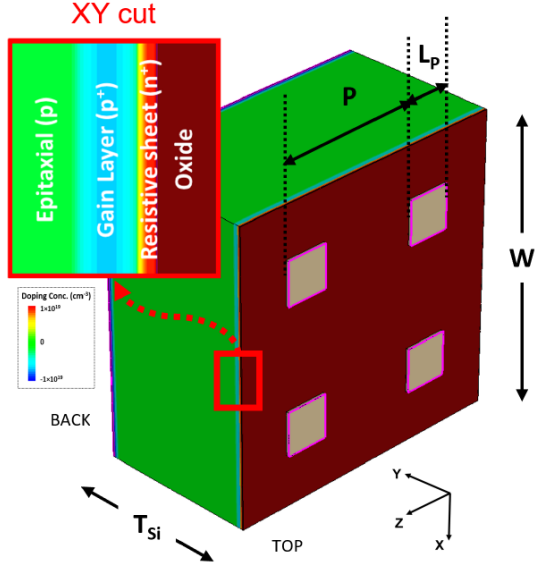


√ Bulk damage

Type	Energy (eV)	η (cm^{-1})	σ_n (cm^2)	σ_h (cm^2)
Donor	E_C - 0.23	0.006	2.3×10^{-14}	2.3×10^{-15}
Acceptor	E_V - 0.42	1.6	1×10^{-15}	1×10^{-14}
			7×10^{-14}	7×10^{-13}



XY cut



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- **Collaborations**
  - HEPHY of Vienna, CERN, INFN of Torino, UniTN, FBK of Trento.
- **Infrastructures and equipment**
  - Probe station (T-controlled down to -60C up to 200°C, CV, IV up to 1 kV).
  - DLTS system setup ongoing.
  - High-end computing infrastructure (3 dedicated WorkStations with ≥ 80 CPUs each)
- **Software**
  - Synopsys Sentaurus TCAD (device/circuit level simulations)
  - Synopsys Front End and Verification Suite (FEV) and Analogue Simulation & Modelling Suite (ASM)