

WP6

Introduction

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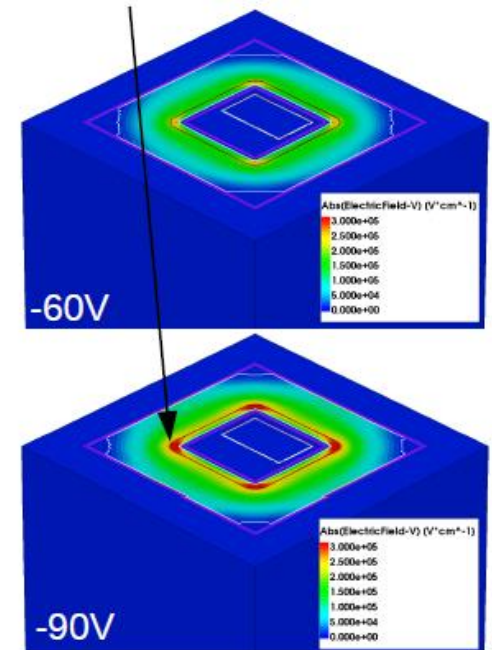
- WP Coordinators: Gianluigi Casse, Ivan Peric
- Goal: Exploration of an innovative tracking-detector technology based on active CMOS sensors
- Task 1: Scientific Coordination (KIT, UNILIV)
- Task 2: Simulation (CNRS-CPPM, UBONN, STFC-RAL, UNIGLA)
 - Perform TCAD process simulations and Geant4 simulations for test structures and sensor prototypes for different CMOS processes
 - Optimize sensor designs based on simulation results
 - Organise simulation workshops
- Task 3: Sensor Development (CEA, CNRS-CPPM, KIT, UBONN, STFC-RAL, UNIGLA, UNILIV)
 - Design test structures and sensors
 - Design pixel sensors matching different readout ASIC footprints (FEI4, RD53, CLIC)
 - Prepare designs for MPWR submissions exploring different foundries
 - Characterise test-structures and sensors using electrical measurements, lasers, sources and test beams
 - Perform irradiation campaigns to validate the radiation hardness of each process technology and sensor design
- Task 4: Hybridisation (INFN-GE, IFAE, UNILIV)
 - Perform basic R&D on capacitive interconnection
 - Setup production facilities for full-prototype assemblies (chips on test boards)
 - Deliver full assemblies to all participating projects
 - Investigate options for future industrialisation of the interconnection process

- **MS1: Simulation workshop on HV/HR-CMOS TCAD and Geant4 simulations. (M6)**
- MS2: Simulation tutorial on HV/HR-CMOS TCAD and Geant4 simulations. (M24)
- **MS3: MPWR submission. Design generic test structures for technology evaluations. Design HV/HR-CMOS active sensors matching the requirements of the target readout ASICs. (M12)**
- **MS4: First test beam campaign with initial sensor prototype assemblies. (M16)**
- MS5: First irradiation campaign with sensor prototype assemblies. (M16)
- MS6: First functional HV/HR-CMOS assembly with capacitive interconnection. (M16)

- D1: TCAD libraries (M40)
 - *Extract performance parameters (depletion depth, charge-collection efficiency, timing, etc.)*
- D2: Sensor-design guidelines (M46)
- D3: Performance characterisation results (M46)
 - *report on performance characterisation of test structures and sensors, including electrical, laser, source and test-beam measurements*
- D4: Radiation tolerance assessment
 - *report on measured radiation tolerance of optimised test structures and sensors*
- D5: Optimised interconnection process (M12->42)
 - ***Basic R&D with different adhesives, dispensing and curing methods on electrical test structures to achieve precise alignment, high and uniform capacitance and sufficient yield and reproducibility. Mechanical and electrical characterisation of the glued assemblies***
- D6: Assemblies delivered (M40)
 - Use the sensors produced in Task 6.3 (Sensor development) to produce assemblies of sensors and readout ASICs for all participating projects. Mount assemblies on test boards provided by the participating projects. Make wire-bond connections between chips and PCBs.
- D7: Recommendation for industrialisation (M46)
 - Investigate options for hybridisation of large-area assemblies. Adapt the interconnection technology for larger surface areas and make it suitable for mass production with high yield. Investigate wafer-to-wafer bonding options. Select industrial partners for initial tests.
- D8: Final report (M46)

- The two days workshop took place at the Centre de Physique des Particules de Marseille (CPPM), Marseille (FR) on the 12-13th of May 2016
- 18 talks in two days, 25 participant from 5 countries
- Various aspects covered by the workshop included introductions for putting the simulation activity in the context of LHC experiments and the role of Geant-4 simulations
- Followed by the introduction of device simulations using TCAD tools, comparison with measurements and hands-on sessions on TCAD simulation practice
- TCAD simulations of sensors structures in AMSH18 and H35 as well as in LFoundry technologies have been presented

Type of activity	Thematic Workshop
Title	WP6 workshop on simulations
Date	12-13 May 2016
Place	Marseille (FR)
Type of audience	Scientific community, ESRs
Size of audience	25
Scope of the workshop	International
Link	https://indico.cern.ch/event/497449/
Partners involved	



Example: M. Buckland (Liverpool) Simulation of AMS H18 HVCMOS Pixel
Origin of breakdown detected -> new design submitted in February