

# WP6

*Paul and Sebastian*



- **WP Coordinators: Sebastian Grinstein, Paul Dervan**
- **Goal: Exploration of an innovative tracking-detector technology based on active CMOS sensors**
- **Task 1: Scientific Coordination (IFAE-Barcelona, 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
  - 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

- **Official mailing list of WP6 is: [AIDA-2020-WP6@cern.ch](mailto:AIDA-2020-WP6@cern.ch)**
  - **Link added to WP6 workspace :**
    - [https://espace.cern.ch/AIDA2020-intranet/WP6/\\_layouts/15/start.aspx#/SitePages/Home.aspxWP](https://espace.cern.ch/AIDA2020-intranet/WP6/_layouts/15/start.aspx#/SitePages/Home.aspxWP)
- **Please inform us if you are missing from the list.**
  - **At least one contact person should be there from each institute.**
  
- **Publication list to be updated (aware of some publications coming out), need to get input from groups**
- **No meetings since the Bologna Meeting (Summer Holidays).**
- **We will plan one soon.**

- MS7: Simulation workshop on HV/HR-CMOS TCAD and Geant4 simulations
  - [ACHIEVED](#)
- MS11: Multi Project Wafer Run (MPWR) submission
  - [ACHIEVED](#)
- MS26: First test beam campaign with initial sensor prototype assemblies
  - [ACHIEVED](#)
- MS27: First irradiation campaign with sensor prototype assemblies
  - [ACHIEVED](#)
- D6.5: Optimised interconnection process
  - [ACHIEVED](#)
- MS28: First functional HV/HR-CMOS assembly with capacitive interconnection
  - [ACHIEVED](#)
- MS48: Simulation tutorial on HV/HR-CMOS TCAD on Geant4 simulations
  - [ACHIEVED](#)

- **D6.1: TCAD libraries (M40) -- Achieved**
  - *Extract performance parameters (depletion depth, charge-collection efficiency, timing, etc.)*
- **D6.2: Sensor-design guidelines (M46) -- Achieved**
- **D6.3: Performance characterisation results (M58)**
  - *Report on performance characterisation of test structures and sensors, including electrical, laser, source and test-beam measurements*
- **D6.4: Radiation tolerance assessment (M58)**
  - *Report on measured radiation tolerance of optimised test structures and sensors*
- **D6.5: Optimised interconnection process (M42) – Delayed**
  - *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*
- **D6.6: Assemblies delivered (M40) – Achieved**
  - 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.
- **D6.7: Recommendation for industrialisation (M46) -- Next one. Should start preparing it now.**
  - 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.
- **D6.8: Final report (M58)**