

# Interconnection studies for monolithic silicon pixel detector modules using the MALTA CMOS pixel chip

Wednesday, 17 February 2021 11:20 (25 minutes)

The material budget in the innermost tracking layers is a critical parameter that strongly influences the impact parameter resolution especially for lower momentum particles. Monolithic silicon pixel detectors can be thinned to typical thicknesses of 100  $\mu\text{m}$  or less, thus providing the possibility to minimize the silicon contribution in the material budget. The MALTA monolithic silicon pixel sensor is a large area radiation hard monolithic CMOS sensor developed in the 0.18  $\mu\text{m}$  CMOS process. It provides the possibility to transfer data and power from chip to chip and first tests using ultrasonic Al-wedge wire bonding have validated this concept to build multi-chip modules. Several interconnection technologies are being studied to provide high quality and mechanically robust direct chip-to-chip connections between different MALTA chips. Transferring data (GHz) and power from chip-to-chip will further contribute to designing a low mass and compact MALTA module. This presentation will present the studies and first findings as well as plans to build a large area module.

**Primary author:** RIEDLER, Petra (CERN)

**Co-authors:** ALLPORT, Philip Patrick (University of Birmingham (UK)); ASENSI TORTAJADA, Ignacio (Univ. of Valencia and CSIC (ES)); BORTOLETTO, Daniela (University of Oxford (GB)); BUTTAR, Craig (University of Glasgow (GB)); DAO, Valerio (CERN); DACHS, Florian (Vienna University of Technology (AT)); CARDELLA, Roberto (CERN); DOBRIJEVIC, Dominik (University of Zagreb (HR)); DYNDAL, Mateusz (AGH UST Krakow); FLORES SANZ DE ACEDO, Leyre (University of Glasgow (GB)); FREEMAN, Patrick Moriishi (University of Birmingham (GB)); GABRIELLI, Andrea (CERN); SHARMA, Abhishek (University of Oxford (GB)); SANDAKER, Heidi (University of Oslo (NO)); PERNEGGER, Heinz (CERN); VAN RIJNBACH, Milou (University of Oslo (NO)); SOLANS SANCHEZ, Carlos (CERN); SNOEYS, Walter (CERN); SULIGOJ, Tomislav (University of Zagreb); TORRES PAIS, Jose (Univ. of Valencia and CSIC (ES))

**Presenter:** RIEDLER, Petra (CERN)

**Session Classification:** Session 6: 3D Integration 2

**Track Classification:** 3D integration technologies in radiation and optical sensors