

Advanced UK Instrumentation Training 2022

Monday, April 25, 2022 - Friday, June 24, 2022

Scientific Program

The course programme currently reflects the interest/involvement of the UK silicon community, and is heavily focussed on semiconductor theory, simulation, experimental tools and applications.

Semiconductor theory

Band theory 1

Band theory 2

Layout, guard rings, device calculations 1

Layout, guard rings, device calculations 2

Interaction of particles with matter 1

Interaction of particles with matter 2

Ramo-shockley theory

Radiation damage 1

Radiation damage 2

Electronics and DAQ

General electronics, simple circuit calculations

Circuit theory, common topologies

Circuit design, noise and grounding

Amplifier designs (fast amplifiers, TDC)

Typical ASIC architectures

PCB layout

FPGA overview

Trigger + DAQ systems

Mechanics and cooling

Mechanical structures 1

Mechanical structures 2

Thermal management 1

Thermal management 2

CAD and technical drawing

FE analysis tools

CAD walkthrough

Silicon fabrication and structures

Silicon device fabrication 1

Silicon device fabrication 2

Silicon device fabrication 3

Silicon device fabrication 4

Device structures: planar and 3D sensors

Device structures: Gain layers (LGAD, SPAD, SiPM)

Device structures: Monolithic sensors

Transistor layout 250 - 28 nm, FinFETs

Experimental techniques

Lab techniques: IV, CV, source measurements, x-ray measurements 1

Lab techniques: IV, CV, source measurements, x-ray measurements 2

Transient current techniques

Solid state techniques: DLTS, TSC

Testbeams 1

Testbeams 2

Irradiation 1

Irradiation 2

TCAD electric field and transport simulations

TCAD introduction, getting started

SProcess planar sensor

SDevice planar sensor

SProcess 3D sensor

SDevice 3D sensor

SProcess monolithic sensor

SDevice monolithic sensor

Advanced features

Software tools

PCB design (kicad) 1

PCB design (kicad)2

SPICE - electronics simulations (LTspice) 1

SPICE - electronics simulations (LTspice) 2

Monte-Carlo simulations (allpix squared) 1

Monte-Carlo simulations (allpix squared) 2

Testbeam reconstruction (corrvreckan) 1

Testbeam reconstruction (corrvreckan) 2

Short topics

Photon science applications

Non-silicon semiconductors: Diamond

Non-silicon semiconductors: Diamond II

Other silicon devices: CCDs, Depfets, imaging sensors

Applications: Dosimetry, medical uses