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Oxford detector and mechanics R&D plans and facilities

Subtitle



OPMD Equipment and Facilities



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Current (and funded upcoming) OPMD facilities for detector R&D and prototype production. 160m² of class 10k and class 100 clean room with ESD protection with stabilised atmosphere.
Unique in UK marked in red

- Test equipment
 - 300mm Probe station and Keithley 4200 test system (-90C)
 - Laser TCT + 15ps laser + **Two Photon TCT system** (in progress) -25C testing capability
 - Fast Scopes (128Gs/s and 40Gs/s) 10 bit & Function Generator 12Ghz two channel
 - Radioactive Sources Sr90 (**1.4Gbg**) Fe55 + high flux X-ray machine (damage and gain measurements with fluorescent foils), Cool-X x-ray source
 - **Cryogenic vacuum (LN2) visible light flat field, spot and radiometry equipment & Archon CCD controller (LSST/Rubin, MAGIS & AION)**
 - **Thermal Air system (thermal cycling) -90 to 255C**
 - Material tester for pull, peel and shear (Dage 4000 plus)
 - Good relationship with Diamond Light Source for local photon testbeams
- Fabrication equipment
 - **Gantry robot**, Wire and **tab bonding**, Smartscope CNC500, Glue Robot for encapsulation, **Light weight fabrication experience for Mu3e** (current), plasma cleaning
 - **Laser Router for Al/Kapton flex fabrication** (planned)
- Access to advanced capabilities in other Oxford departments
 - DLTS, STM, AFM, Nanofabrication/National Thin film facility, advanced materials design & characterisation

Sensor R&D current and planned



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- Current and continuing projects
 - DMAPS in collaboration with CERN (AIDA)
 - LGADs for HGTD in collaboration with TE2V, RAL, Birmingham, & CEI
 - CCDs for LSST & SCMOS camera for AION & MAGIS
 - Timepix4 (Member of Medipix4 collaboration)
 - RD53 & RD50 Members
 - III-V semiconductors detectors, GaN
 - A2D2 low cost, large area silicon with ~ns fast timing based on commercial PCBs
- Simulations
 - Allpix2
 - Cold Atom imaging
 - TCAD
 - Analytic Amplifier simulation
- Future detector R&D Projects
 - Trench 3D detectors
 - 28nm RD53/CFI RAL
 - Monolithic LGADS
 - LGAD timing layer detector
 - Segmented LGADs with Timepix4 (close to VELO)
 - PIN photodiodes in collaboration with CEI
 - Perovskite & Organic Detectors
 - Future Detectors for Photon Science
 - Chromatic CCDs
 - Silicon Photonics

Mechanical R&D Current and Future



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- Current Projects / Capabilities
 - Mu3e – low mass supports Low mass Al/Kapton flex (with tab bonding)
 - Radiation damage and thermal studies
 - Low mass Carbon Fiber structure fabrication
 - AIDA structure characterization facility
- Facilities
 - 200 m² double height assembly semi-clean space
 - Autoclave for CF layup 1m by 600mm
 - Vibration shaker table (low intensity) 1.2m
 - Airflow cooling system
 - Climate chambers (room) up to 4m by 2m by 2m
 - FSI system 16 channels
 - V-Stars large area fast survey system (Static deformation measurements)
 - CF layup facilities and experienced design engineers and technicians
 - TRACI CO₂ cooling system + thermal camera system
 - Large area tape testing robot
- Future Projects
 - Development of In house low mass flex design and fabrication
 - In house Sintered Al additive manufacture (cooling structures)
 - Silicon Carbide foam low mass structures
 - CF structures with embedded services with layout optimized structure
 - Low mass supports for bent silicon
 - Development of possible large structures (8m long)
 - Advanced powering layouts and services