



*A member of the Russell Group of
UK research-led Universities*

Department of Physics

<https://www.liverpool.ac.uk/physics/>

Key areas of research:

Particle Physics

Condensed Matter Physics

Nuclear Physics

Accelerator Science

Also internationally renowned for work in applied fields
such as **semiconductor sensors, nuclear and
renewable energy.**

Proposal to the ePIC Collaboration Council for a new UK institute:

Marielle Chartier (Professor, Team leader)

John Dainton (Em. Professor, now Professor in Lancaster)

Tim Jones (LSDC Director)

Jian Liu (Postdoc Research associate)

Jaime Norman (Postdoc Research associate)

Undergraduate students, (Future) PhD students



Excellent Facilities/Infrastructure

Liverpool Semiconductor Detector Centre (LSDC)

- Large state-of-the-art **clean room complex** where semiconductor sensors/detectors can be assembled and/or tested.
- **R&D** for new detector technologies e.g. CMOS, HV-CMOS.
- Detectors built for the **ALICE, ATLAS and LHCb** experiments (and upgrades) at the LHC for instance.



Workshop

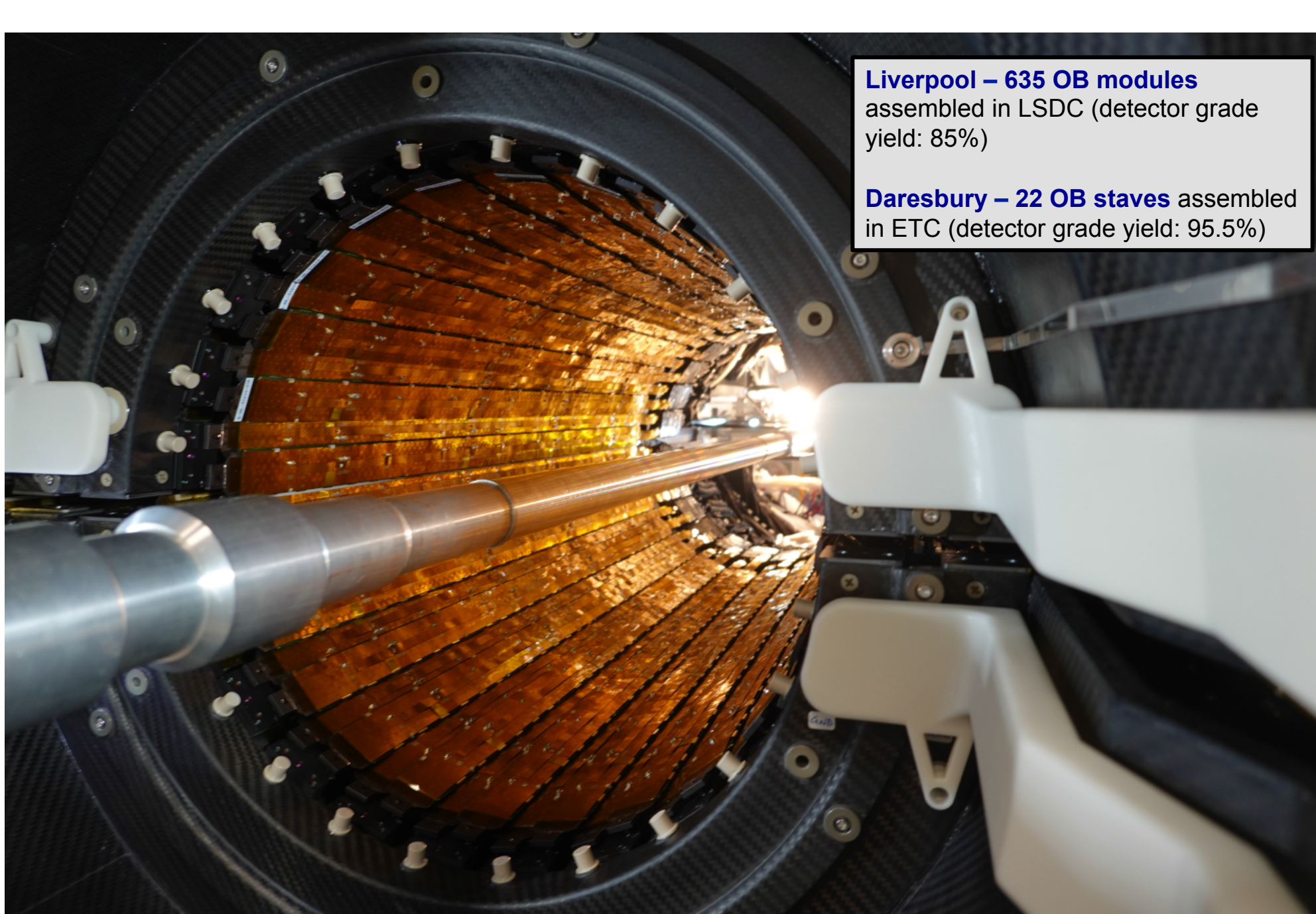
- First class mechanical workshop equipped with **state-of-the-art machinery** including wire-spark eroders, CNC milling, lathe machines and 3D printers.
- Substantial contributions to the build of many experiments by Liverpool Workshop.
- **Composites lab** for the construction of sophisticated high-precision components e.g. production of **carbon fibre support structures** for detector components.



Computing

Tier-2 Grid cluster with over 1000 cores and 800TB of high performance RAID storage, and a **Tier-3 cluster** for both interactive analysis and batch processing with dedicated 64-bit nodes and NVidia Tesla and Intel Xeon Phi GPGPU/Accelerators.



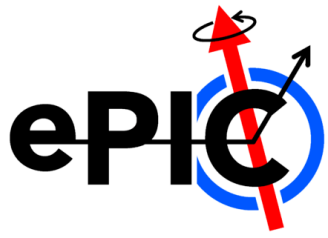


Liverpool – 635 OB modules
assembled in LSDC (detector grade
yield: 85%)

Daresbury – 22 OB staves assembled
in ETC (detector grade yield: 95.5%)

ITS2
Outer
Barrel
(Installed
March
2021)

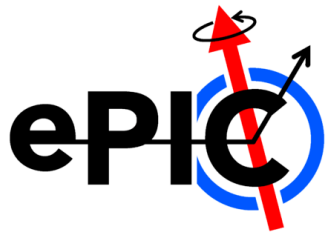




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- Group is member of the **eIC-UK Collaboration funded by UKRI/STFC for MAPS detector R&D** (Oct. 2021 – Sep. 2025) – Birmingham, Brunel, Daresbury Lab, Lancaster, Rutherford Appleton Lab + Oxford
- Imminent submission of full project proposal to UKRI Infrastructure Fund (peer-reviewed by STFC) – Liverpool is involved in UK effort for Central Silicon Tracker of the SVT
- Group has extensive experience with **hadron collider physics analyses (ALICE, LHC)** and in development, construction and operation of precision charged-particle tracking detector using **CMOS silicon technology (ALICE ITS2 and ITS3)**
- Group is active member of the ALICE Collaboration:
J. Liu – Data Preparation Group Quality Control Coordinator, previously ITS2 QC Coordinator and ITS2 System Run Coordinator (and Deputy)
J. Norman – Convener of inclusive jets and hard photons Physics Analysis Group, leadership in measurements of Λ_c charmed baryon production in pp, p-Pb and Pb-Pb collisions
M. Chartier – elected Chair of the Collaboration Board (2022-2025)



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- **Current contributions:**

- Testing and **characterisation of ITS3 MLR1 APTS-SF sensors in LSDC** since Oct. 2022 (with ^{55}Fe and ^{90}Sr)
- Contributing to **APTS beam tests at CERN** (PS, SPS) and data analysis
- Involvement of Liverpool undergraduate (and PhD) students

- **Planned contributions:**

- Recruitment of 1-2 Masters students for **detector physics performance simulations** (in both academic years 2023-24 and 2024-25)
- Securing (co-)funding for PhD student(s) on hardware **R&D, prototyping and/or construction**

Assuming UKRI funding awarded:

- **Sensor characterisation** (ITS3 and EIC) in LSDC and beam tests, data analysis
- Assembly and testing of **prototype and pre-production modules** in LSDC
- **QC/QA** of production modules in LSDC
- **Jet measurements** in 'cool nuclear matter'