



**Update on EIC
activities in the UK**

Daria Sokhan
University of Glasgow, Scotland

EIC Users Group Meeting
Paris, France — 25th July 2019

Current UK interest



UNIVERSITY OF
BIRMINGHAM



UNIVERSITY
of
GLASGOW



The Cockcroft Institute
of Accelerator Science and Technology



Science & Technology Facilities Council

Daresbury Laboratory



UNIVERSITY
of York



UNIVERSITY OF
DERBY



THE UNIVERSITY
of LIVERPOOL



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2016: First UK EIC workshop



Workshop on Physics & Engineering Opportunities at the Electron-Ion Collider 2016

[Home](#)

[Programme](#)

[Venue](#)

[Registration](#)

[Accommodation](#)

[Travel](#)

[Dinner and Whisky Tasting](#)

[Entertainment](#)

13 – 14 October 2016, Ross Priory on Loch Lomond, Scotland

Funded by STFC, IoP and University of Glasgow

<https://ukeicworkshop2016.wordpress.com>

First UK EIC meeting



University of Birmingham: silicon vertex & tracker

eRD18 - Precision Central Silicon Tracking for the EIC

P. Allport, L. Gonella, P. Jones, P. Newman, H. Wennlof

Awarded funding through the **EIC Detector R&D Programme (since 2017)**
& **STRONG2020 (2019-23)**

To develop a detailed concept for a central silicon vertex detector for a future EIC experiment, exploring the potential advantages of depleted MAPS (DMAPS) technologies

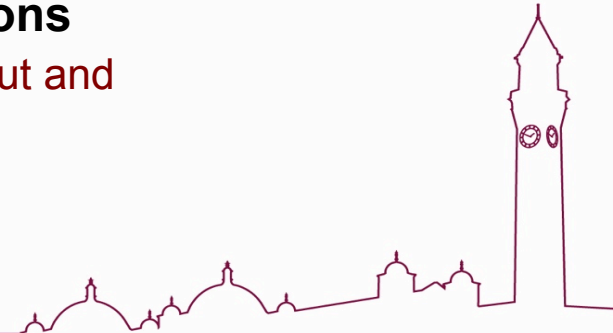
WP1: Sensor Development

Exploit on-going R&D in Birmingham into depleted MAPS to investigate potential solutions for the EIC

WP2: Silicon Detector Layout Investigations

Performance requirements: numbers of layers, layout and spatial resolution of the pixel hits

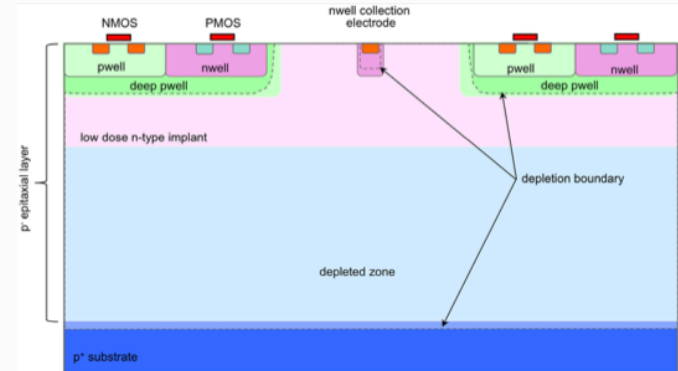
See talk by Håkan Wennlöf on Thursday morning



WP1: Sensor development

- Towards an EIC-specific DMAPS sensor
 - Aim for improved spatial resolution with ALPIDE
 - Smaller pixels ($20 \times 20 \mu\text{m}^2$)
 - Low mass detector layers ($< 0.3\% X/X_0$)
 - Consider readout requirements for the EIC
 - Integration time and time-stamping capability
- Current status
 - **Technology** identified: TowerJazz modified process
 - Defined preliminary **specifications** for EIC-specific DMAPS sensor
 - Ongoing EIC specific DMAPS **design study** in collaboration with RAL CMOS sensor design group
- Next step: design and production of a prototype EIC DMAPS sensor

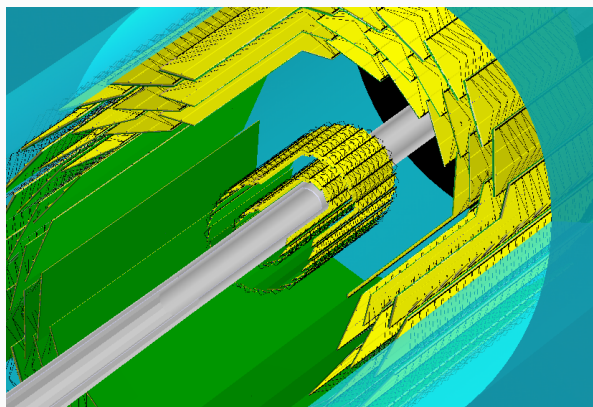
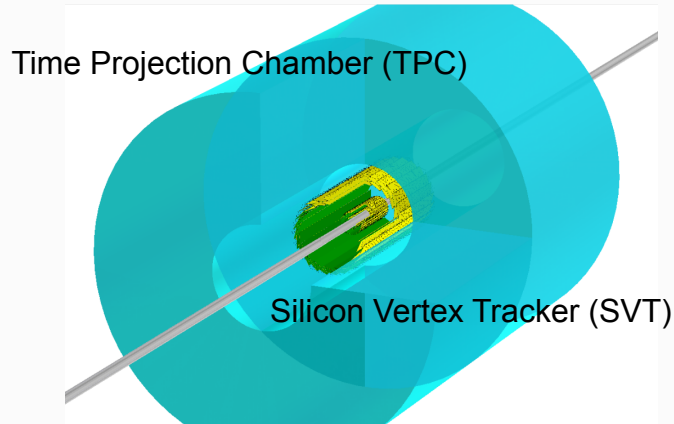
TJ 180 nm CMOS imaging process with modified cross section



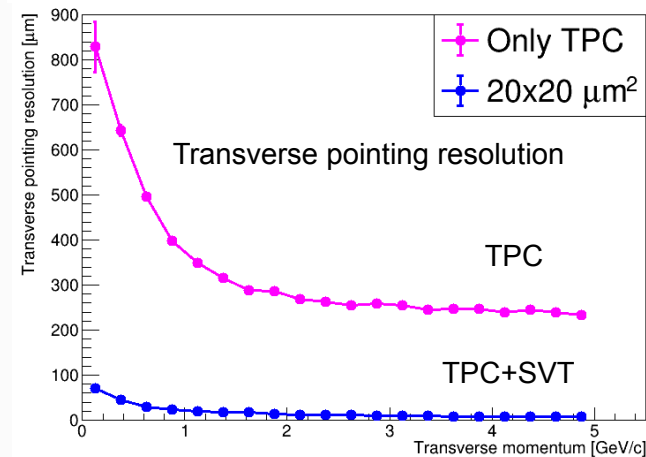
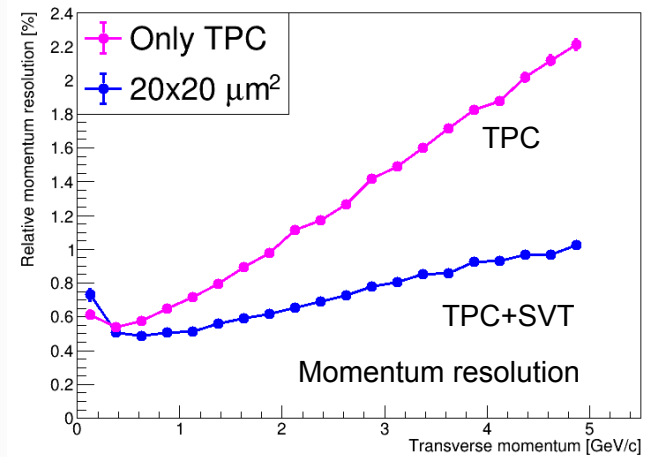
W. Snoeys et al, <http://dx.doi.org/10.1016/j.nima.2017.07.046>

WP2: Detector layout simulations

- Central tracker optimisation



- Baseline performance figures



STRONG-2020

JRA6 - Challenges for Next-Generation DIS Facilities:

Next-DIS

PIs:

Daria Sokhan (Glasgow, UK) and Francesco Bossu (CEA Saclay, France)

- * Monte Carlo simulations (Glasgow, post-doc)
 - * Depleted MAPS for tracking (Birmingham)
 - * Very low ion-back-flow detectors for high-flux TPC (CEA Saclay, post-doc)
 - * Photon detectors for particle identification using RICH (INFN Ferrara, postdoc)
- Glasgow post-doc to start before the end of this year (***search about to be opened***).
 - Birmingham DMAPS development already underway: STRONG-2020 funds for the design and TowerJazz manufacture of the sensor.

Accelerator Activities

Cockcroft Institute (ASTec) : Bruno Muratori, Peter Williams, John Dainton, 3 PhD students (started in 2018), ...

- * Active collaboration on CBETA with Cornell & BNL: non-scaling FFAGs and energy-recovery electron accelerator — prototype for electron transport in EIC. Synergies with UK-XFEL project.
- * Collaboration with JLab: addressing solenoid fringe-field effects: implications for hadron cooling.

Other interest

- * University of Derby: Lee Barnby, ...

Computational Techniques (machine learning, etc...), expertise from ALICE

- * Universities of Oxford and UCL: Amanda Cooper-Sarkar, Matthew Wing, ...

Large-x PDFs, development of physics case for the EIC, expertise from HERA...

- * University of Liverpool: Marielle Chartier, Roy Lemmon, ...

Tracking detectors, expertise from ALICE...

Summary

- * Keen interest in **accelerator R&D, detector R&D and physics case** development.
- * Externally-funded targeted activities underway / about to start: **detector R&D (Birmingham) and simulations (Glasgow)**.
- * Funded activities through synergies with other projects: **accelerator technologies (Cockcroft)**.
- * Synergies with ALICE and JLAB detector R&D.
- * Physics interest from hadron physics, heavy ion and HERA communities.
- * UK funding body interested and informed: EIC: one of the 52 priority projects in the **UKRI Developing a World Class Research Programme** initiative.
- * We hope to grow and establish formal support from our own funding bodies — CD0 would be a huge help!