The UK in ALICE at the CERN LHC

Birmingham, Liverpool, Derby, and Daresbury Lab

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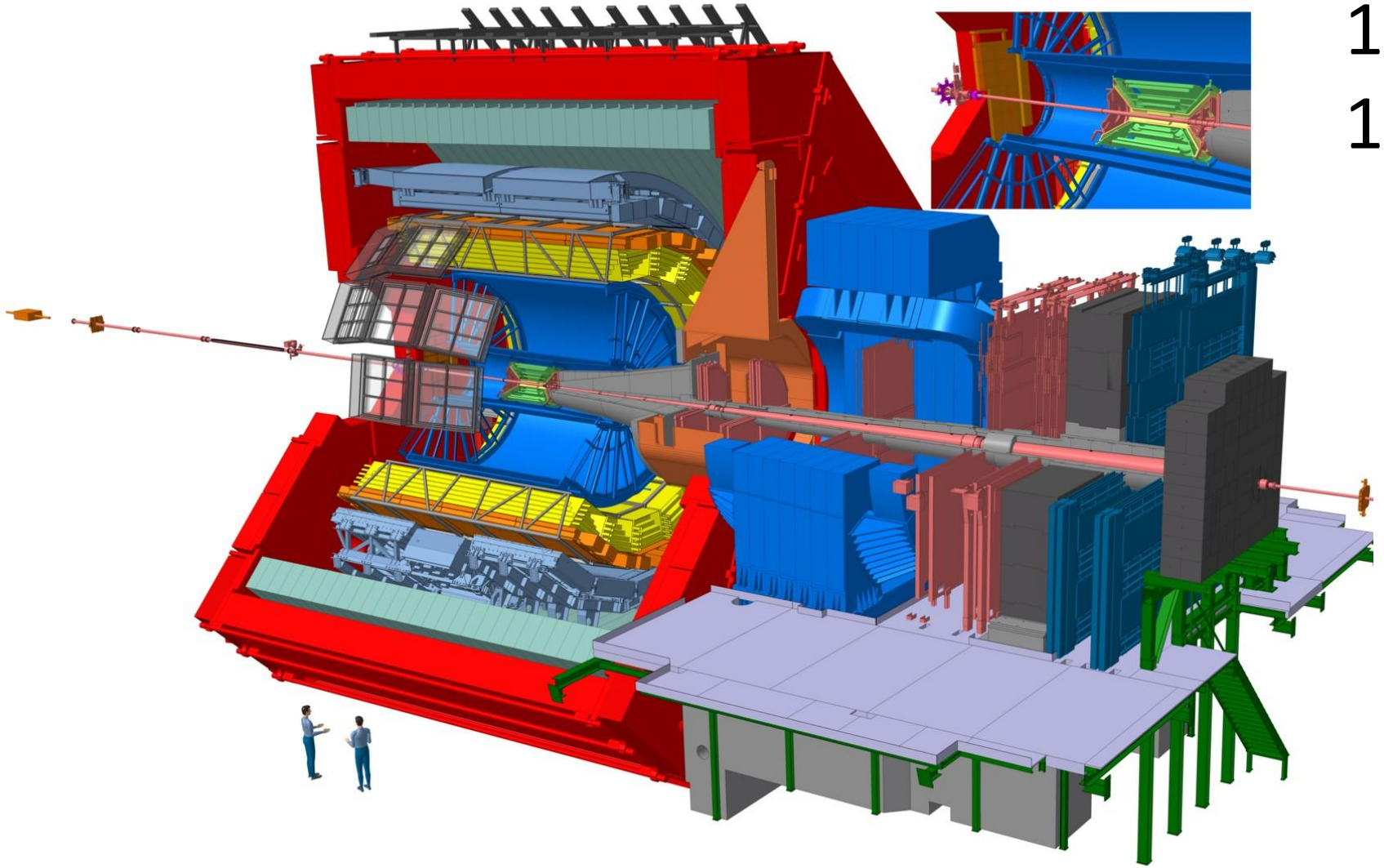
NP Community Meeting
Glasgow 6th – 7th July 2026

ALICE Physics

- **Study of Hot QCD**
- **Study strongly interacting matter at extreme energy densities over large volumes and long time-scales.**
- **Study the nature of quark confinement.**
- **Study the physics of the Quark-Gluon Plasma (QCD under extreme conditions).**
- **Exotics, light anti-nuclei, gluon saturation, etc.**

ALICE Detector

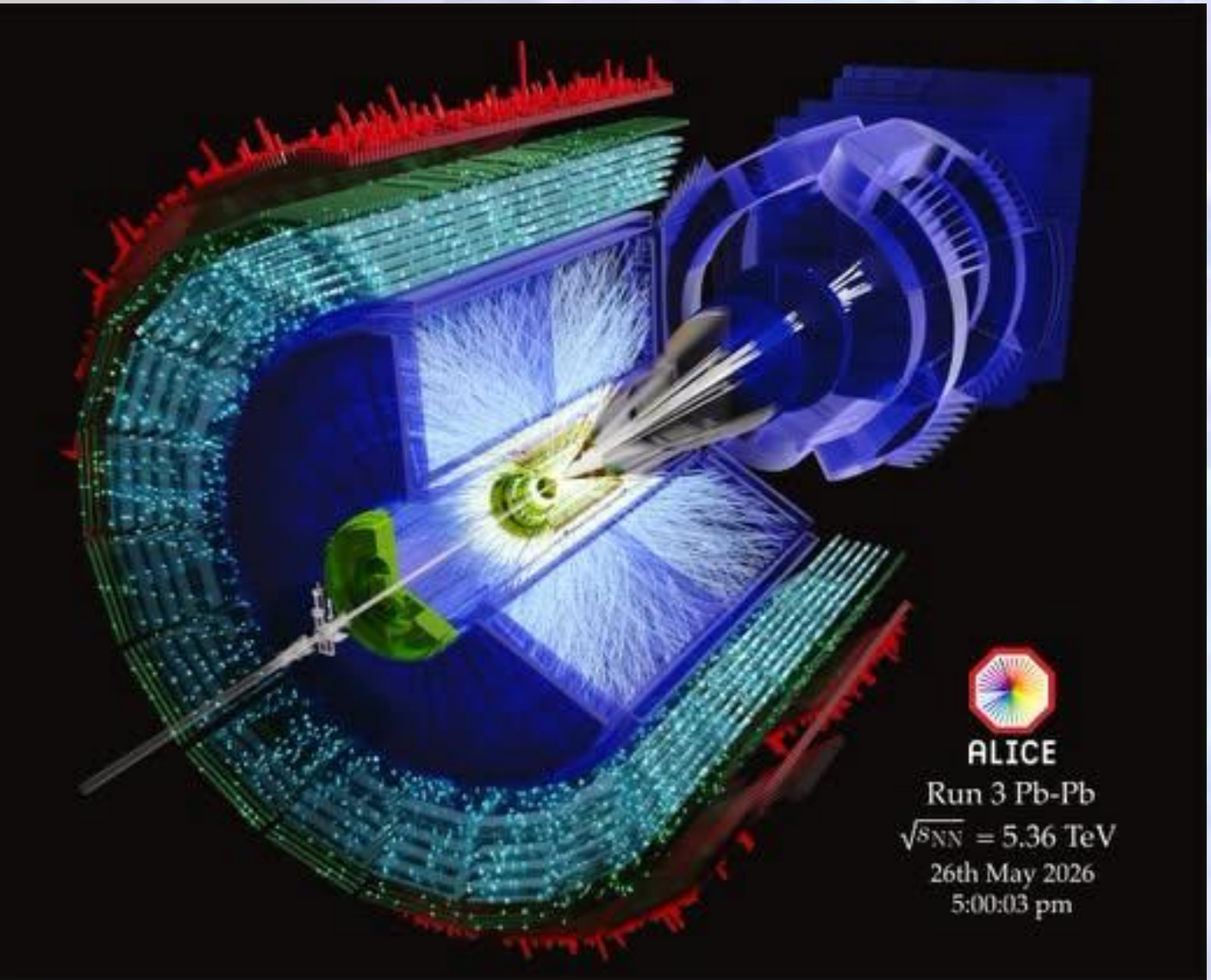


16 x 16 x 25 metre
10,000 tonne detector

UK responsible for:

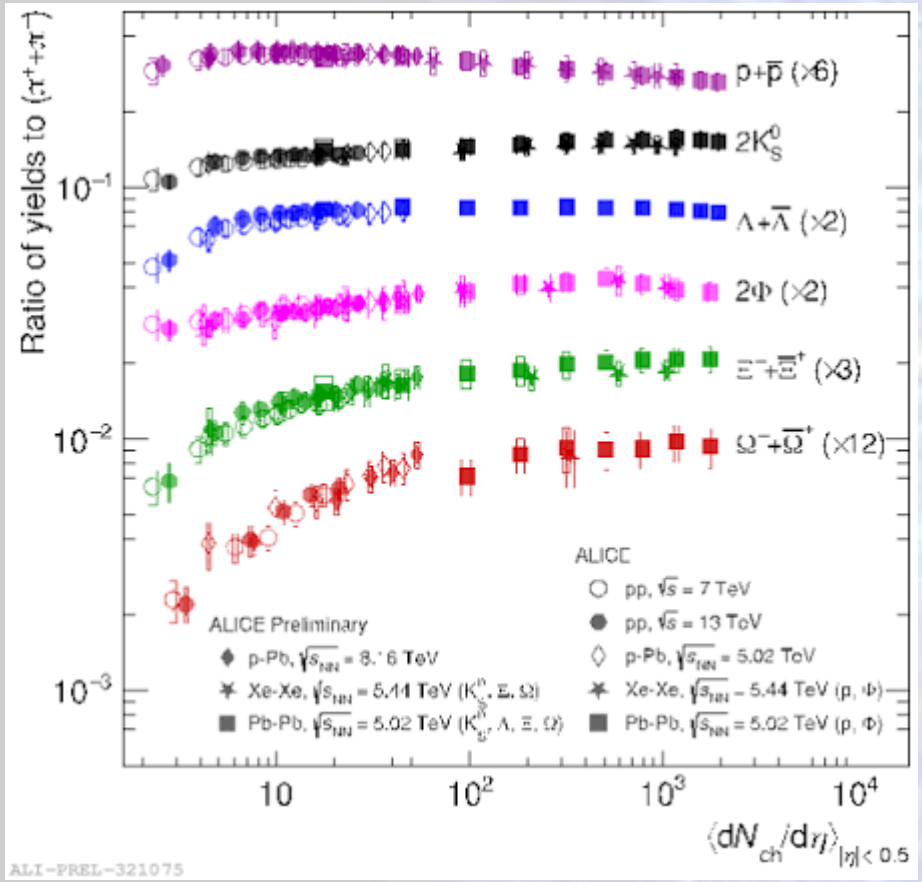
- The trigger system
- A Large part of the Si pixel Inner Tracking System
- Some of the software upgrades

Collision Systems



- Pb-Pb to create hot dense system and Quark-Gluon Plasma (QGP).
- p-p as baseline QCD but lots of physics in its own right.
- p-PB as baseline for nuclear effects
- Lighter ions to bridge the gap between Pb-Pb and p-p systems.

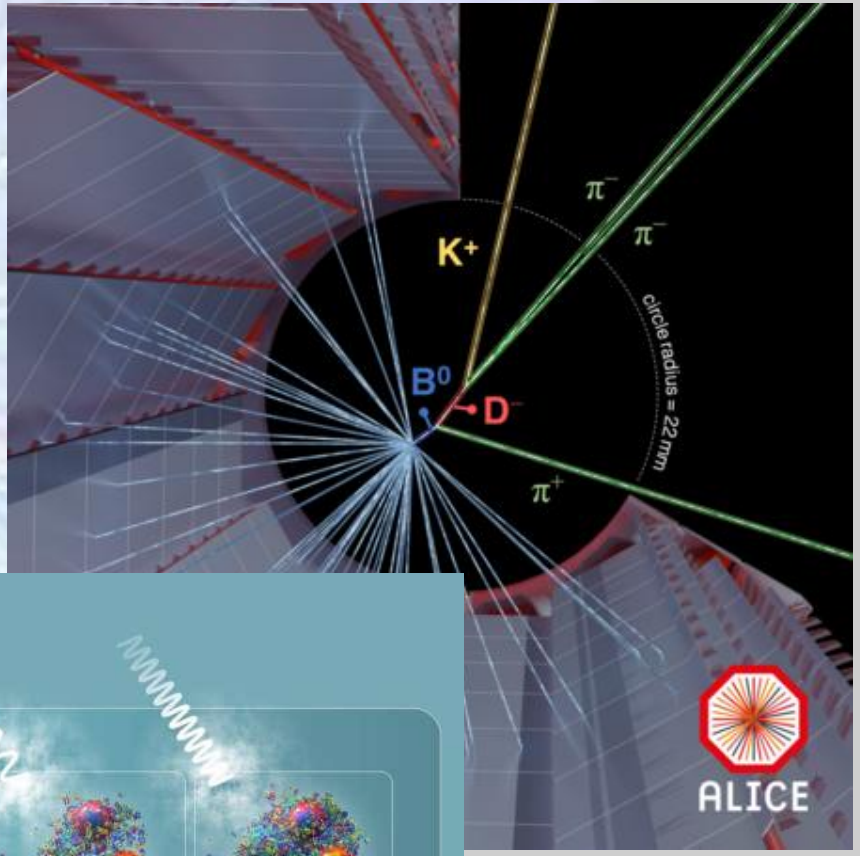
Sample of UK Physics Interests

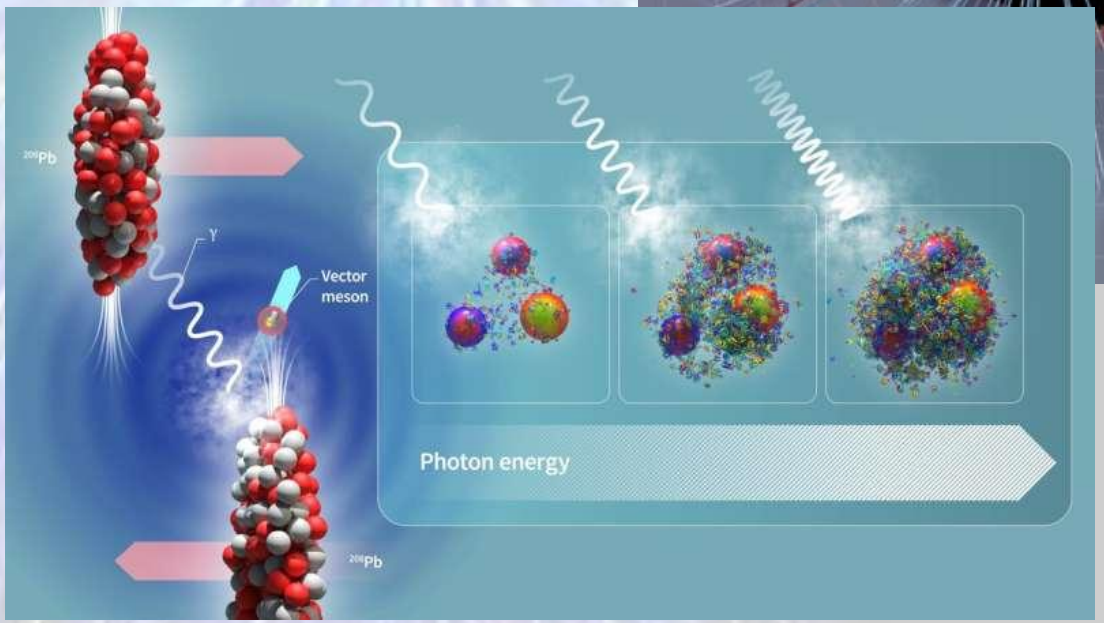


Strangeness production and QGP-like behaviour in small systems

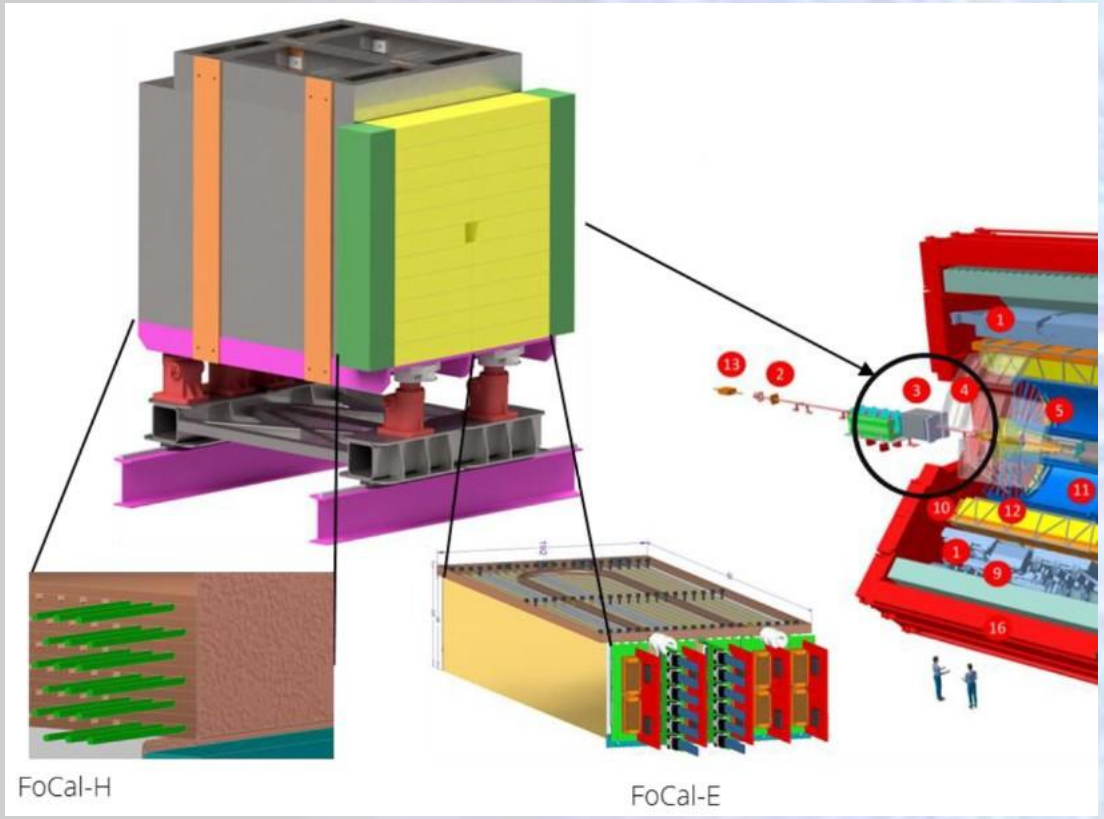
Heavy flavour: probably the best probe of the QGP.

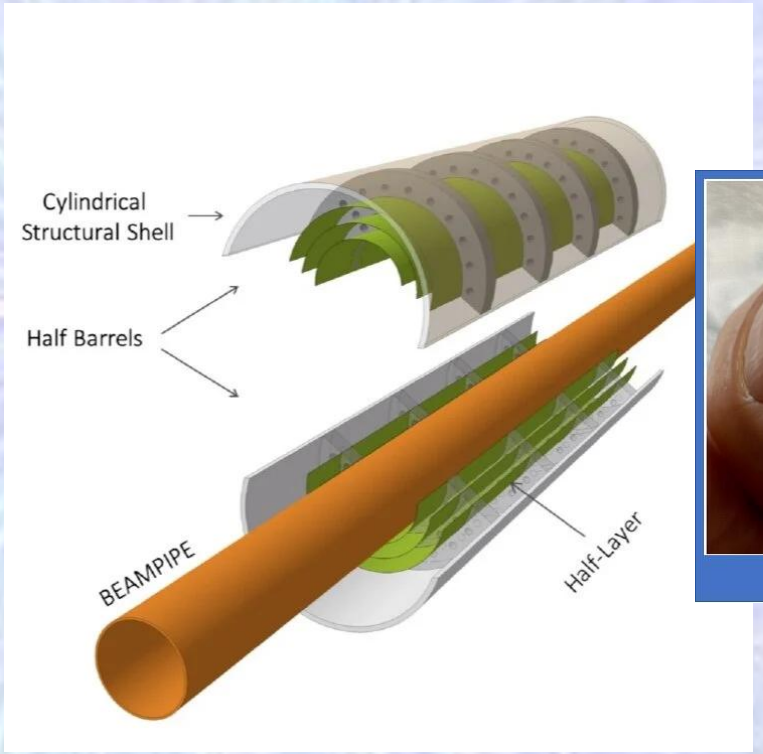
UPC – probing gluon saturation at low x

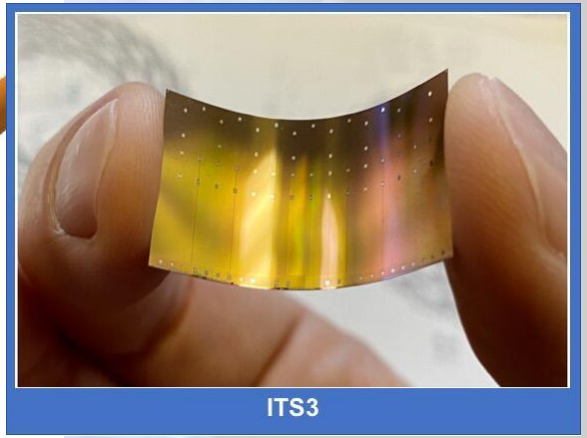




Near Future – Run 4 (from 2030)







FoCal - access to gluon densities in Pb down $x<10^{-5}$ and search for saturation regime of QCD

ITS3 – bendable Si MAPS pixel technology.
Superb vertexing for heavy flavour and rare decays

ALICE Summary

- UK ALICE group is making a large contribution to the experiment.
- Management level
  - Management Board
  - Technical Board
- Physics analysis
  - PAG convenors, Editorial Board, Collaboration Board
- Detector Level
  - Trigger Project Leader & large part of ITS detector
- 53 Billion Pb-Pb collisions in Run 3 – a new era of discovery.
- **Next Steps:** Preparing for upcoming installations, including the **Forward Calorimeter (FoCal) and all-silicon ITS3 trackers** for future LHC runs. Plus, a lot of data analysis.