ALICE 3 status and plans

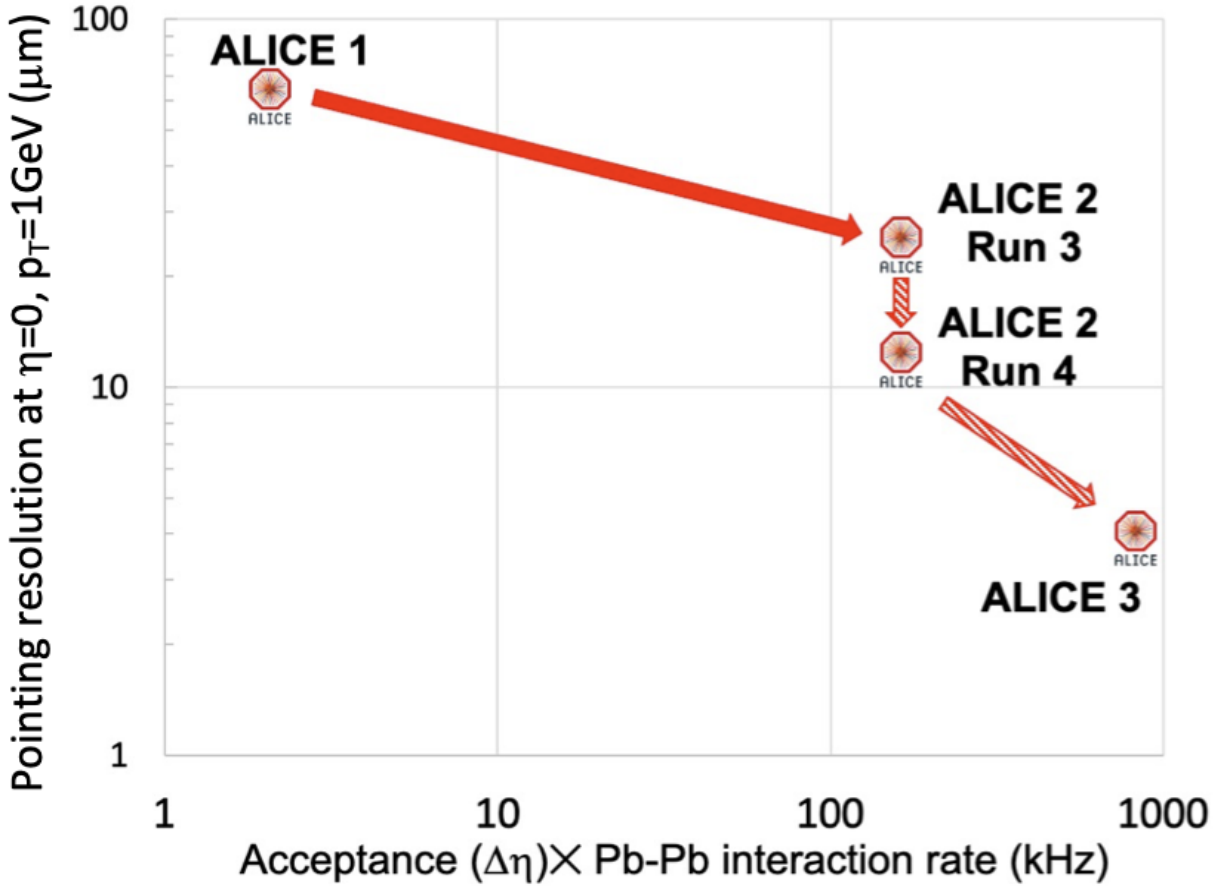
Birmingham, Liverpool, Derby, and Daresbury

David Evans, The University of Birmingham

6th-7th July 2026
NP Community Meeting, Glasgow

ALICE upgrades strategy

Large steps in pointing precision and "effective acceptance"



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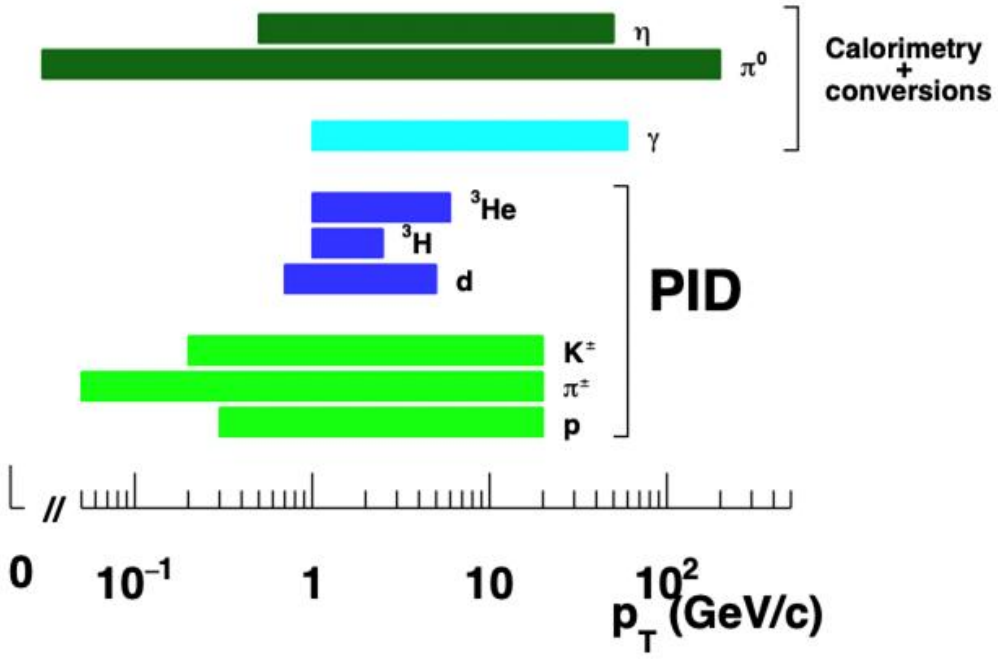
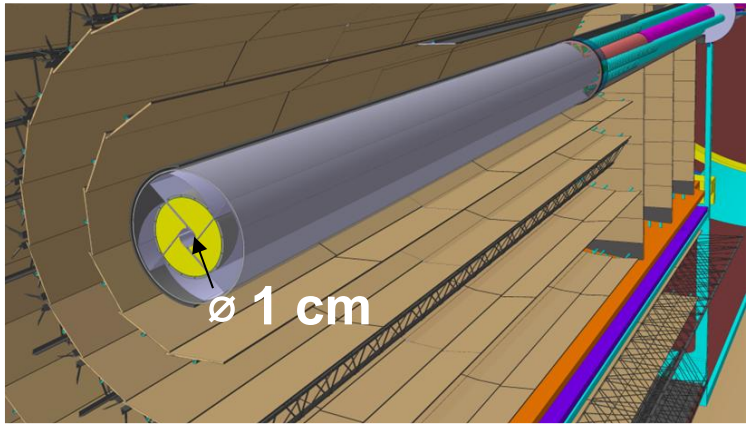
Keep/strengthen ALICE unique reach in particle identification

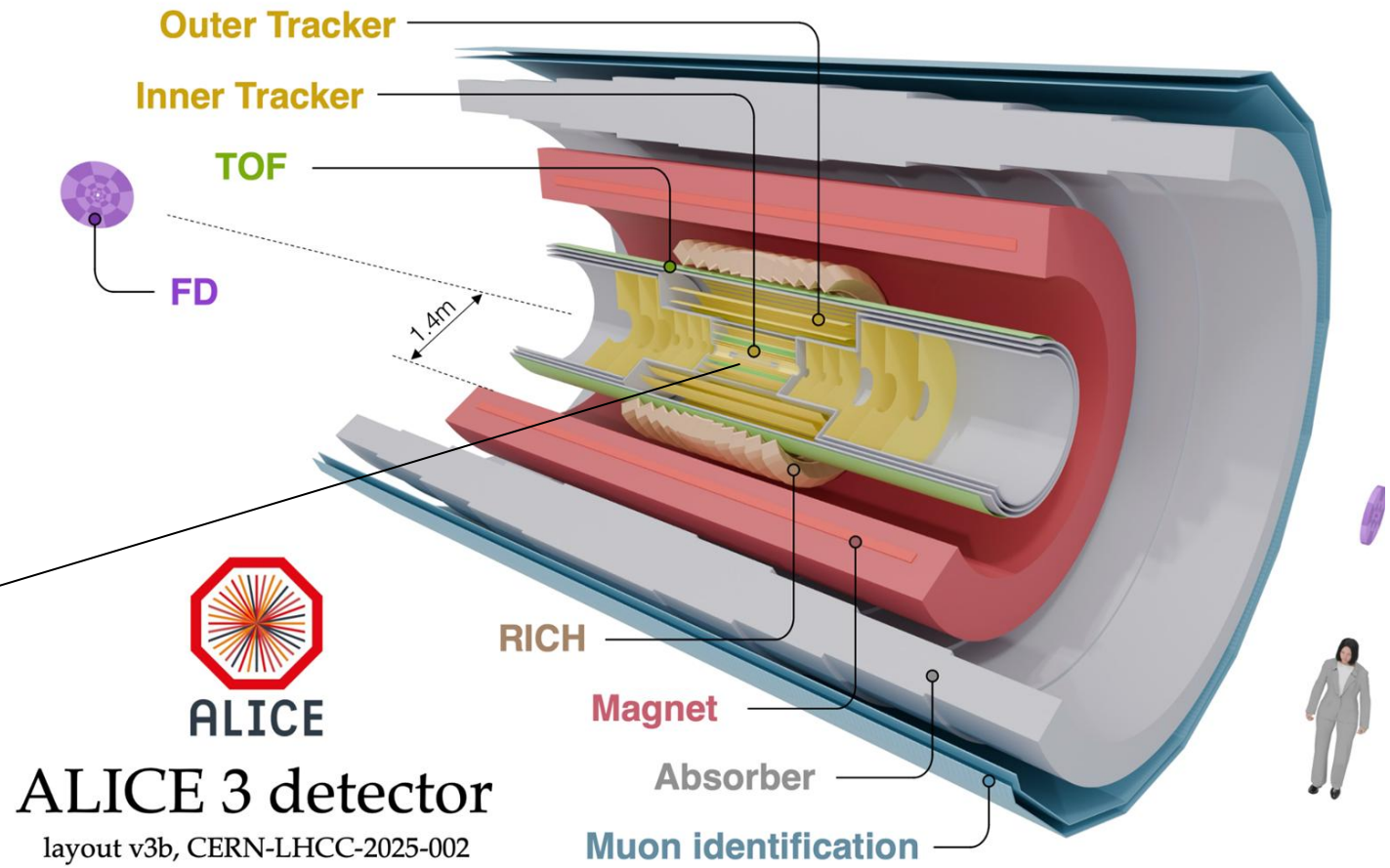


ALICE 3 detector

➡ **Novel and innovative detector concept**

- Compact and lightweight all-silicon tracker
- Retractable vertex detector (inner R = 0.5 cm)
- Extensive particle identification
- Large acceptance
- Superconducting magnet (2 T)
- Continuous read-out and online processing





CERN-LHCC-2022-009
CERN-LHCC-2025-002

Unique ALICE 3 physics goals

- **Access to temperature as function of time**
  - ➞ high-precision di-electron mass spectra, p_T dependence, elliptic flow
- **Understanding thermalisation in the QGP**
  - ➞ direct access to charm diffusion: D-Dbar azimuthal correlations
  - ➞ degree of thermalisation of beauty: high-precision beauty measurements
  - ➞ approach to chemical equilibrium: multi-charm hadrons
- **Fundamental aspects of the QCD phase transition**
  - ➞ net-baryon and net-charm fluctuations
  - ➞ mechanism of chiral symmetry restoration in the QGP: di-electron mass spectrum
- **Laboratory for hadron physics**
  - ➞ hadron-hadron interaction potentials
  - ➞ explore nature of exotic hadrons (tetraquarks)

Also summarised in Scoping Document (CERN-LHCC-2025-002 p9) and endorsed in LHCC report:

"**ALICE 3 is a unique detector at the LHC** in terms of having a low material budget, a few-micron pointing resolution, a large acceptance in eta, and hadron, electron and muon identification."

"The **LHCC recognises** that the different scoping options presented would enable a **compelling and unique heavy ion physics programme** in Run 5."

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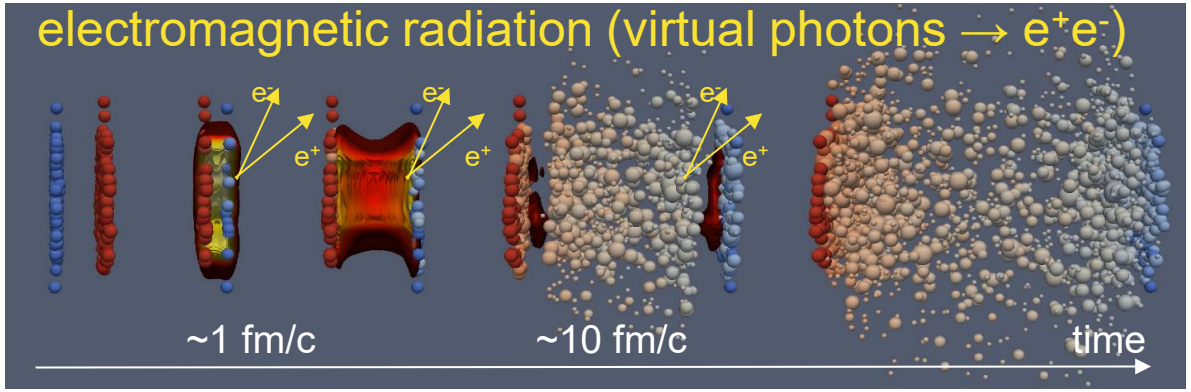
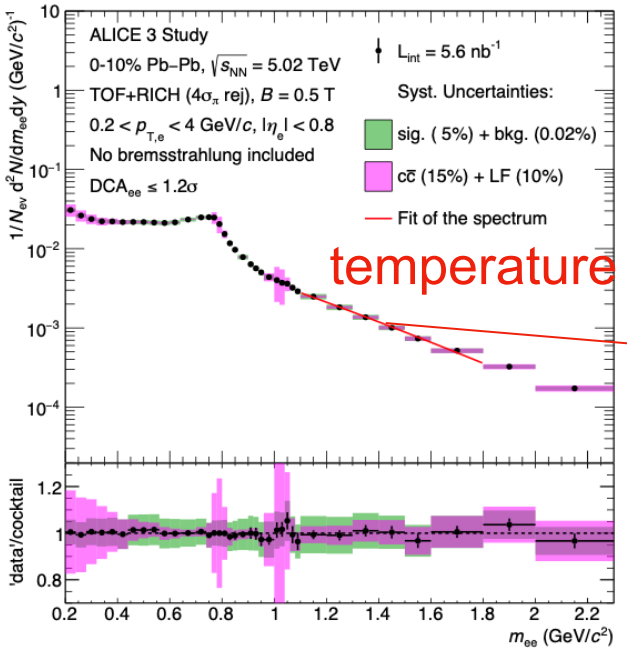
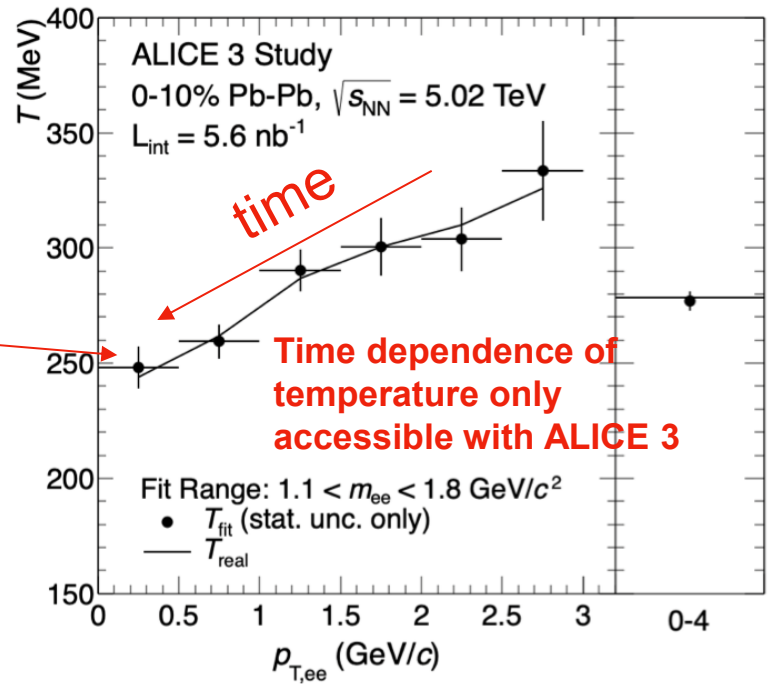


ALICE 3 LoI, CERN-LHCC-2022-009





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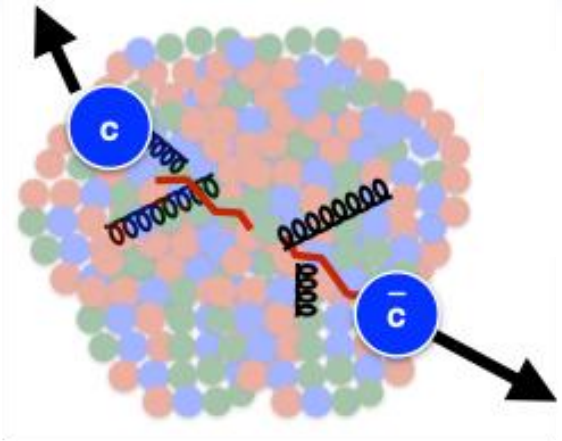
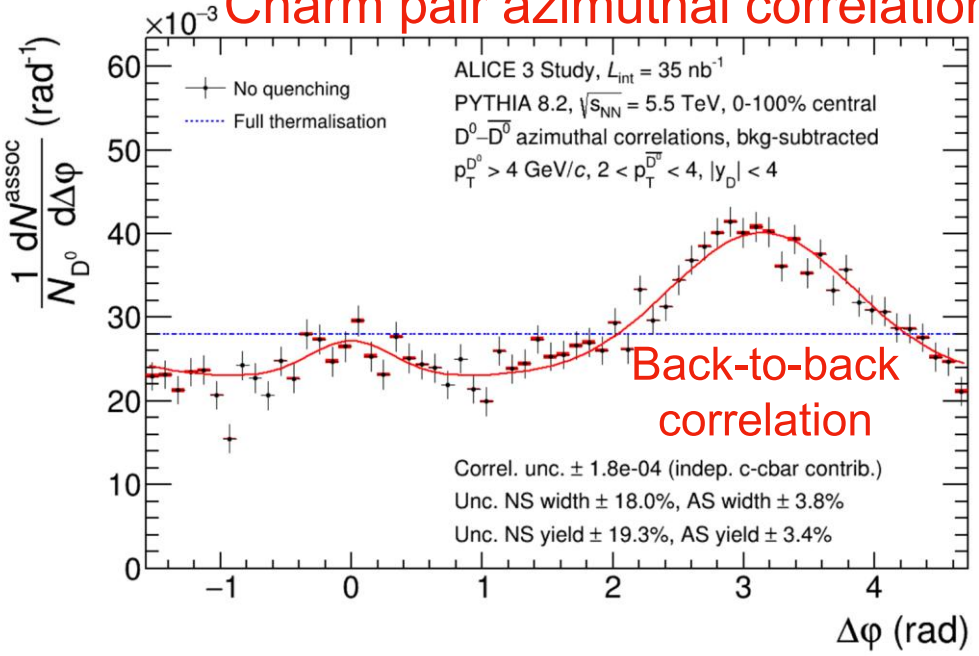


ALICE 3 LoI, CERN-LHCC-2022-009

Charm pair azimuthal correlation



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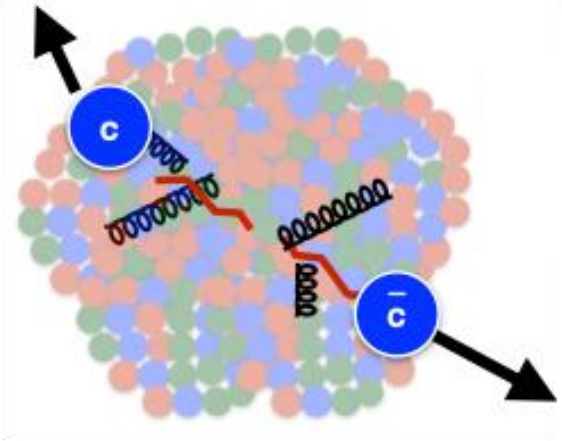

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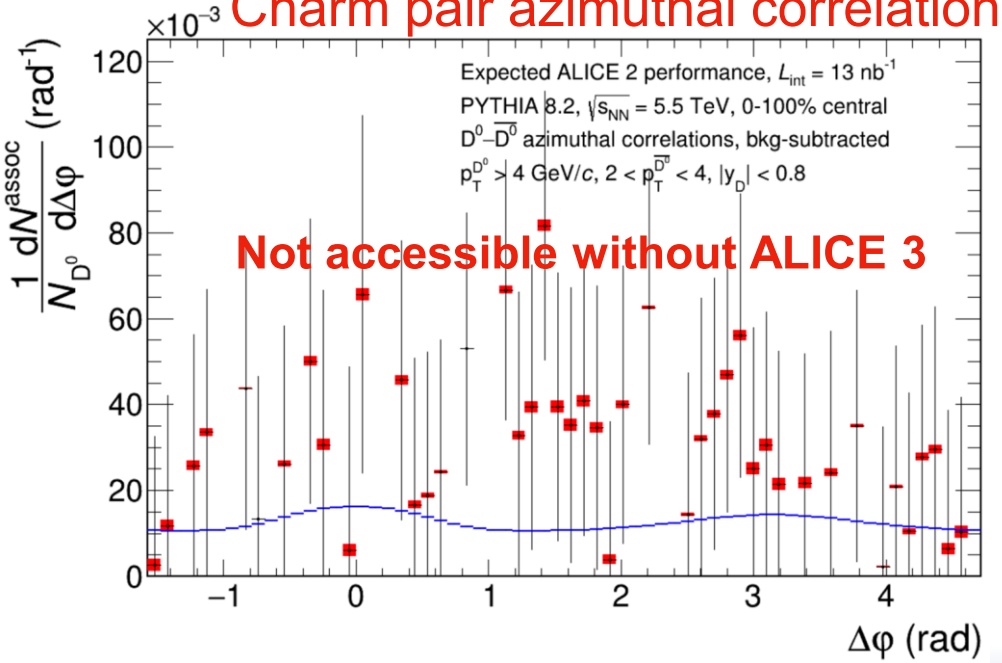

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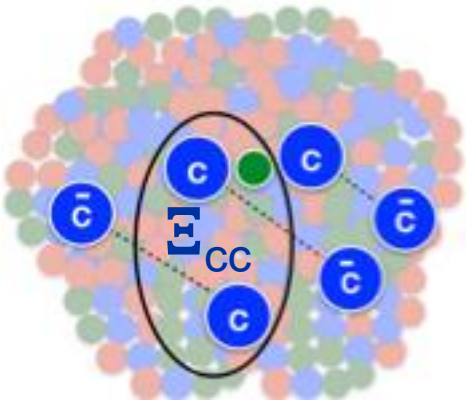

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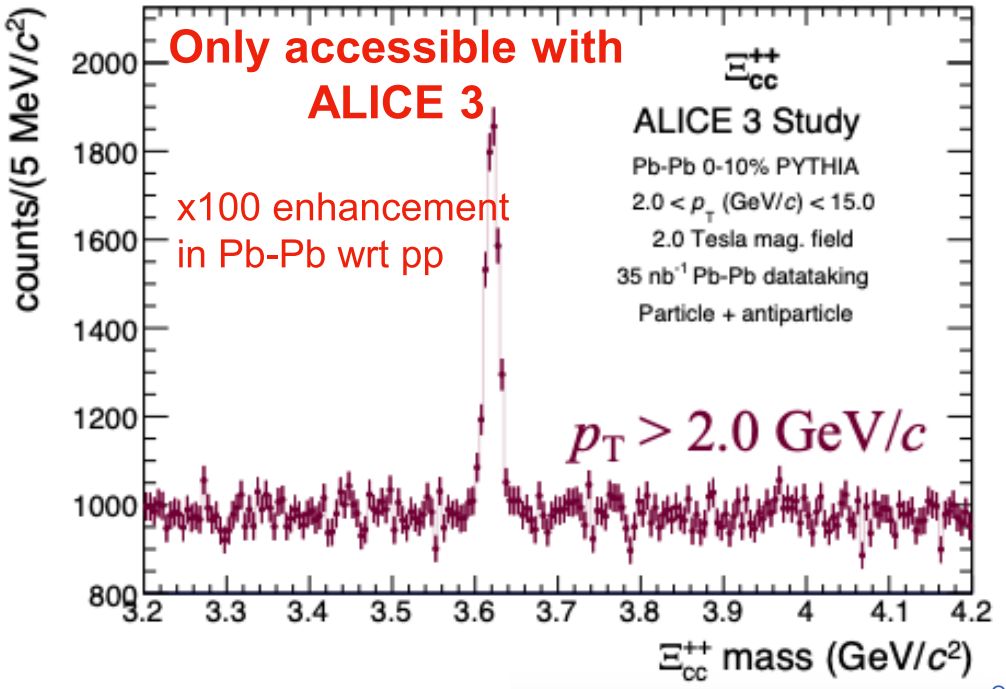

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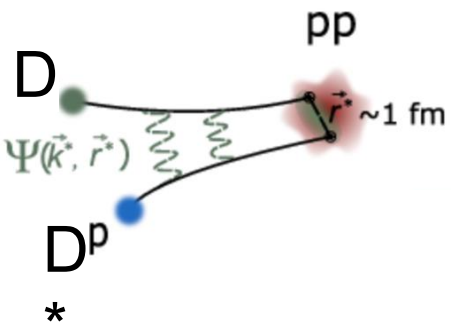
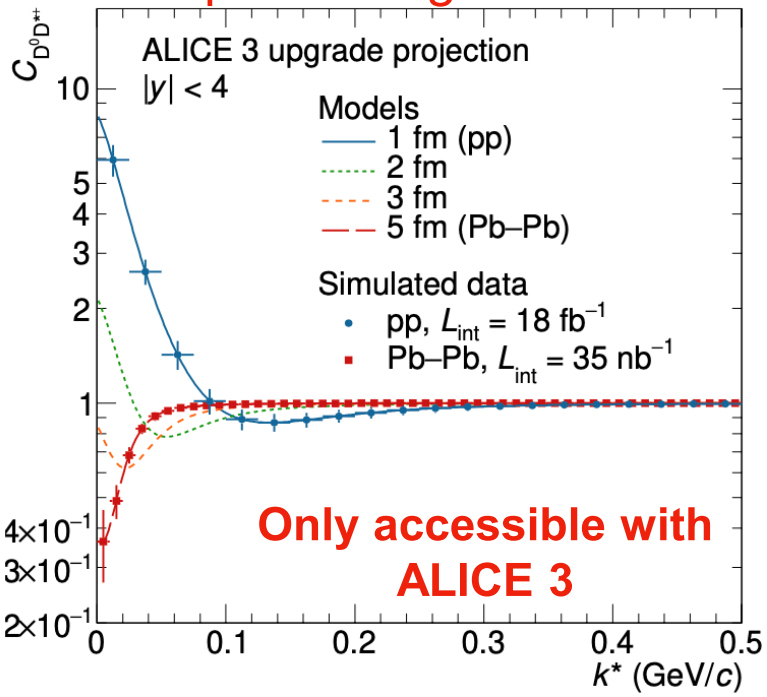
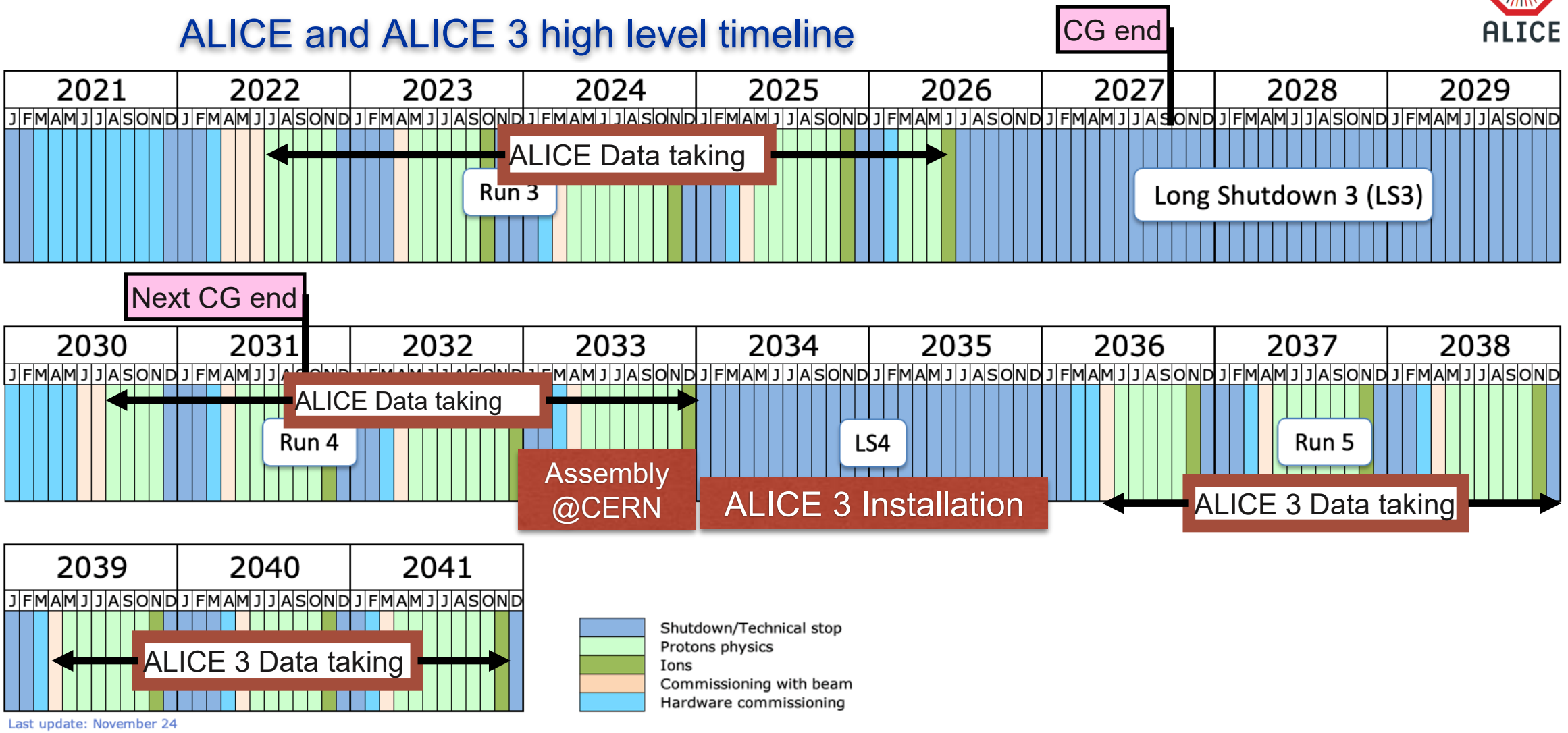


ALICE 3 LoI, CERN-LHCC-2022-009

Charm pair strong interaction



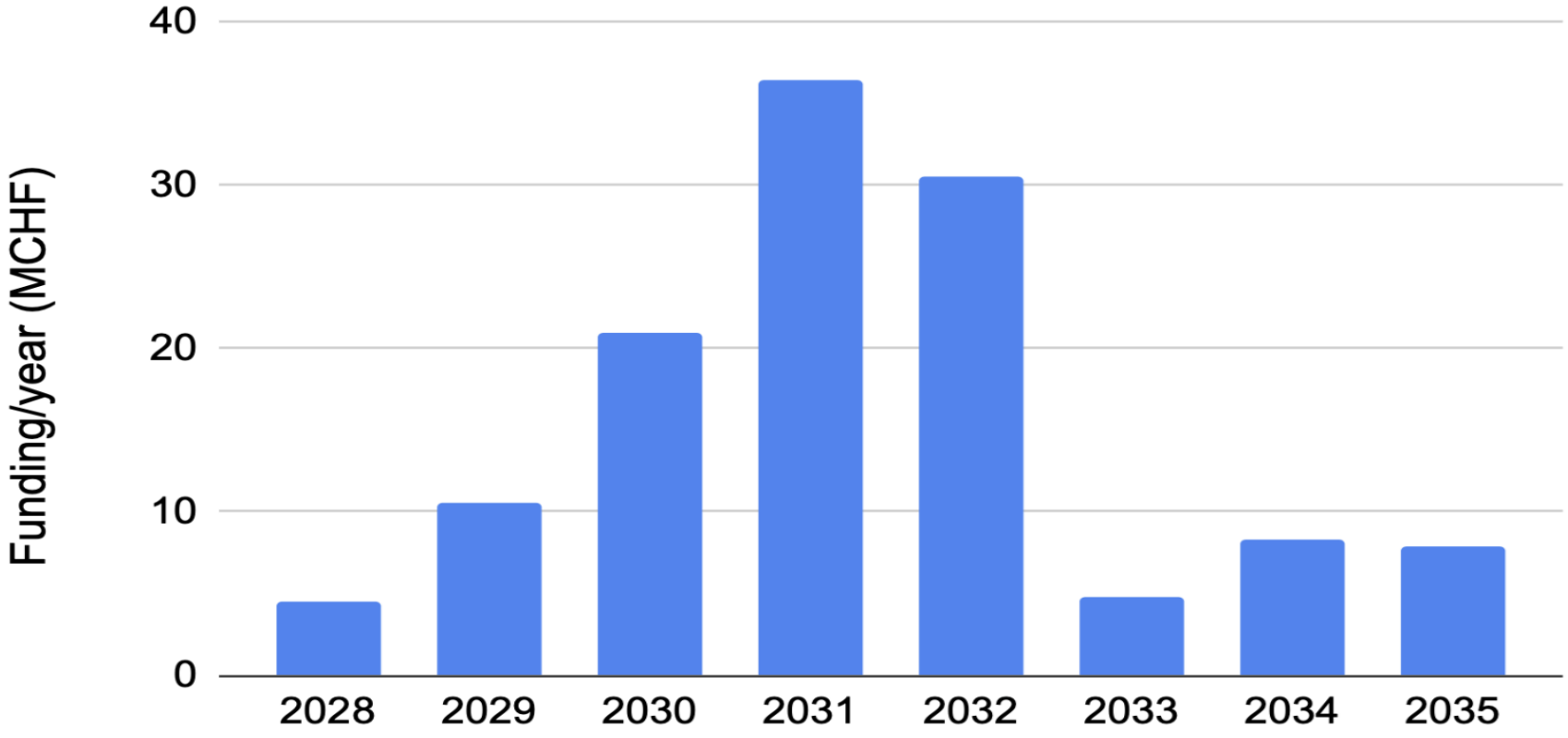
ALICE and ALICE 3 high level timeline

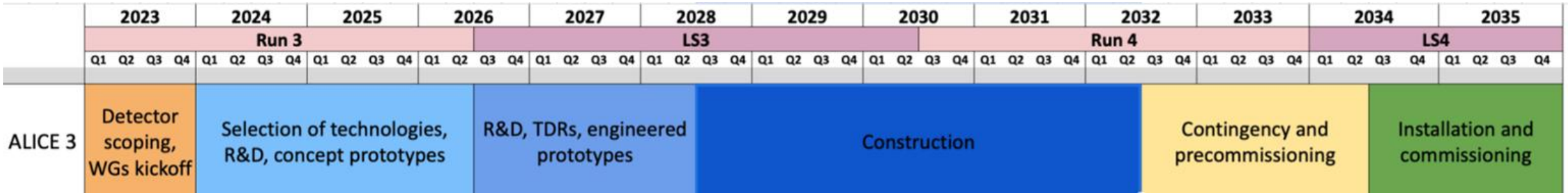


Last update: November 24

Spending profile and schedule

- Projected profile of expenses, including Common Items and Magnet
- Peak of spending in 2030-32





Proposed UK Contribution

- The UK team would like to contribute to ALICE3 to maintain the UK's influence in this exciting project.
- Our proposal matches our pro-rata common fund and capital contribution but also include manpower, travel etc.
- The proposed project cost is £6 million over five years from approx. 2028. The breakdown is:
- **Central Timing Processor** (distributes precision timing to all sub-detectors and calibration triggers)
  - £1,790k (assuming current engineers are partially funded on the CG (to maintain ALICE in Run 4)
- **Contribution to MAPS silicon pixel tracker** – Liverpool / Darebury
  - £4,215k (more staff effort required than for CTP)