

Performance of LHCb in early Run 3

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(on behalf of the LHCb collaboration)



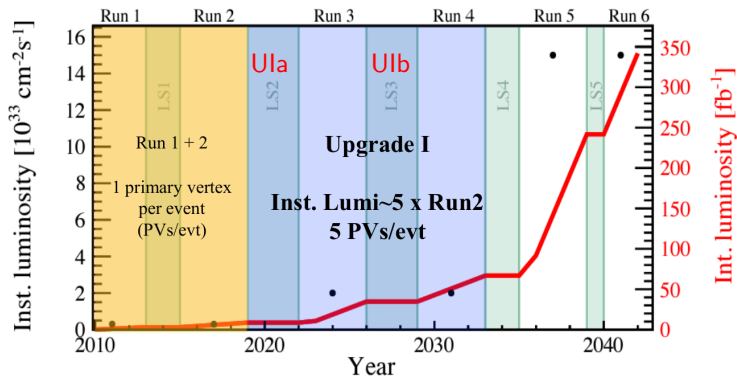
Young Scientists Forum @ LA THUILE 2024



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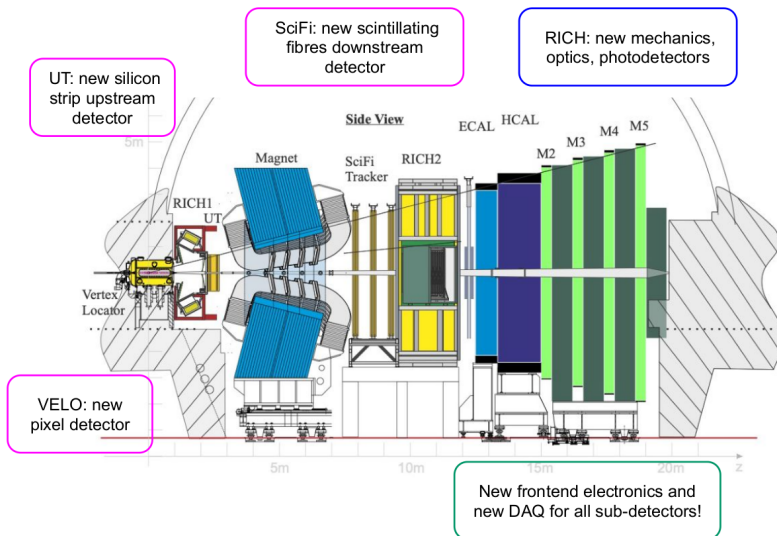
March 6, 2024





- The LHCb detector underwent a major upgrade during Long Shutdown 2 (LS2)
- Run 3 data-taking “Early Measurements Task Force” (EMTF) campaign:
 - ensure readiness for smooth and efficient analysis workflow as data arrives
 - identify, prepare for, and help perform important analyses with the early data.

- Cope with $\times 5$ higher pileup in Run 3: detector + trigger upgrades.
- **Vertex+ tracking system** completely overhauled! L0 hardware trigger removed.



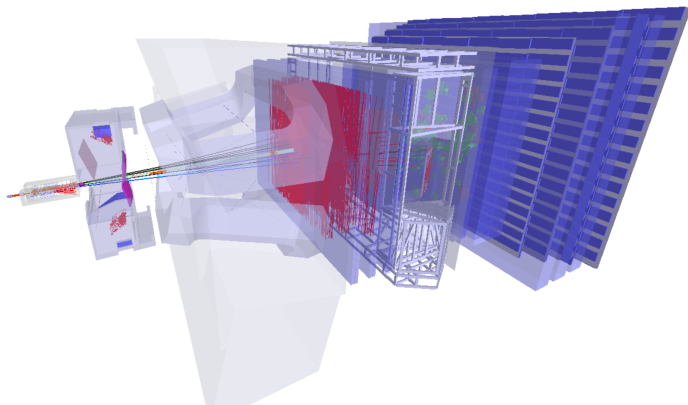
Run 3 event display



LHCb Experiment at CERN

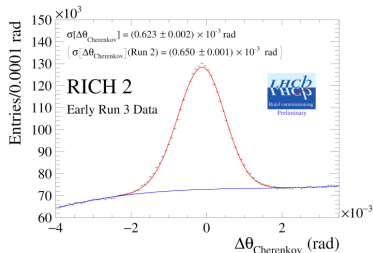
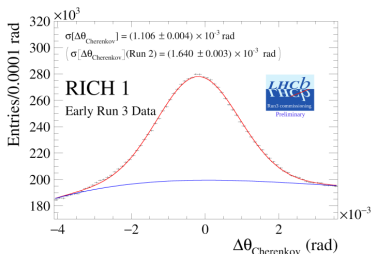
Run / Event: 263132 / 5940637

Data recorded: 2023-05-11 13:50:49 GMT

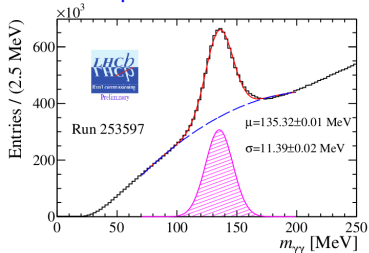
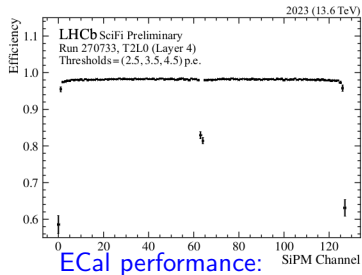


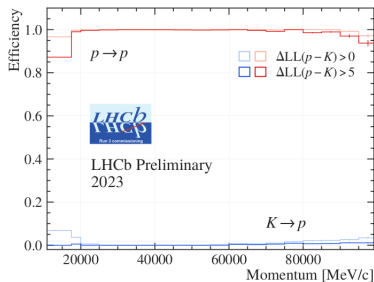
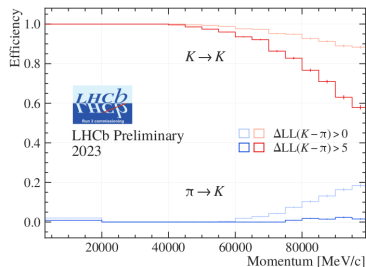
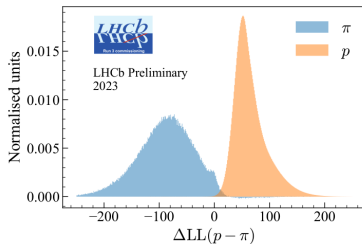
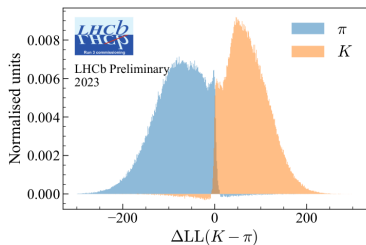
- 150 pb^{-1} data collected in 2023 pp collision run @ 13.6 TeV

Cherenkov angle resolution:



SciFi hit detection efficiency:

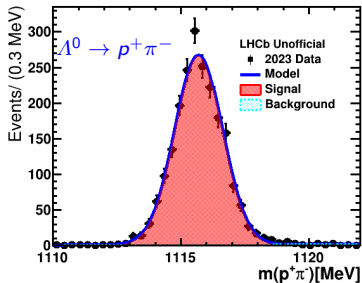
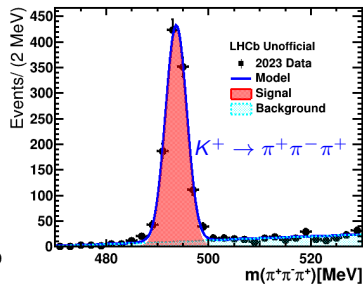
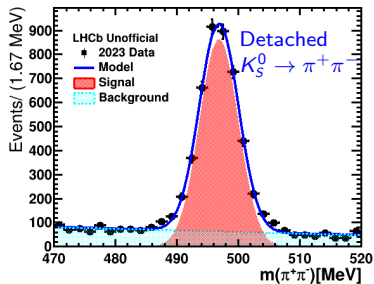
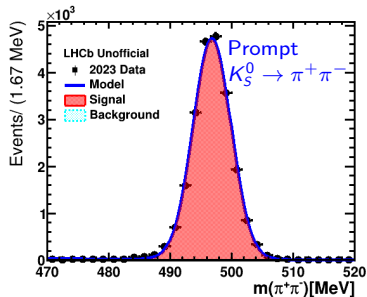




- Excellent PID performance due to improvements in the RICH detector.

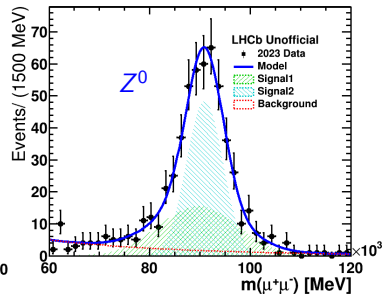
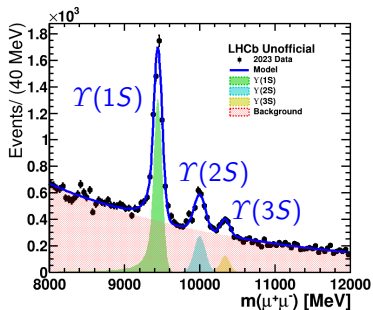
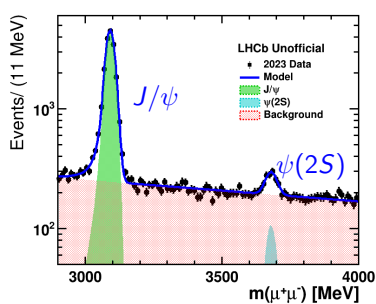
2023 Early Data Mass peaks

Strangeness peaks



Mass resolutions for K_S^0 , Λ^0 reconstruction around $\mathcal{O}(1 - 3) \text{ MeV}$.

Dimuon peaks



- Dimuon mass peaks at different mass ranges are also seen.

- VELO reinstalled
- UT is being tested in global DAQ test and will be included in the next physics run.
- LHCb is ready to take the first runs of the year. Beam circulation will start later in this month.
- LHCb plans to collect $7 + 7$ fb⁻¹ data in 2024 + 2025.



- Despite the difficulties that we faced in early 2023, we continued data taking and checked if the other subdetectors are working as expected.
- Various physics programs are ongoing with the early Run 3 data and mass peaks are shown here.
- Now we are ready to take 2024 data.

THANK YOU!