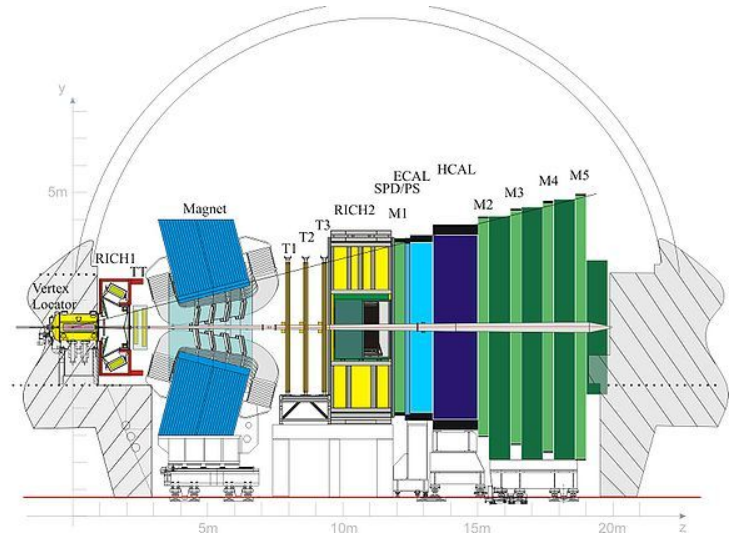


Studies of Short-Lived Kaons at LHCb

By Garath Vettes

Brief background information

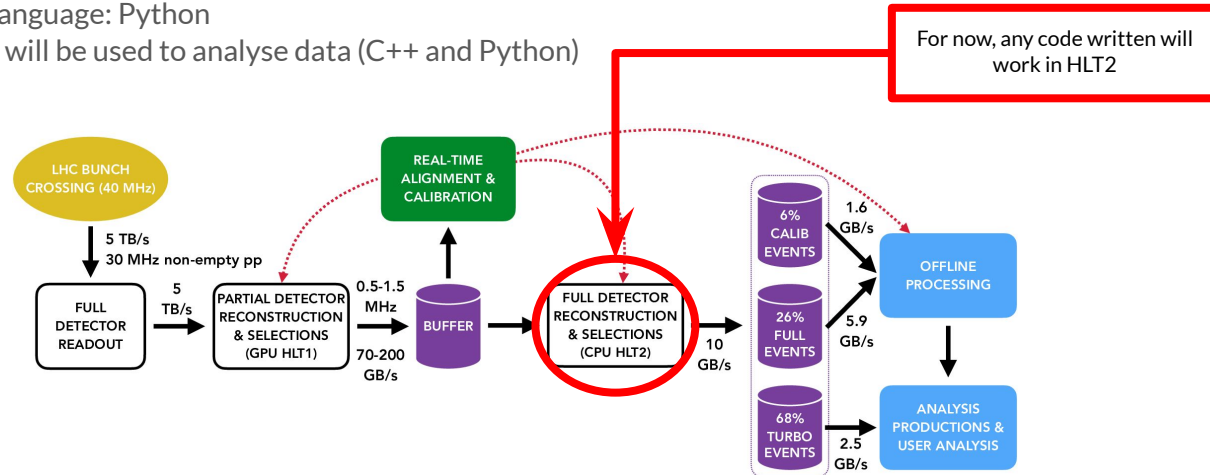
- LHCb - Large Hadron Collider Beauty (Approved in 1998)
 - Focuses on forward-moving particles created by proton-proton collisions.
 - Main interest: the beauty quark and the slight bias toward matter over antimatter



LHCb Experiment - From CERN COURIER

How this research will be conducted

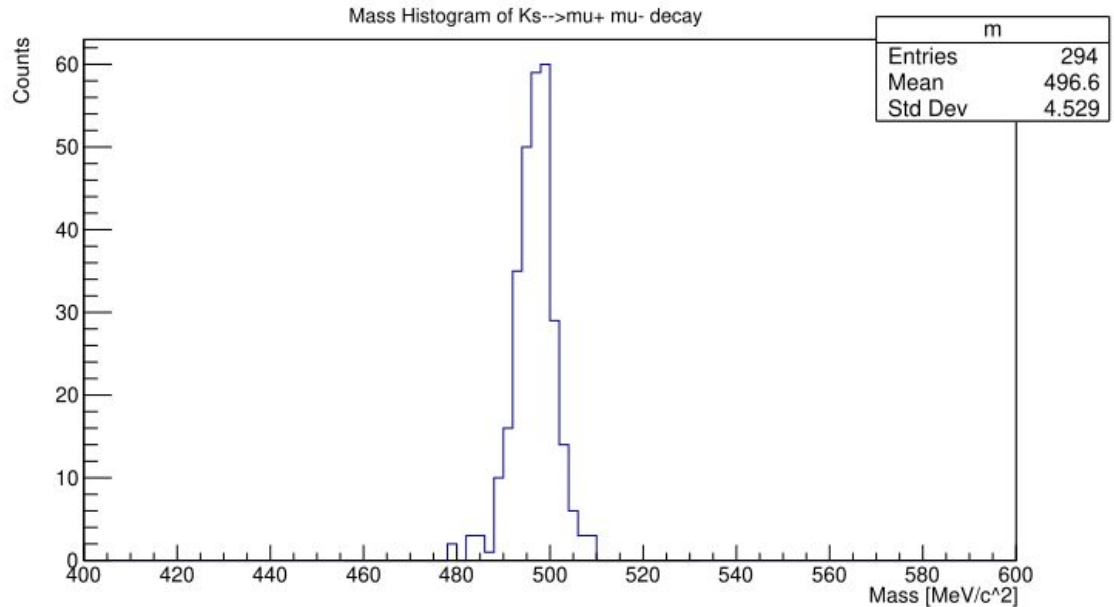
- Most, if not all, of the work regarding this project will be carried out through code written in Linux
 - Main language: Python
 - ROOT will be used to analyse data (C++ and Python)



Dataflow in the upgraded LHCb detector, reproduced from [\cite{LHCb-FIGURE-2020-016}](#).

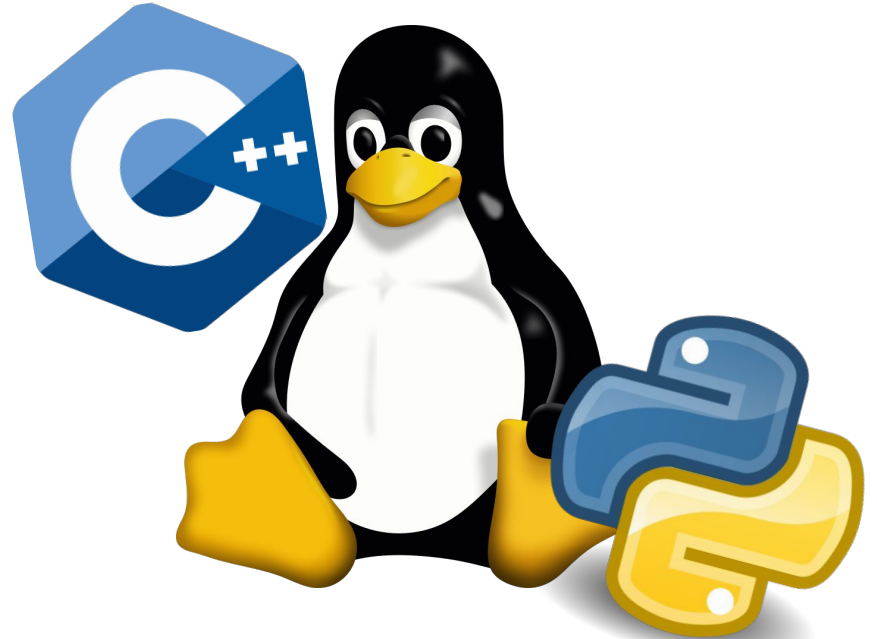
What have I done so far?

- Wrote an example program to learn how an HLT2 line is written.
- Wrote code to analyse the $K_s \rightarrow \mu^+ \mu^-$
 - A histogram was generated from this data



Potential roadblocks

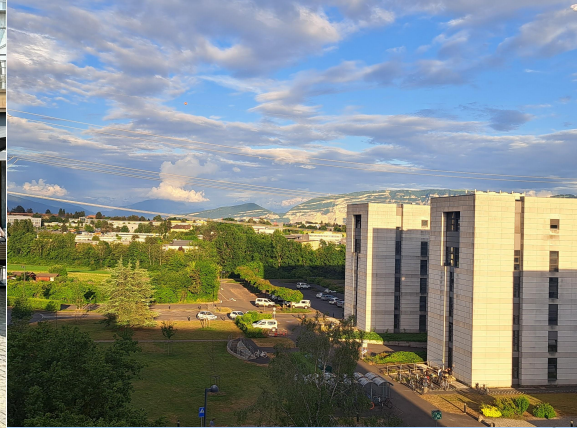
- Learning how to code (and generally function) in Linux.
- Understanding the Physics behind what is happening.
- Writing the code to where it does not take too long to run.
- Working with (potentially) many different coding languages.





Questions?





I made this:D



Pictures!



Sources

- [1] "LHCb: A Question of Asymmetry." *CERN Courier*, 19 June 2022, cerncourier.com/a/lhcb-a-question-of-asymmetry/.
- [2] Aaij, R., Cámpora Pérez, D. H., Colombo, T., Fitzpatrick, C., Gligorov, V. V., Hennequin, A., Neufeld, N., Nolte, N., Schwemmer, R., & Vom Bruch, D. (2021). Evolution of the energy efficiency of LHCb's real-time processing. *EPJ Web of Conferences*, 251, 04009. <https://doi.org/10.1051/epjconf/202125104009>
- [3] Alves Junior, A. A., et al. "Prospects for measurements with strange hadrons at LHCb." *Journal of High Energy Physics* 2019.5 (2019): 1-28.
- [4] Hostert, Matheus, and Maxim Pospelov. "Novel multilepton signatures of dark sectors in light meson decays." *Physical Review D* 105.1 (2022): 015017.
- [5] *Writing an HLT2 line – Moore documentation*. (n.d.). Retrieved June 22, 2023, from https://lhcbdoc.web.cern.ch/lhcbdoc/moore/master/tutorials/hlt2_line.html