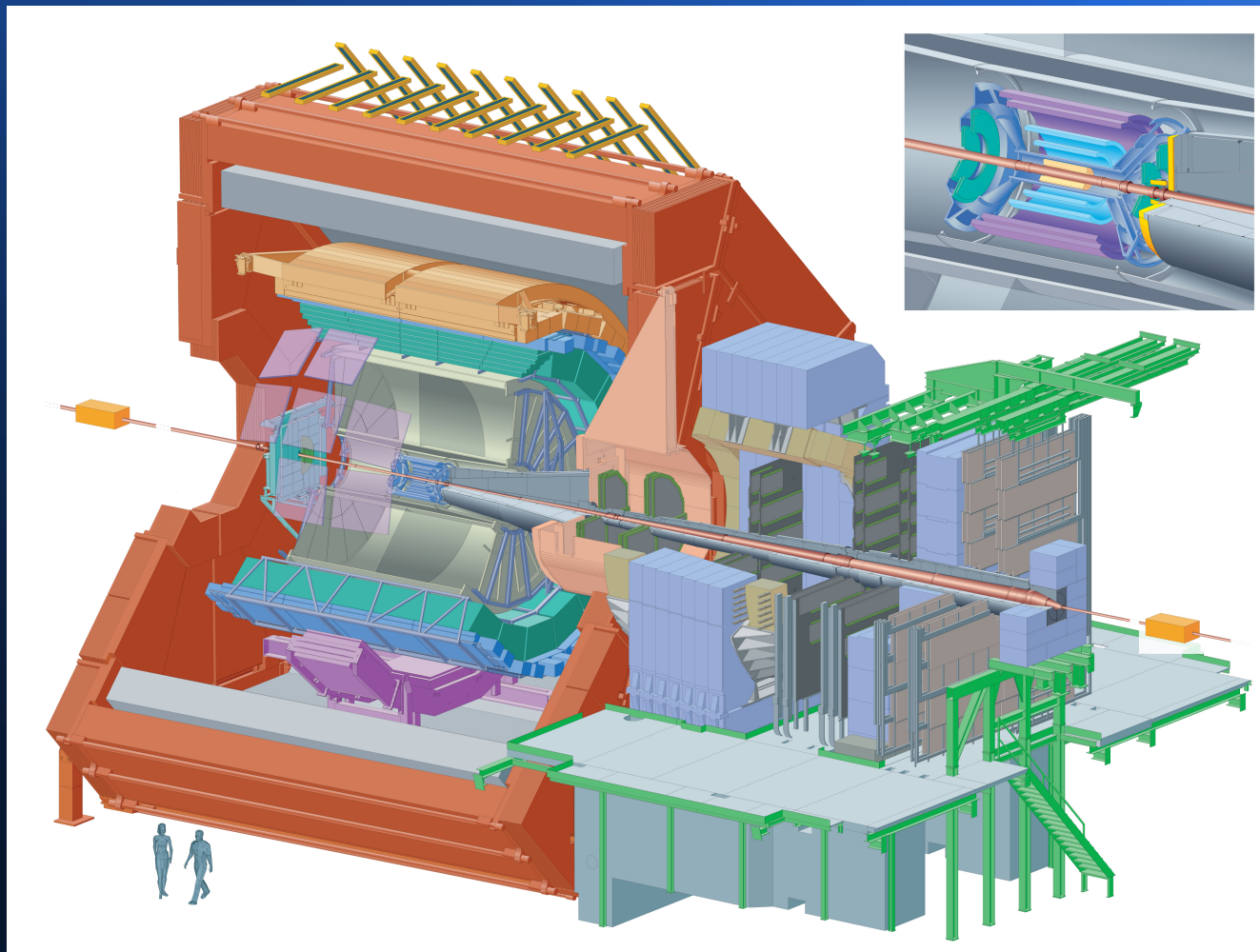


Searching for and Characterizing the Quark-Gluon Plasma in ALICE

John Groh, Penn State University



The ALICE Detector
Image: CERN



The Quark-Gluon Plasma – What, Where, & How

- State of matter in which quarks are no longer confined in hadrons (a color conductor)
- The early universe is thought to have existed as a QGP from $\sim 10^{-12}$ to $\sim 10^{-6}$ s after the Big Bang
- The LHC is able to produce QGPs in Pb-Pb collisions (“the little bang”)

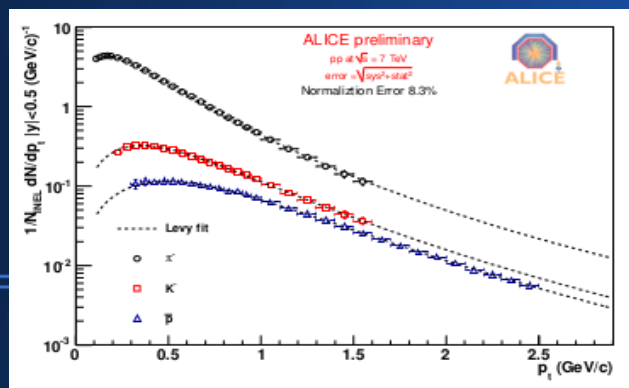
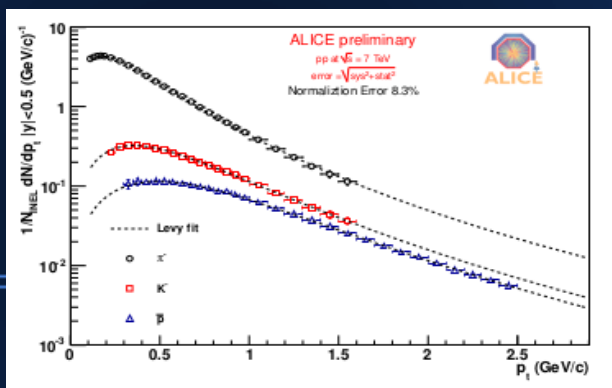
The Quark-Gluon Plasma - Why

Studying the QGP may help us understand:

- The strong force
- The QCD phase diagram
 - This is the only Standard Model phase transition that can be studied in the laboratory!
- The early universe
- The hadronic contents of the universe today

My Work This Summer

- Advisors: Michele Floris and Alexander Kalweit
- PWG: Light Flavour Spectra (π^- , π^+ , π^0 , K^- , K^+ , K^0 , p , and \bar{p})
- The analysis:
 - Map various spectra of these particles for Pb-Pb collisions
 - p_T , m_T , y , η , etc
 - (has already been done for pp collisions and partially for Pb-Pb)
 - Repeat for high-multiplicity pp collisions
 - See how spectra evolve from pp \rightarrow HM pp \rightarrow Pb-Pb
 - Possible QPG formation in HM pp collisions?
 - Possibly more?

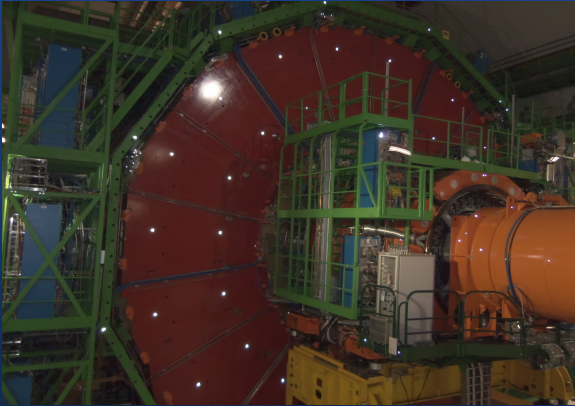


Source: Spectra of identified hadrons with the ALICE detector in pp and Pb-Pb collisions at the LHC, Roberto Preghenella (for the ALICE collaboration)

Expected Difficulties

- Currently in the process of changing data formats for analysis (ESDs to AODs)
 - Also changing from using ALICE's PROOF cluster to running on trains on the grid
- Known Monte Carlo issues
 - Does not match data perfectly
- Limited time...

Some summer fun...



Visit to the CMS Detector



Climbing Aiguille L'Index
(above Chamonix)



Hiking in the Jura



St. Peter's Cathedral, Geneva