DIRECT PHOTON-HADRON JET CORRELATION

DHRUV DIXIT

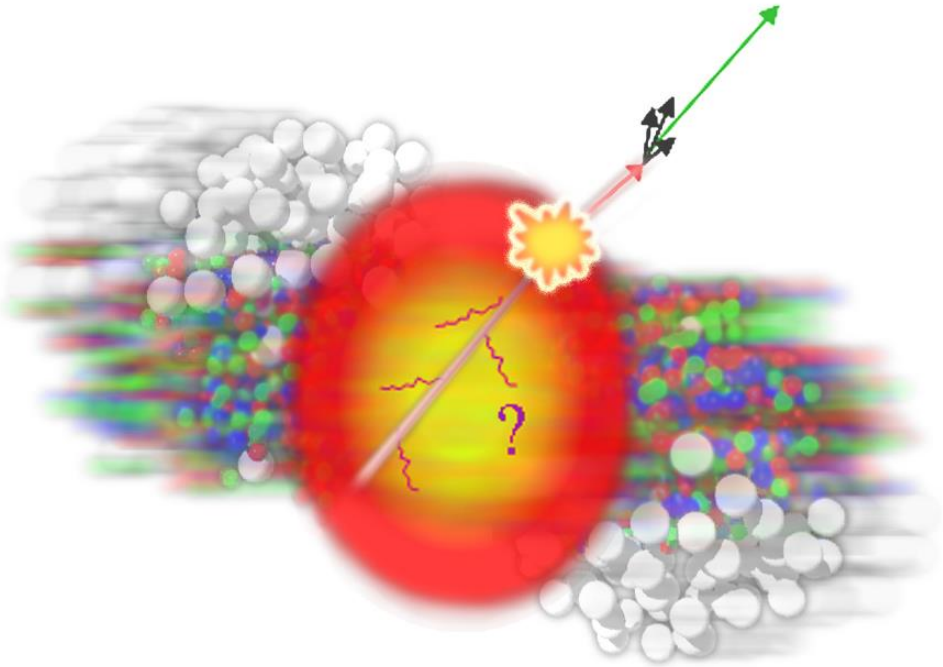
GRAND MOTIVATION

- Study early stages of the universe ~1μs after the big bang
- Study the strong force
  - one of the four fundamental forces of nature
  - Binding force of quarks and gluons – the fundamental particles of all matter, including you and me!
  - Results in ~ 99% mass of a proton

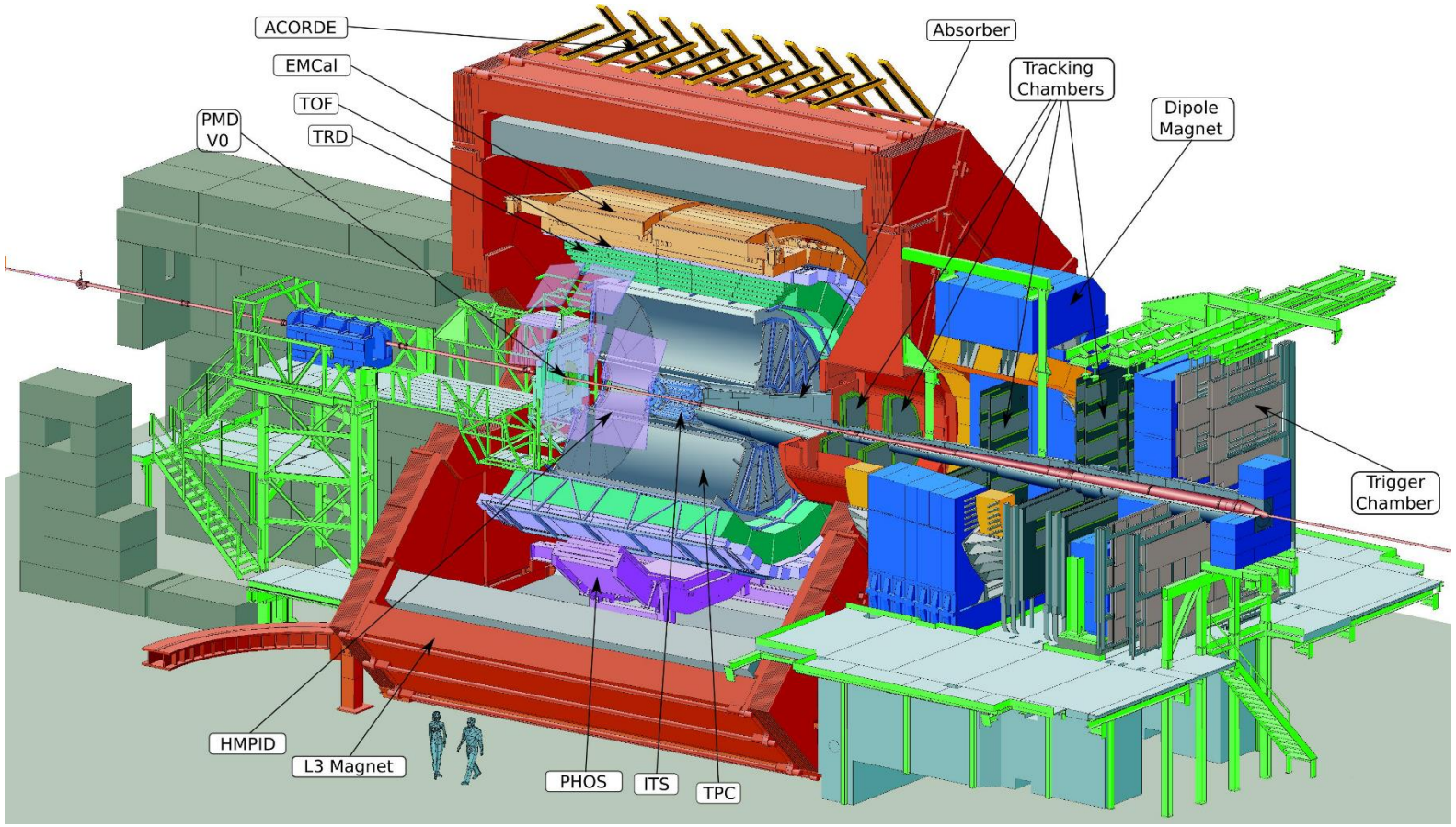
https://cds.cern.ch/record/1306147/files/ALICE%281%29_image.jpg?subformat=icon

PHOTON-JET MEASUREMENTS

- Pb-Pb collisions → QGP
- Jets are made of hadron and interact with QGP
- Photons = EM, force do not interact with QGP
- Photon-Jet show how strongly interacting matter (QGP) behaves

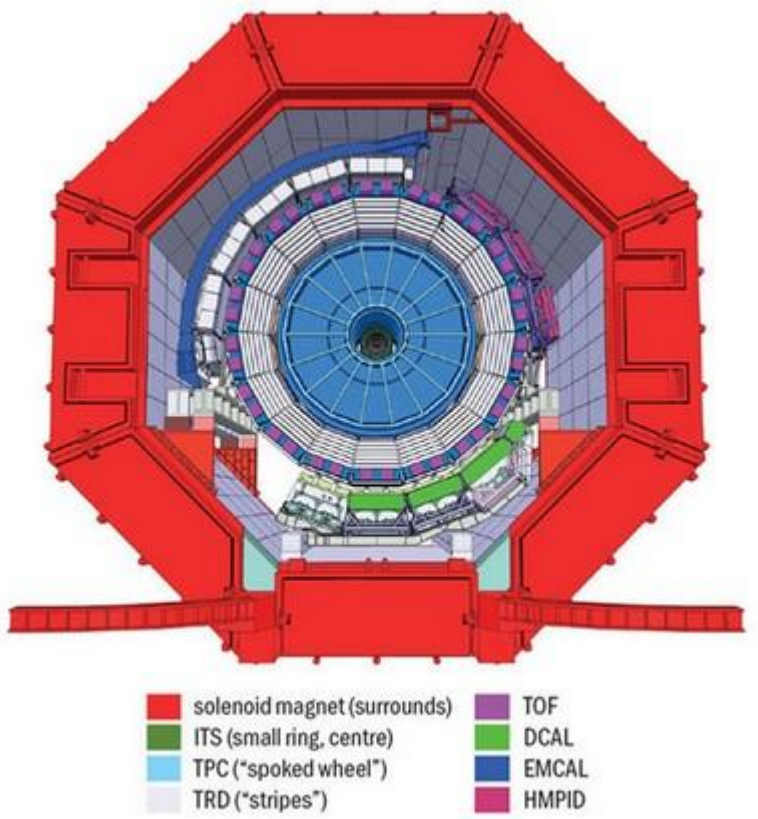


ALICE DETECTOR



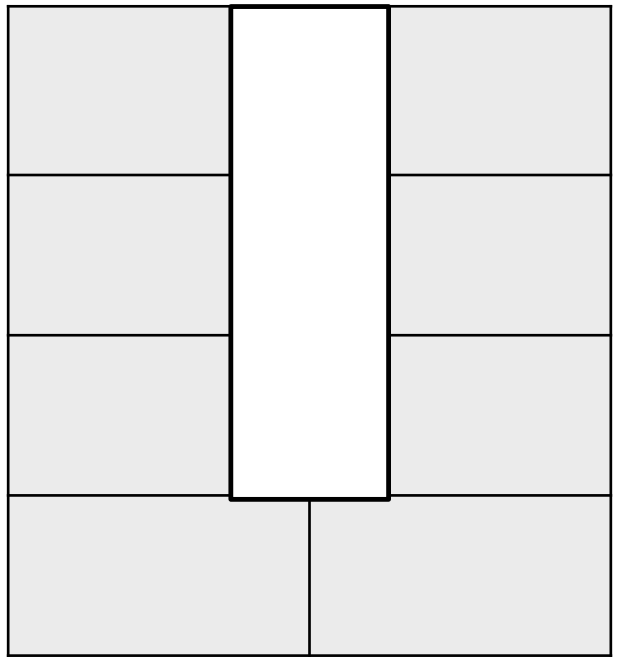
http://inspirehep.net/record/1230338/files/figurer_alicepic.png

WHAT DO I GET TO WORK WITH? (FOR ABOUT A MONTH)



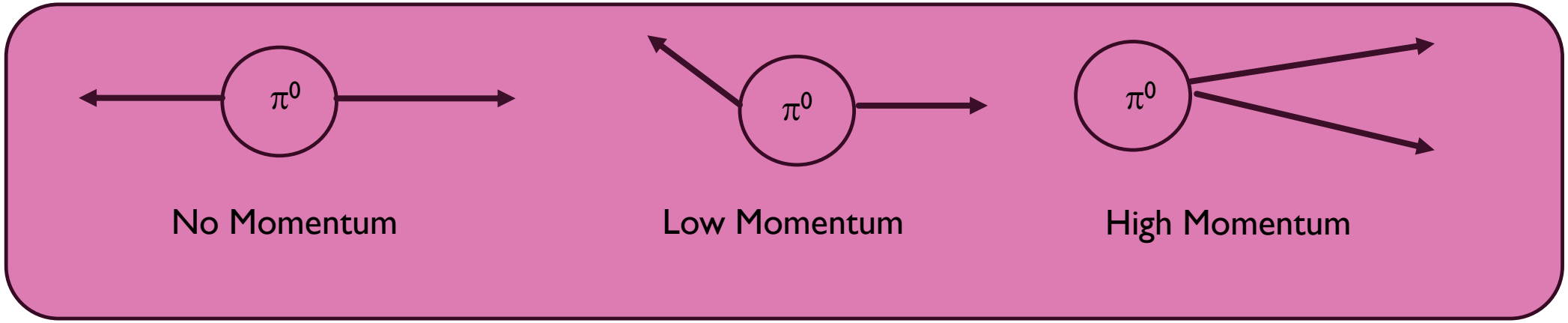
http://alicematters.web.cern.ch/sites/alicematters.web.cern.ch/files/images/ALICEfuture3.jpg

- EMCal and DCal silicon-absorber layered calorimeters
- EMCal
  - Divided into 12 super modules. Each super module has 1000 cells
- DCAL
  - 8 super modules
  - Has a gap in the middle
- The EMCal, like the DCal (cartoon left) but no hole in the middle
- Need to use the current EMCal framework and adapt and adjust it for DCal use
  - Account for gap
  - Geometry
  - Cell numbering



Π^0 PROBLEM (REST OF THE TIME)

- π^0 decays into two photons
- Make a lot of background → very poor signal to noise
- Solution: Try to figure out which photons are from π^0 and don't use them
  - Easier said than done… ☹

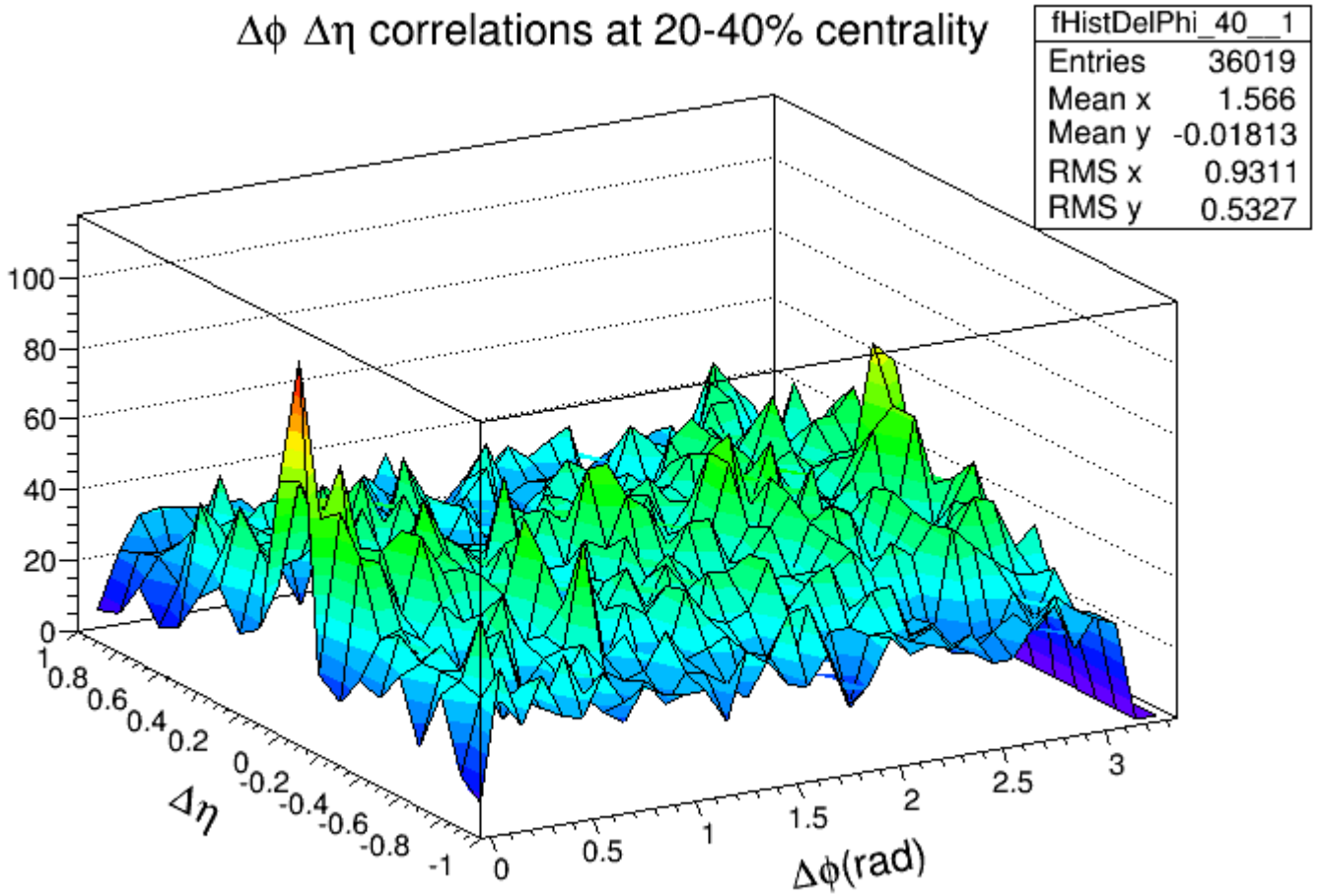


DATA TAKING

- Would like to take at least one shift once the LHC is back on π^0
- Extent of involvement to be discussed
  - Suggestions to train towards on call EMCal expert

WORK DONE SO FAR

- Wrote an Analysis task and a macro to execute to the task
- ϕ-η correlations plots
  - 895 events
  - P_t: 5 GeV for leading track and 2 GeV for associated tracks
  - Centrality cut: 20-40%
- Basic HI phy concept
  - Centrality cuts
  - Correlation plots



FUN STUFF