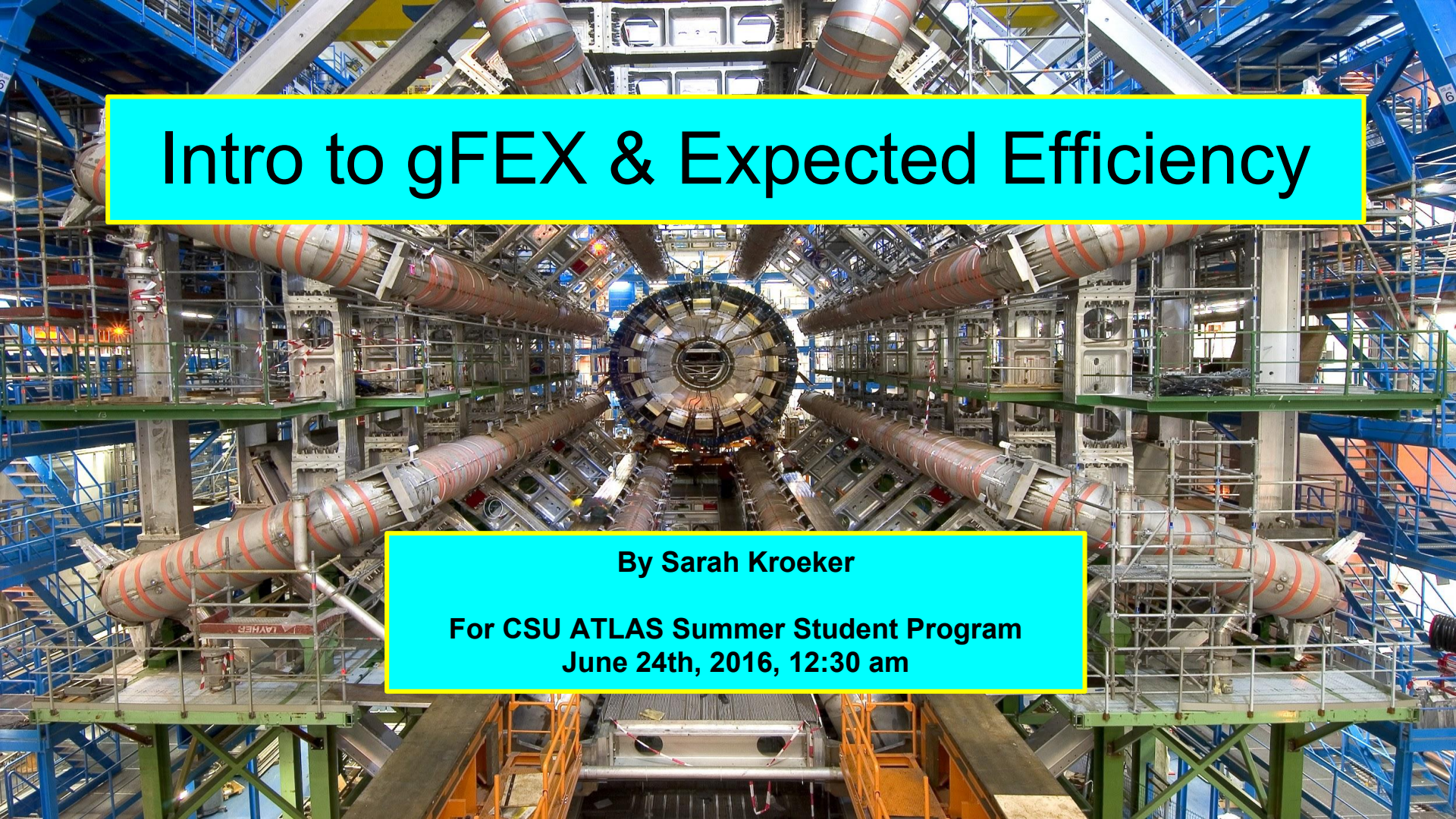


Intro to gFEX & Expected Efficiency

By Sarah Kroeker

For CSU ATLAS Summer Student Program
June 24th, 2016, 12:30 am

Detector Structure

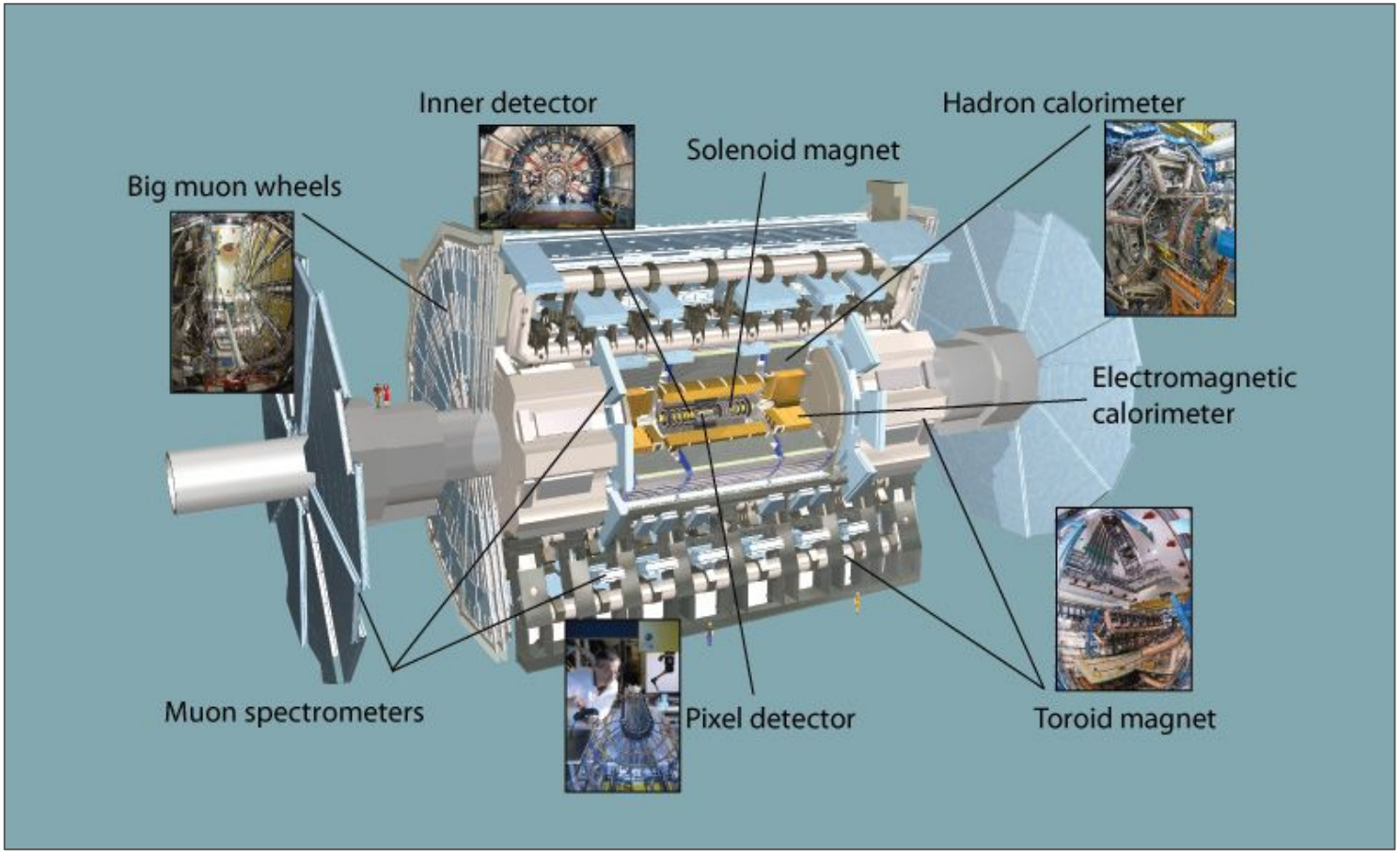
Inner detector
& Pixel detector:
- Measure trajectories of charged particles

Electromagnetic Calorimeter:
- Measure energy depositions of charged particles

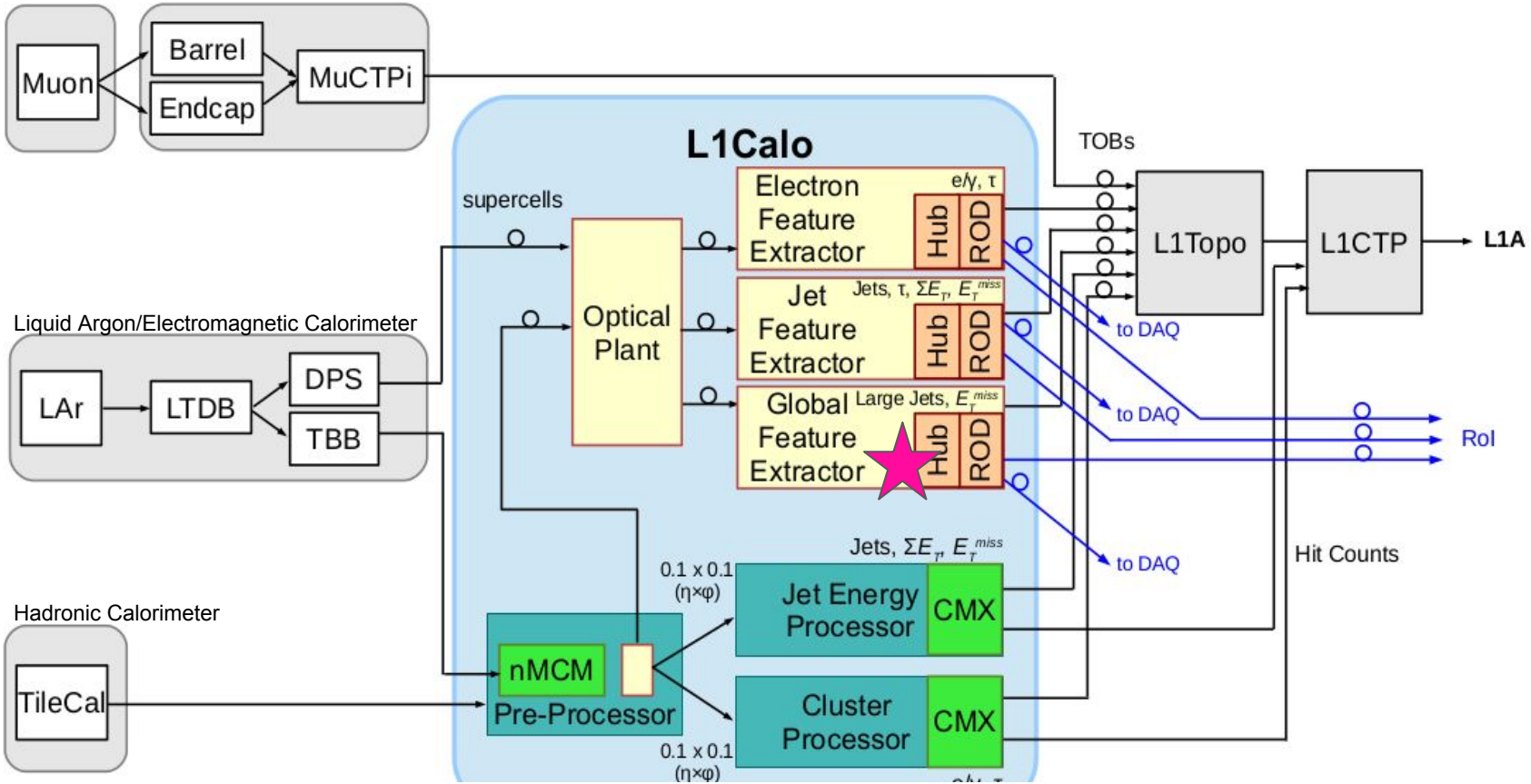
Hadron calorimeter:
- Measure energy depositions of neutral particles

Solenoid & Toroid magnets:
- Create strong magnetic field for tracking paths of particles

Muon Spectrometer:
- Track the paths of muons



What is gFEX? □ “Global Feature Extractor”



Seeded Simple-Cone Jet Algorithm

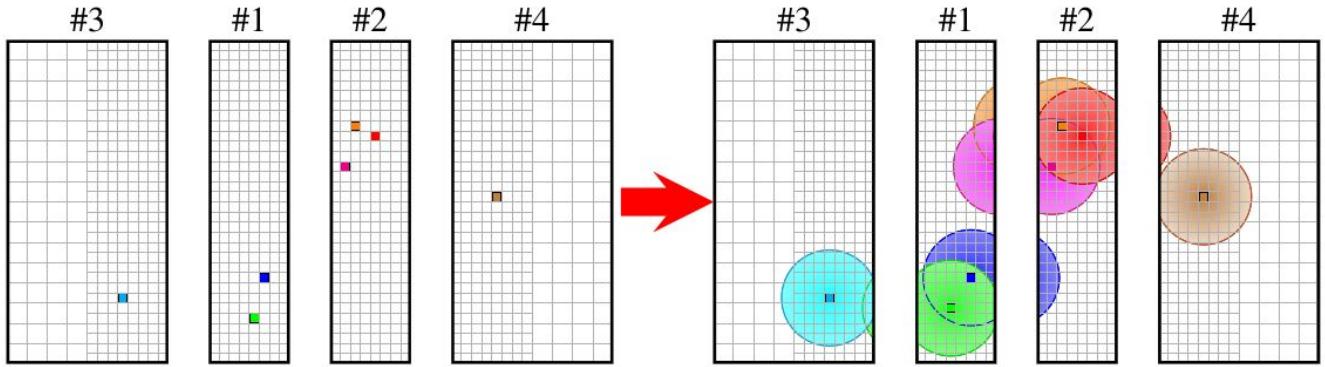


Figure 4 Left: Seeding step for identifying large-R jets by selecting towers over a threshold E_{T} value. Right: Summing the energy around the seeds within $\Delta R \lesssim 1.0$.

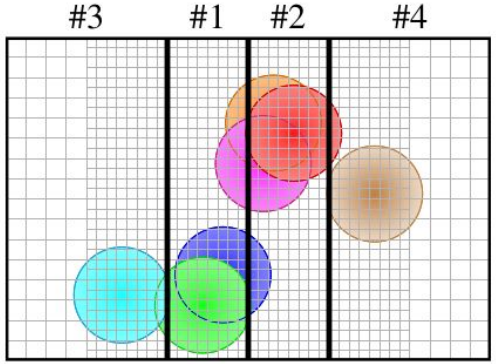
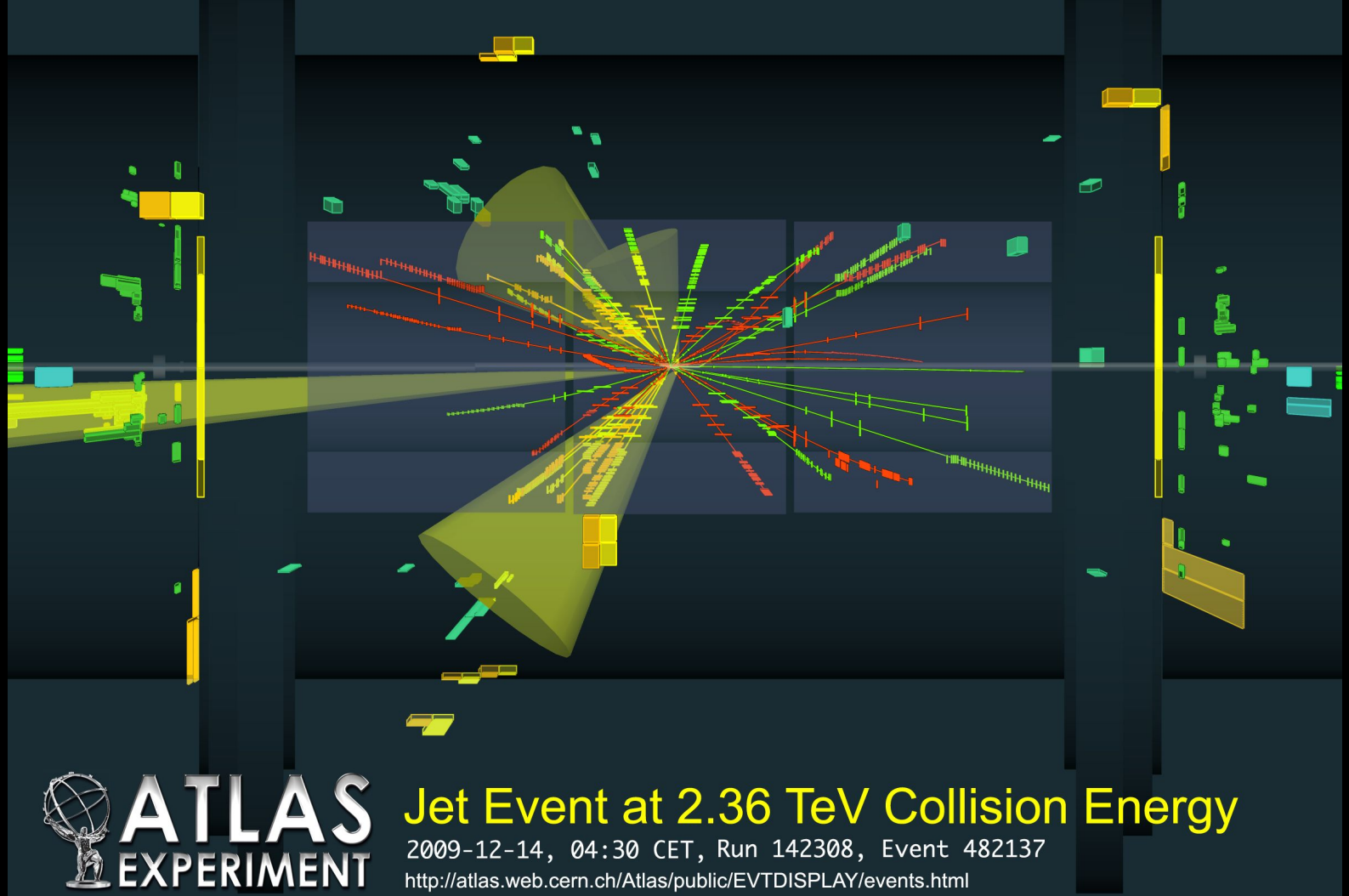


Figure 5 The final large-R jets. Each jet is stored on the Processor FPGA that produced the seed.


SWISS


SWISS


JETS


ATLAS
EXPERIMENT
Jet Event at 2.36 TeV Collision Energy
2009-12-14, 04:30 CET, Run 142308, Event 482137
http://atlas.web.cern.ch/Atlas/public/EVTDISPLAY/events.html

gFEX Will Help Find:

- “Large-area boosted jets”
- Missing transverse energy
- Centrality for Heavy Ion Triggers
- Jets without jet algorithms

gFEX Timeline

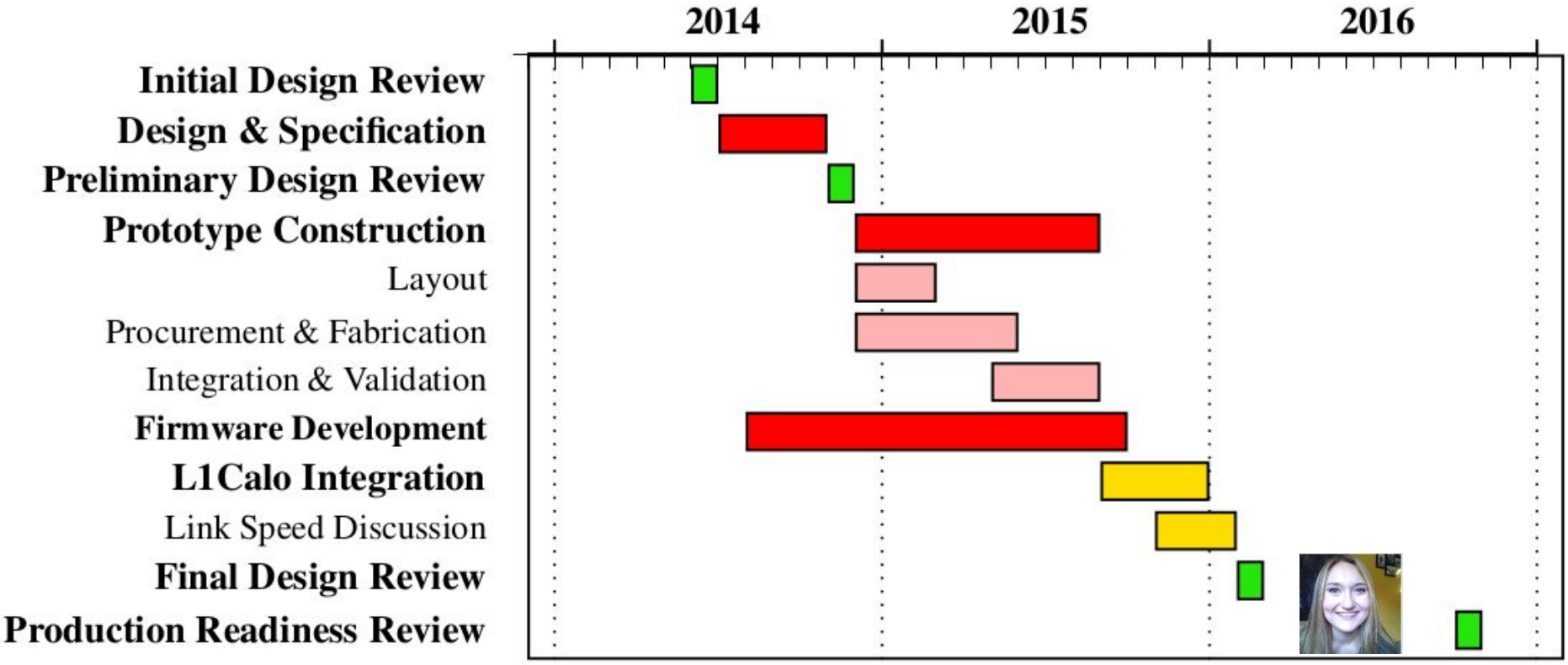


Figure 22 GANTT chart for the construction of the prototype gFEX module.

Efficiency Plots

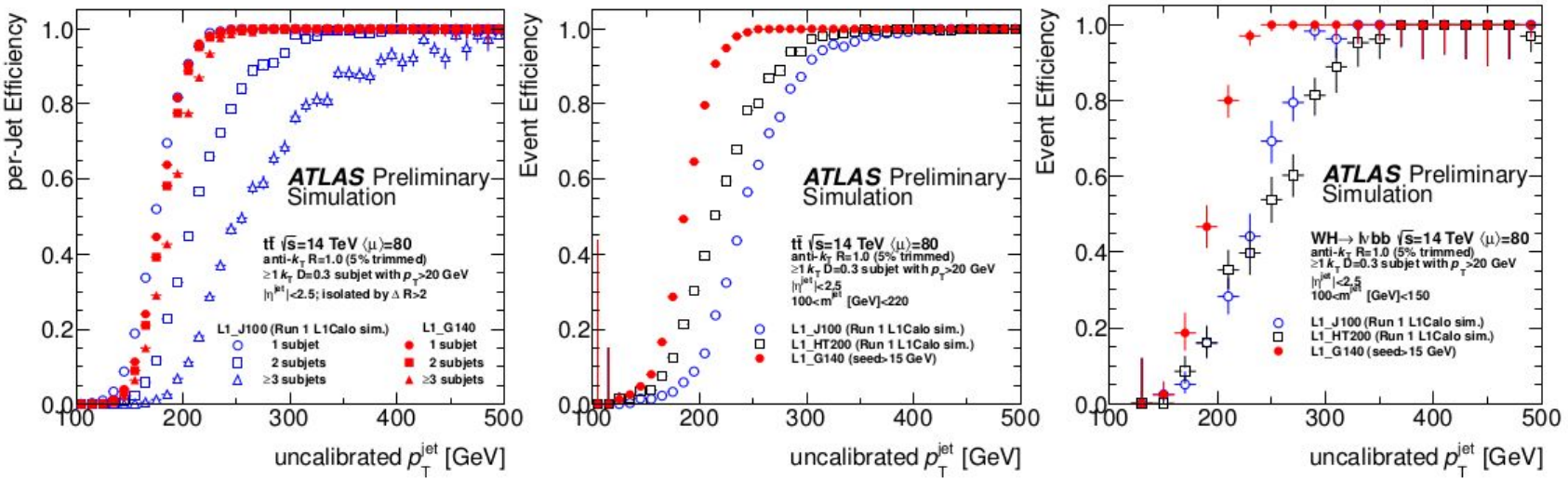


Figure 6 Trigger efficiency turn-on curves comparing the gFEX $R = 1.0$ jet trigger to the Run 1 style L1_J100 and L1_HT200 jet triggers (both expected to be unprescaled in Run 2). All samples use the $\langle\mu\rangle = 80$ Upgrade Monte Carlo simulation. The left two plots are for $t\bar{t}$ while the right plot is $WH \to \ell\nu b\bar{b}$. The left plot shows the efficiency per "isolated" jet binned in the number of subjets identified offline, while the right two plots display the event-level trigger efficiency. The first 12 bunches from each bunch train were removed prior to analysis in correspondence with the TDAQ TDR [2].