Study of Single and Diboson Z Production at the LHC

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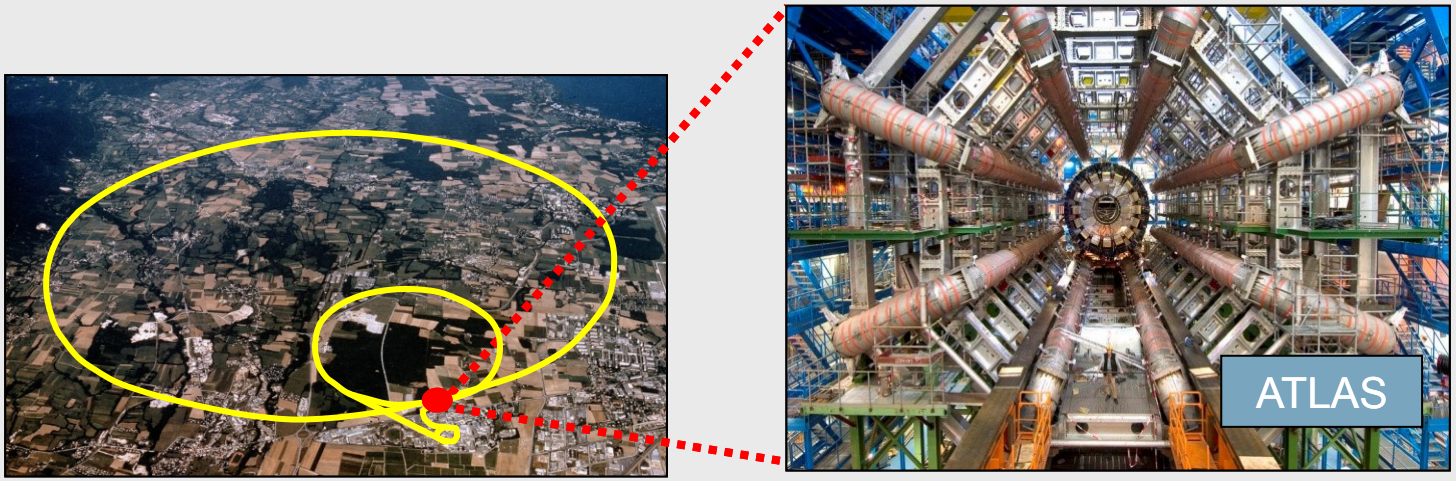
A Toroidal LHC ApparauS

- General purpose detector
- Designed to identify particles and measure their properties
- Explores the high energy frontier for new physics

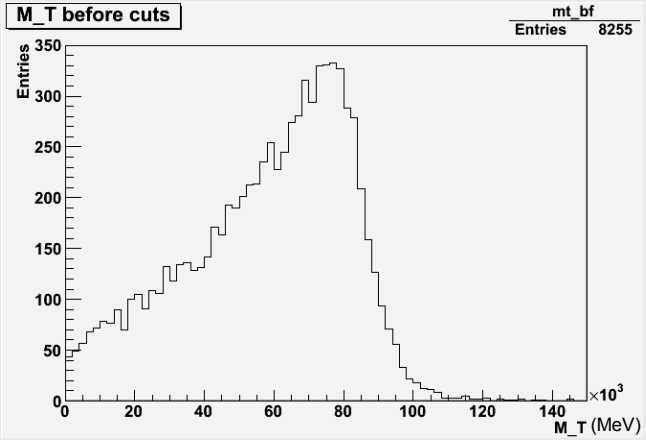


Diboson Z Production

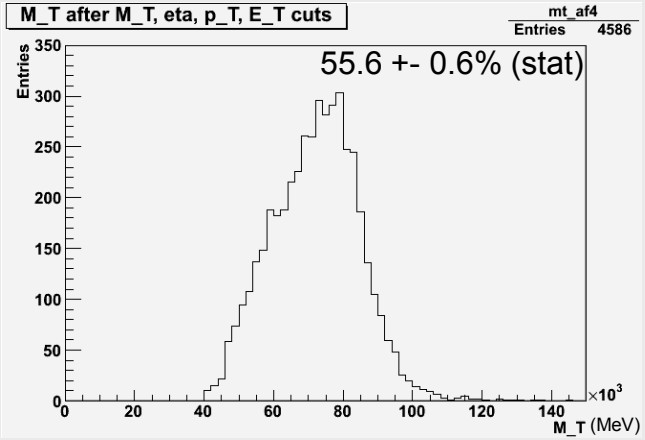
- Important test on the high energy behavior of electroweak interactions
- $ZZ \rightarrow \ell\ell\nu\nu$ decay channel has a large sample size needed for analysis
- Precise cross-section measurements will enhance sensitivity to gauge coupling
- Deviations from SM indicate new physics
- If none, we set stringent new limits on models beyond SM

My Project

- Learned the basics of ROOT
- Coded data analysis program to run on Monte Carlo and 2010 data
  - Learned how to make cuts to reduce background



Transverse Mass of muons before cuts



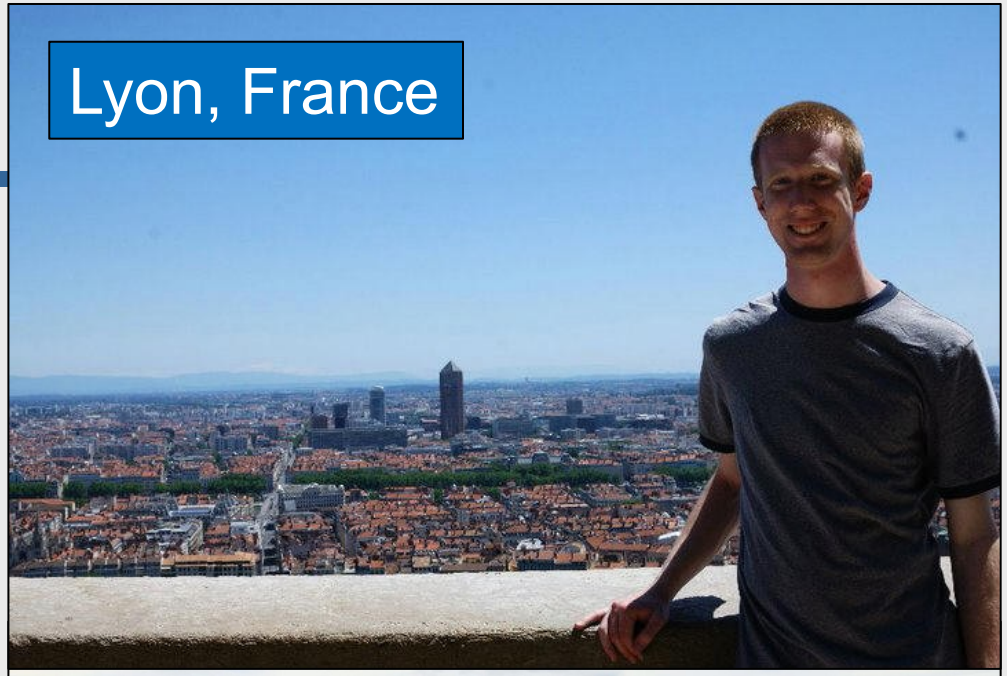
Transverse Mass of muons after cuts on M_T, η, p_T, E_T^{MISS}

My Project

- Switched over to W/Z CERN group data analysis code
- Learning how the program works
- Future work:
  - Implement ZZ → ℓℓνν module for 2011 data analysis
  - Run it on 2011 data and MC simulations
  - “Rediscovery” of Z-boson production in muon decay channel
  - Studies of ZZ production in ℓℓνν decay channel
- Future Goals: Become more experienced in ROOT and learn more about particle physics

Adventures

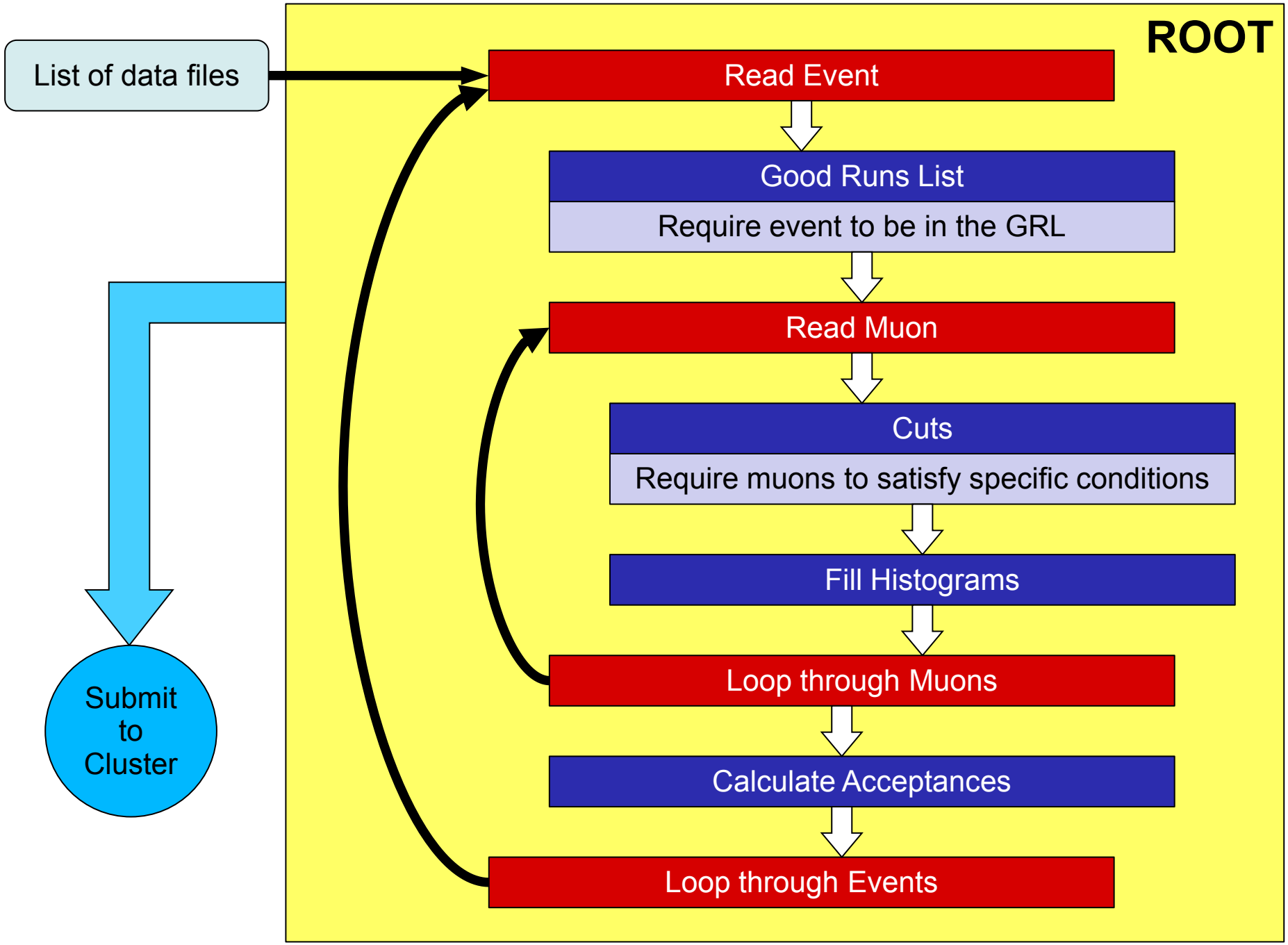
La Sagrada Família
Barcelona, Spain



Lyon, France

Hiking Mont Salève

Backup Slides


ROOT
List of data files
Read Event
Good Runs List
Require event to be in the GRL
Read Muon
Cuts
Require muons to satisfy specific conditions
Fill Histograms
Loop through Muons
Calculate Acceptances
Loop through Events
Submit to Cluster