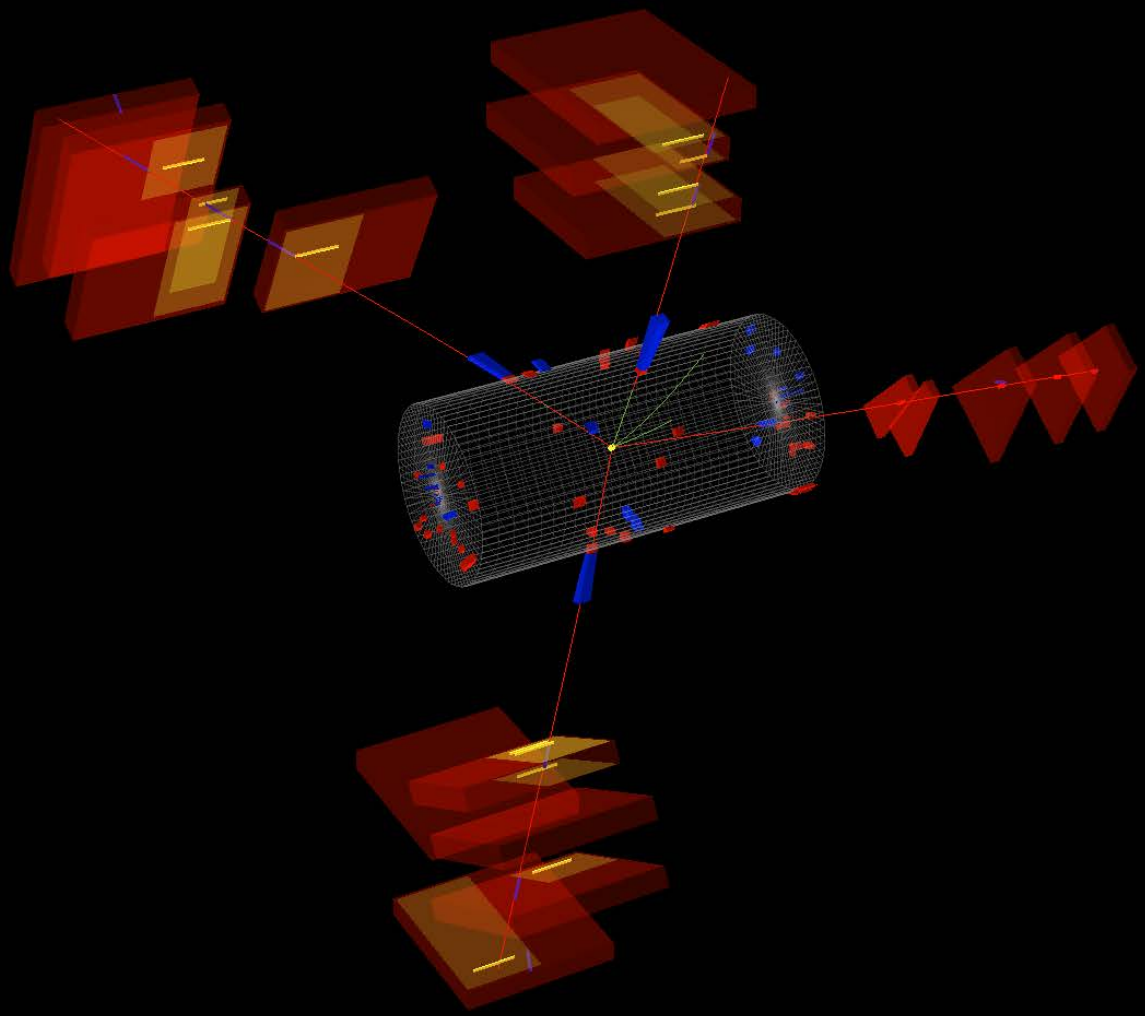
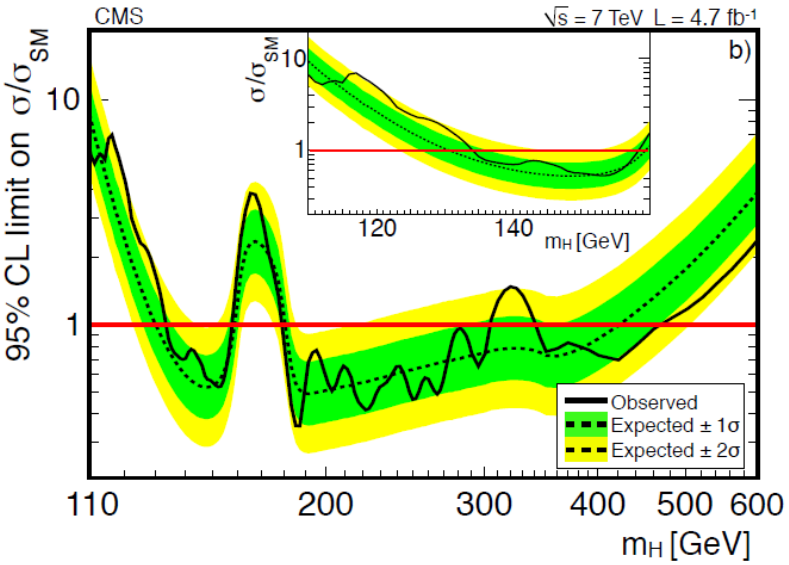
WP2: Experimental Activities



WP2: Goals

- Analysis of data collected by the CMS experiment at the Large Hadron Collider

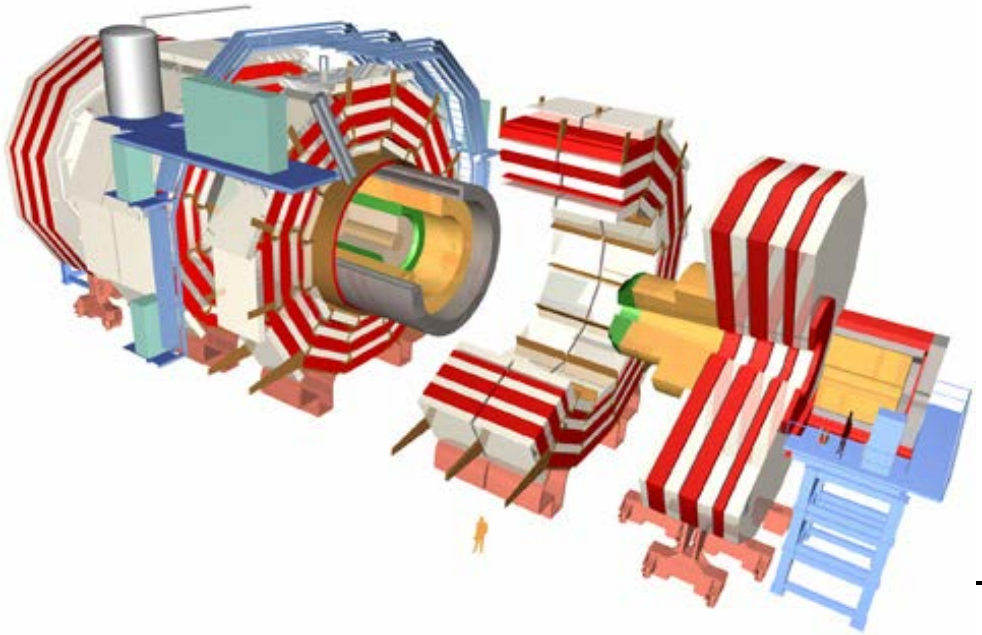
- Our group is presently involved in the search for the Higgs boson in the H→ZZ→4l channel
  - Just submitted a PRL on 2011 data: http://arxiv.org/abs/1202.1997



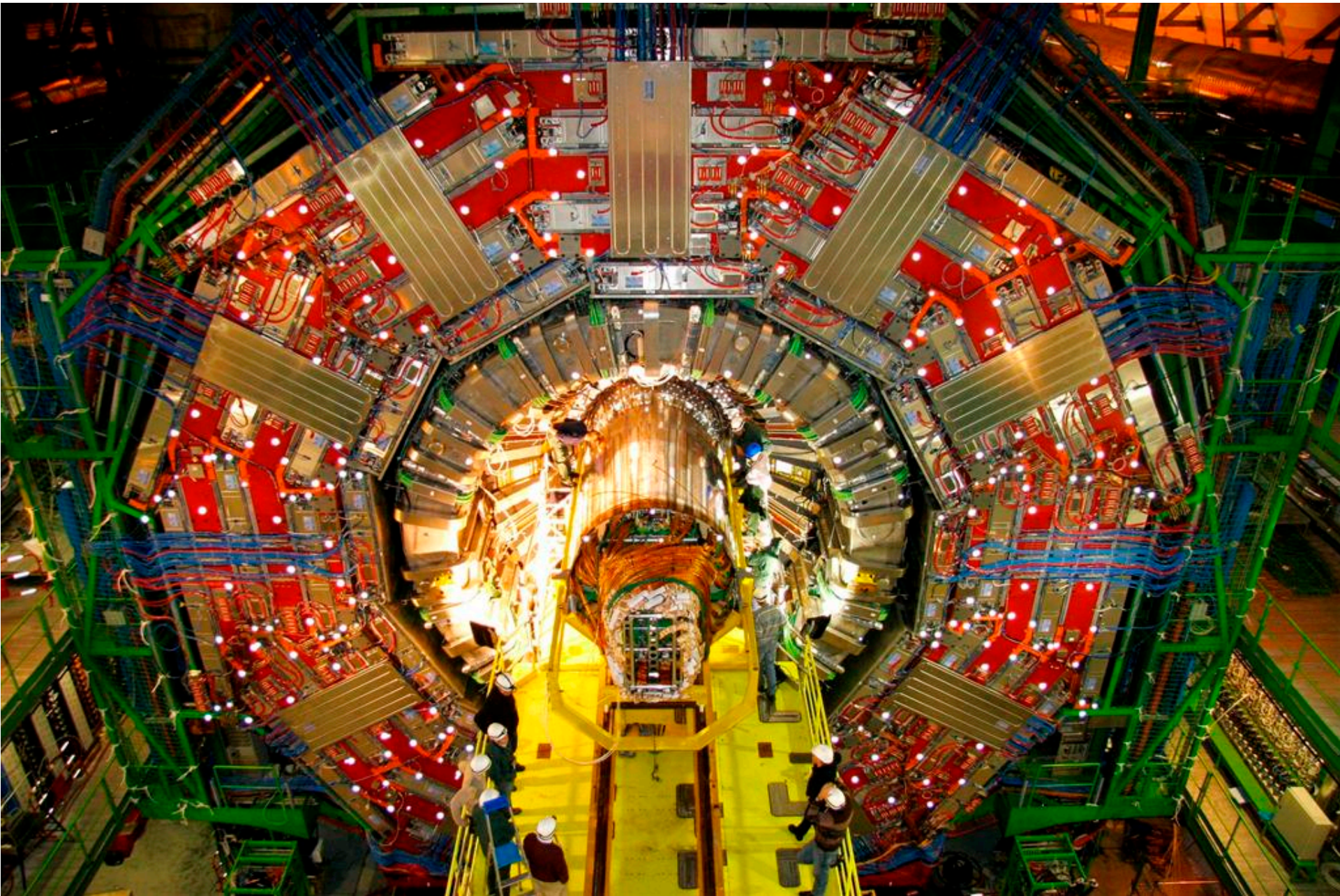
Goal of this presentation: **Review of computing in WP2**

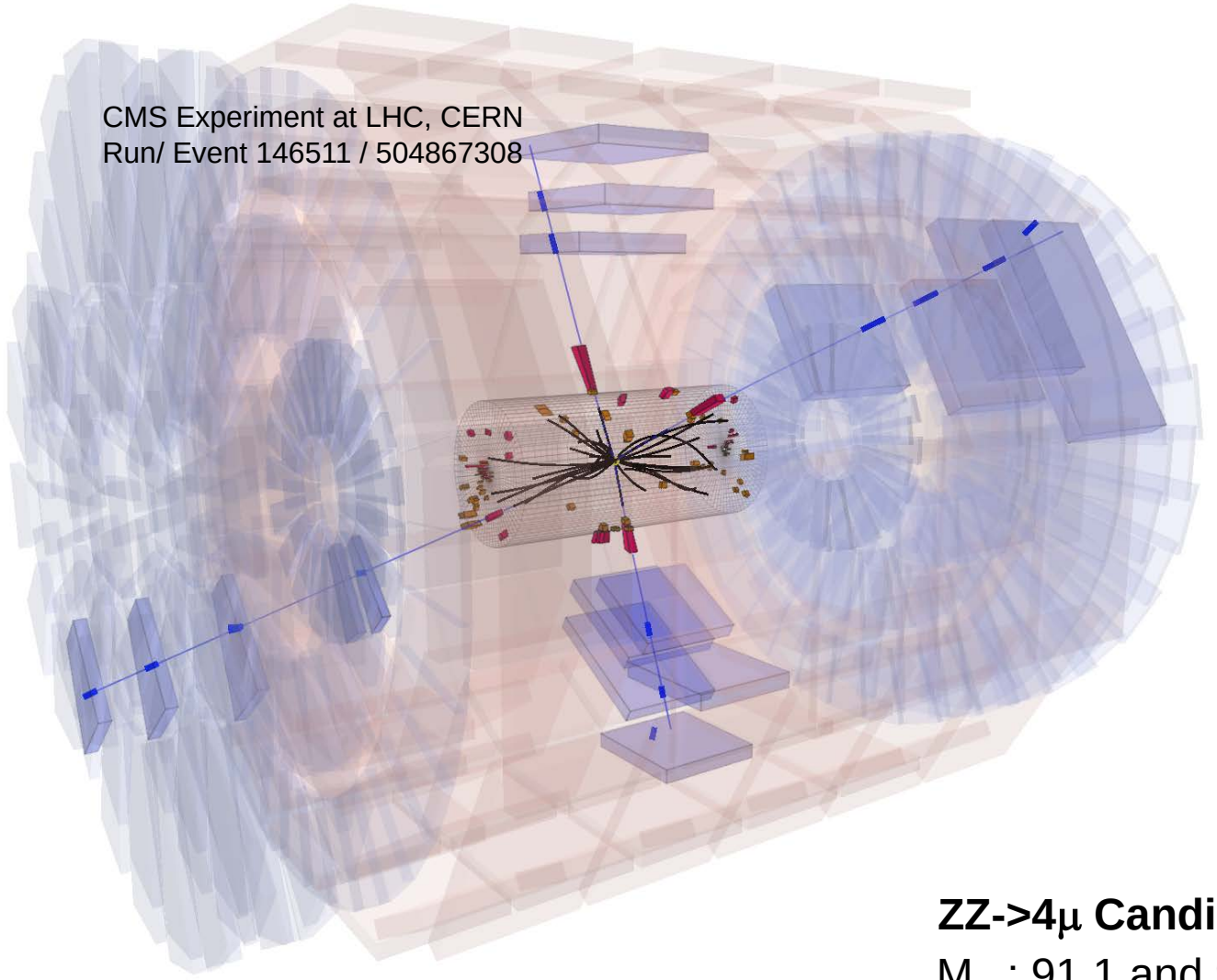
Compact Muon Solenoid (CMS)

- Proton collisions at 7(14) TeV at a frequency of 20 (40) GHz
- Particles produced in collisions are recorded by ~1 million electronic channels in a in a 21x15 m detector
- Data yeld: few Petabytes/year
  - Very large collaboration (155 institutes, 37 countries)
  - Centrally defined data model, software infrastructure (not something we have to invent)



CMS





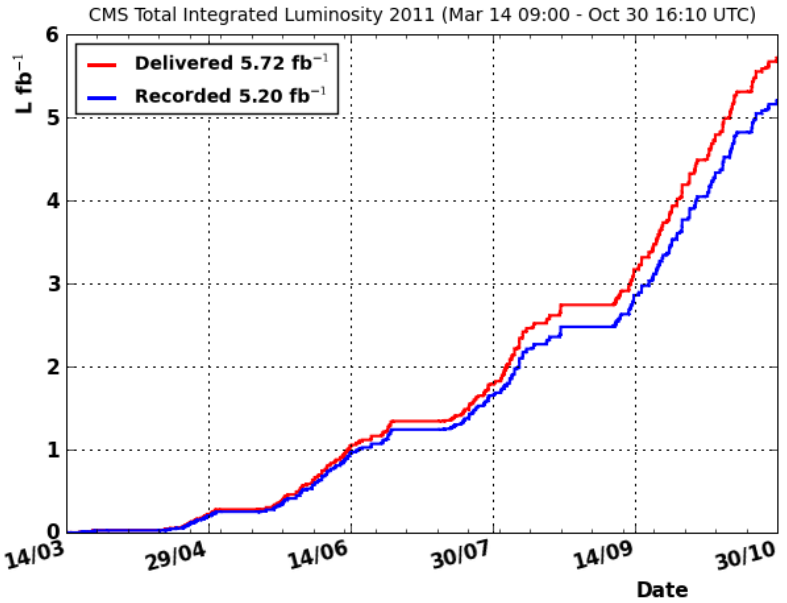
ZZ->4μ Candidate

$M_{\mu\mu}$: 91.1 and 92.2 GeV/c^2

$M_{4\mu}$: 201.7 GeV/c^2

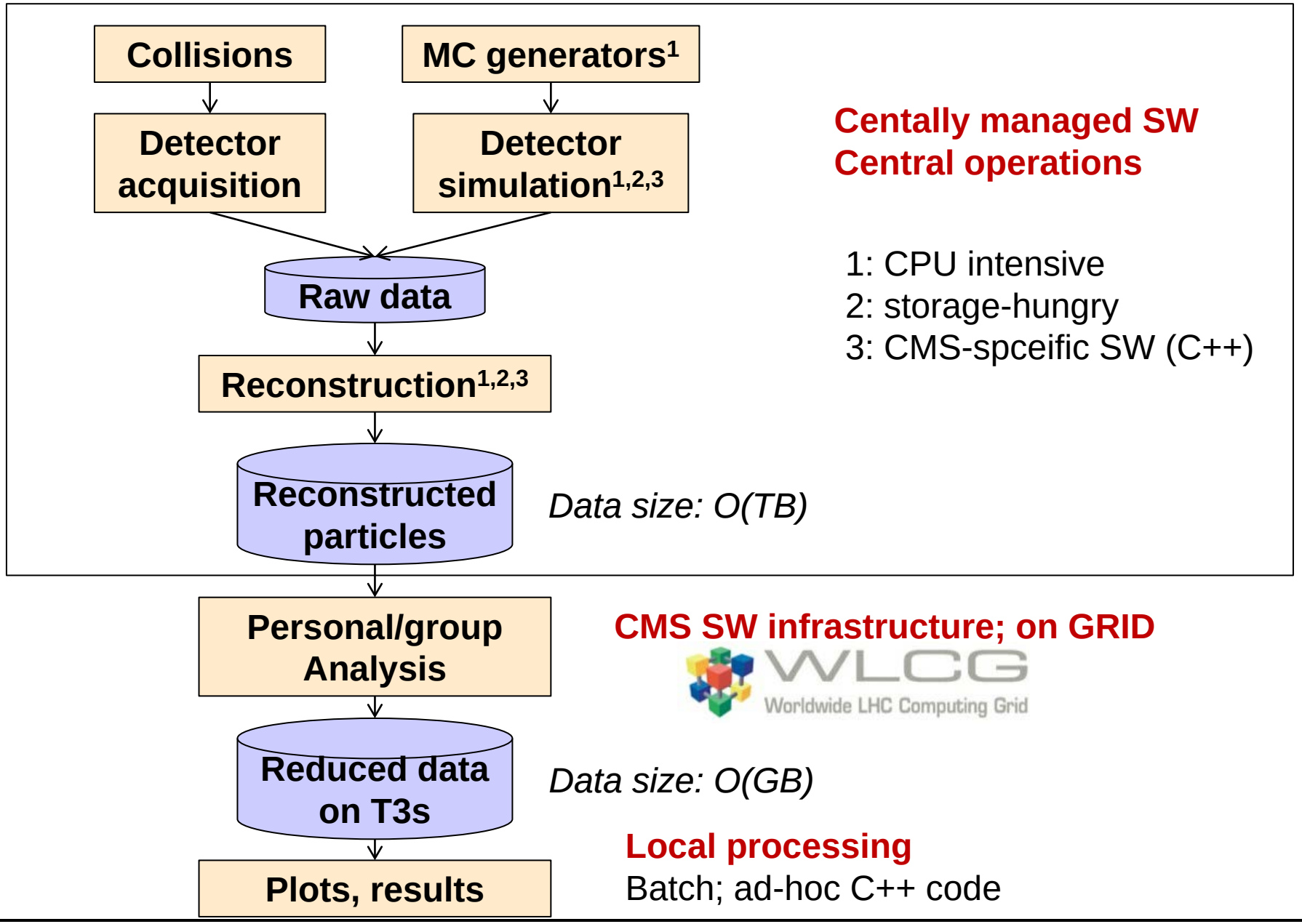
Present status and Plans for 2012

- 2011 data : 5 fb^{-1} @ 7 TeV
- CMS excluded the range 127-600 GeV at 95% CL.
  - CMS overall combination: http://arxiv.org/abs/1202.1488



- 2012: expected 15 fb^{-1} @ 8 TeV
- Our plan: continue the search in the H→ZZ→4l channel focusing in the range 114-127 GeV

Data Flow



Centally managed SW
Central operations

1: CPU intensive
2: storage-hungry
3: CMS-spceific SW (C++)

CMS SW infrastructure; on GRID

WLCG
Worldwide LHC Computing Grid

Local processing
Batch; ad-hoc C++ code

Data flow and WP3?

- Central software
  - CPU-intensive → optimization and parallelization is relevant, but not so interesting in the context of WP2 goals
    - Constrains from existing architecture, WLCG GRID infrastructure
    - Scale of the operation tasks beyond scope of the project
- Personal/group analysis software
  - Short sw lifetime (update-run-update model) cycle makes optimization less appealing than dumb parallelization
    - Typically, same operation repeated on independent events → independent jobs in batch queues
  - We have little experience of handling a T3: could gain a lot here
    - Connection with the Grid infrastructure (e.g. SE), efficient parallelization of our jobs, …
    - Help from a computing expert (WP3 postdoc) would be critical
      - Admittedly, more operational than innovative

Local T3

- We just acquired some resources for local analysis
  - 4x nodes HP DL360g7
    - Dual-E5645 (2x6 core), 48 MB RAM
  - 48 TB in the INFN SAN system
  - Integrated in the infrastructure of the INFN CdC
- Will be available for the project