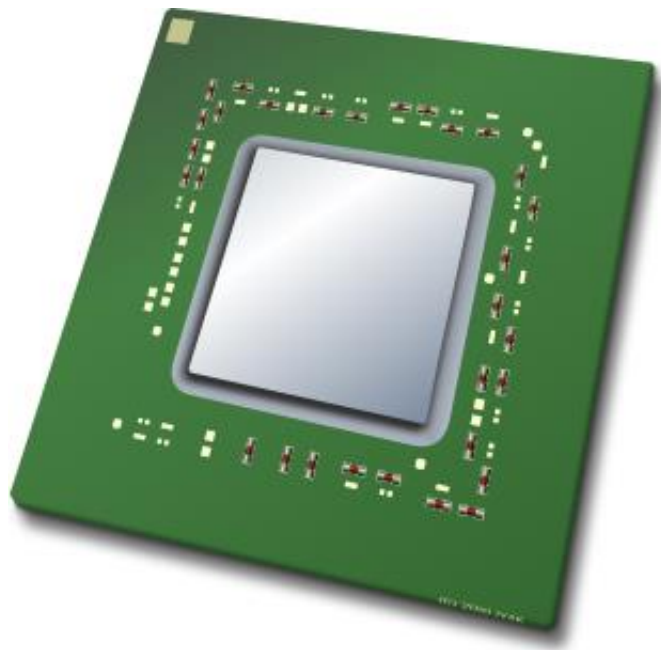




# WLCG: Planetary Computing for CERN's Large Hadron Collider

Oliver Keeble



X 400,000



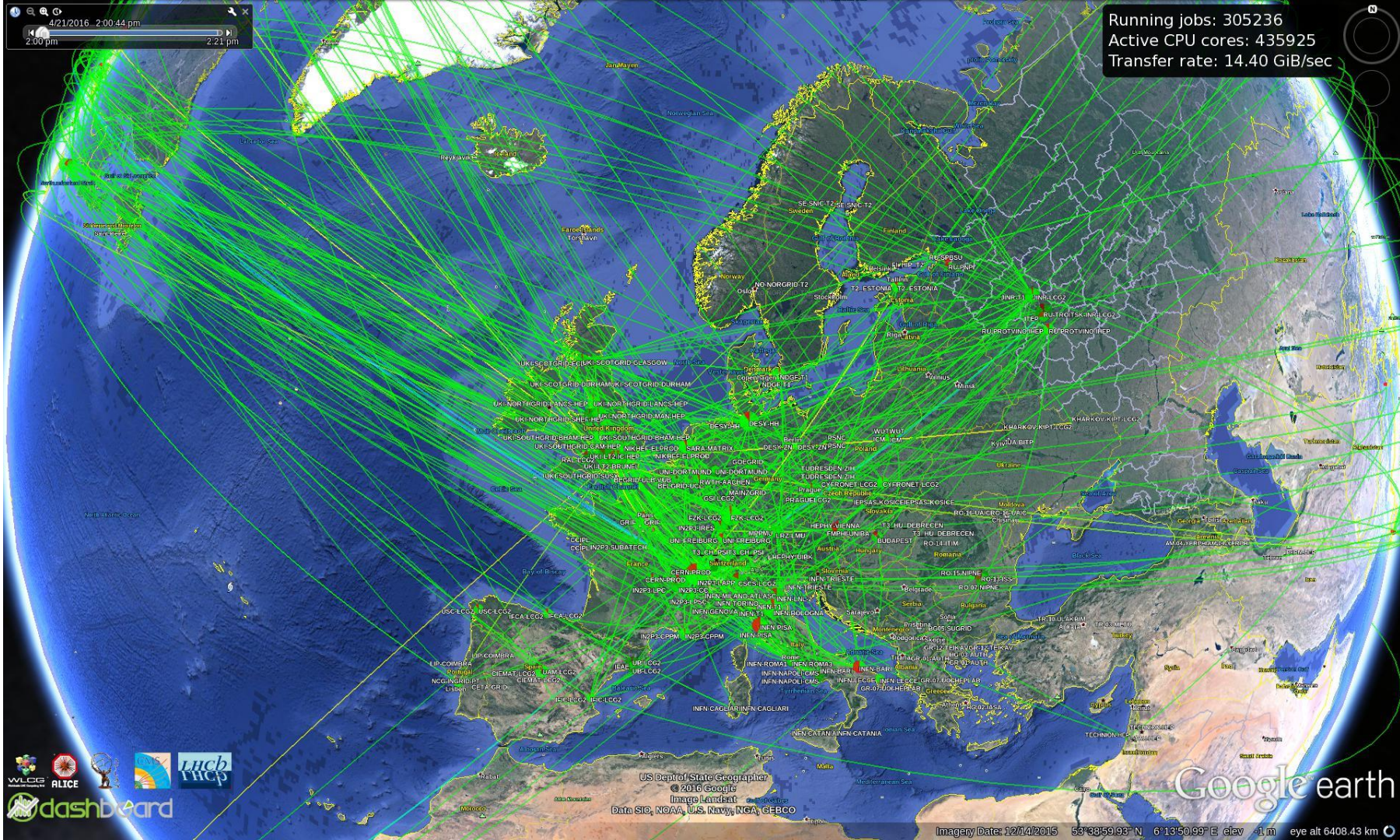
X 300,000







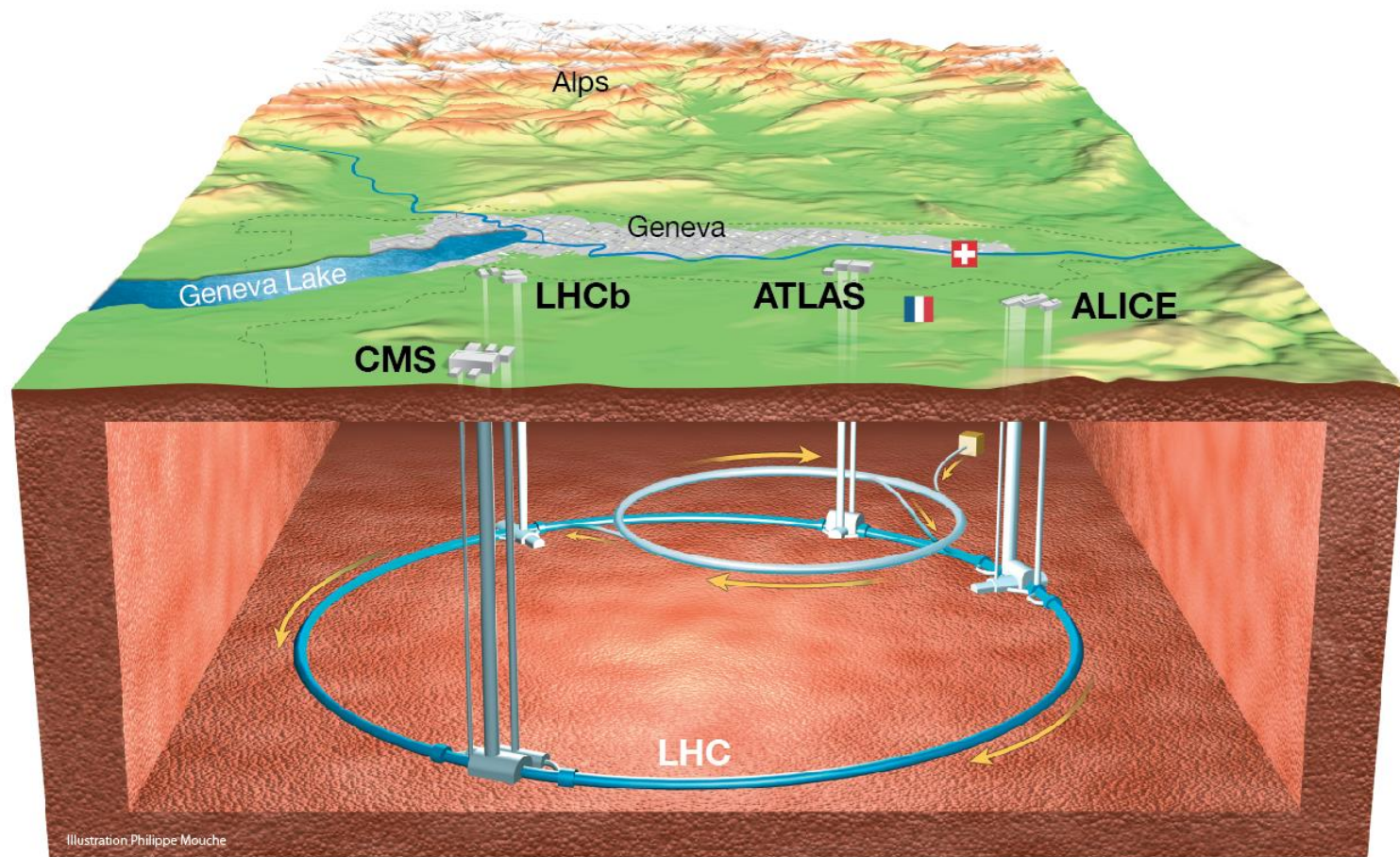
```
Running jobs: 305236
Active CPU cores: 435925
Transfer rate: 14.40 GiB/sec
```



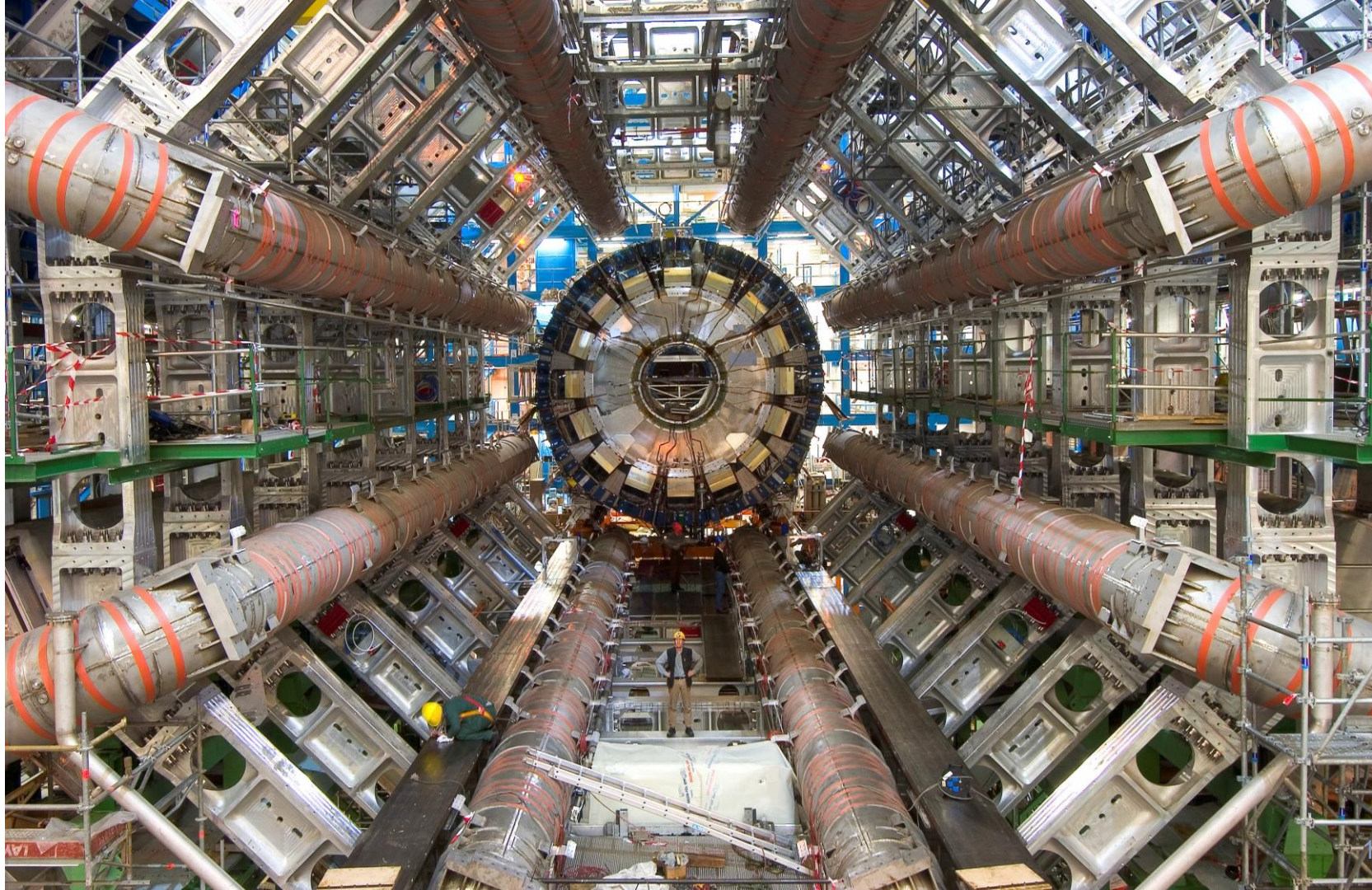
# Outline

- Why do you need so much computing?
- OK, but why did you do it like *that*?
- Fair enough, how does it work then?











## Global Effort → Global Success

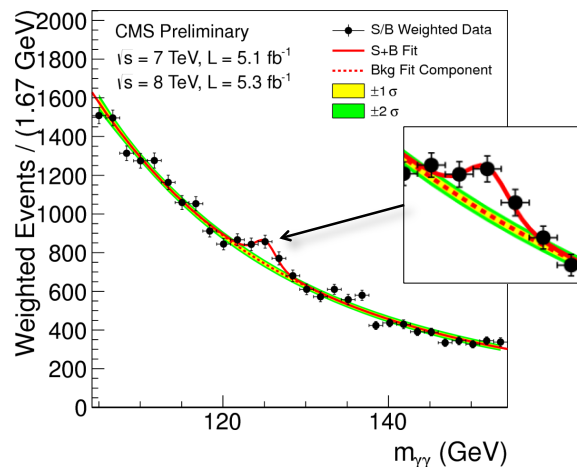
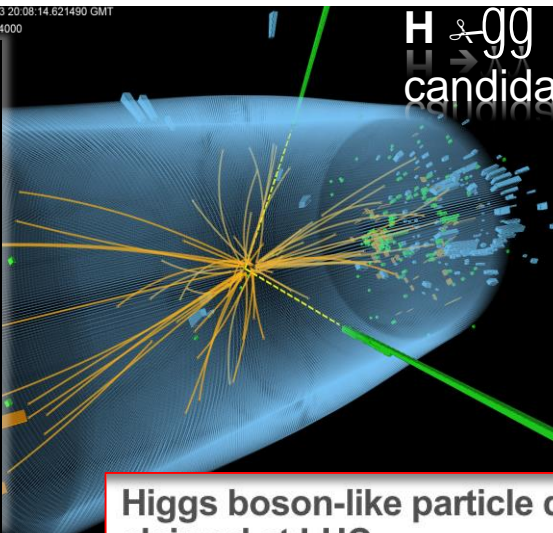
Results today only possible due to  
extraordinary performance of  
accelerators – experiments – Grid computing

Observation of a new particle consistent with  
a Higgs Boson (but which one...?)

Historic Milestone but only the beginning

Global Implications for the future

R-D Heuer



## Higgs boson-like particle discovery claimed at LHC

COMMENTS (1665)

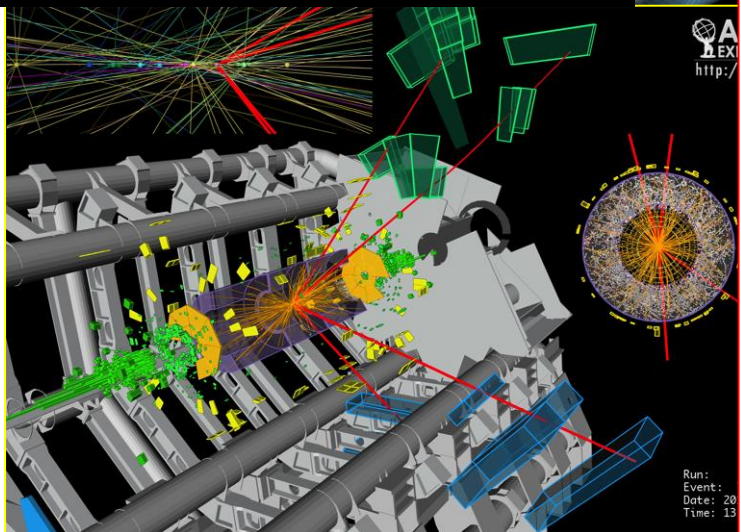
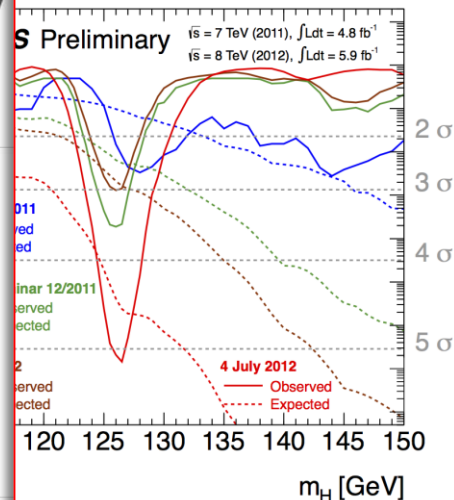
By Paul Rincon

Science editor, BBC News website, Geneva



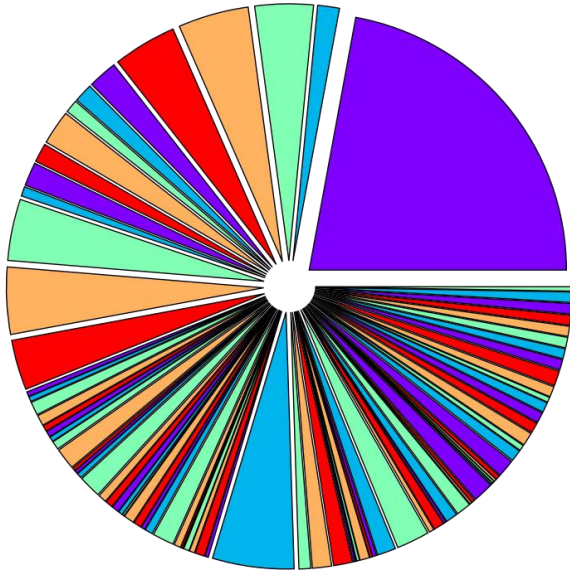
The moment when Cern director Rolf Heuer confirmed the Higgs results

Cern scientists reporting from the Large Hadron Collider (LHC) have claimed the discovery of a new particle consistent with the Higgs boson.

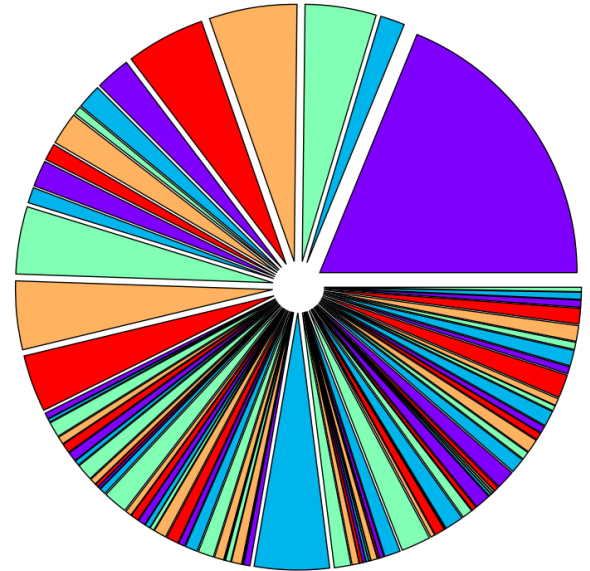


# Pledged Resources

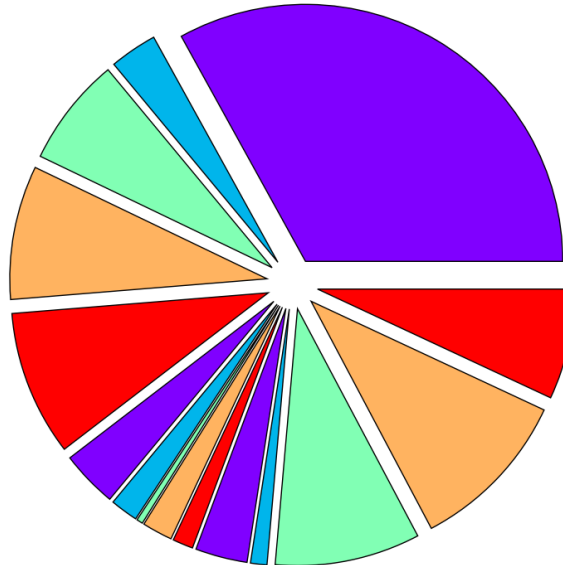
CPU by computer centre  
Total ~400k cores



Disk by computer centre  
Total ~300 PB



Tape by computer centre  
Total ~400 PB







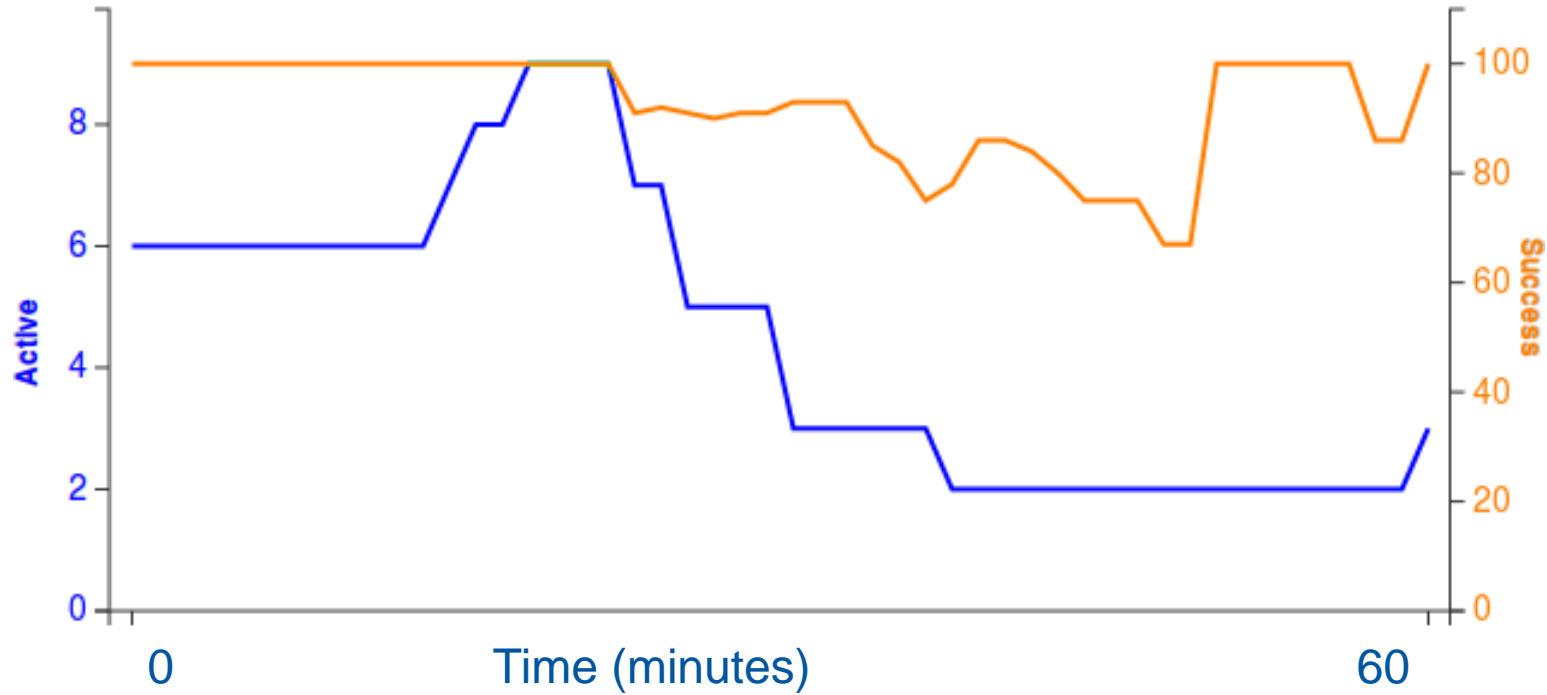
Imagery Date: 12/14/2015 53°38'59.93" N 6°13'50.99" E elev -1 m eye alt 6408.43 km



# File Transfer Service

```
fts-transfer-submit -K -o -l delegation_id  
-s https://fts3.cern.ch:8443  
gsiftp://eoscmsftp.cern.ch//eos/cms/store/PhED  
Ex_LoadTest07/source/T2CHCERN_FE  
srm://grid05.lal.in2p3.fr:8446/srm/managerv2?  
SFN=/dpm/lal.in2p3.fr/...
```

# The FTS optimiser

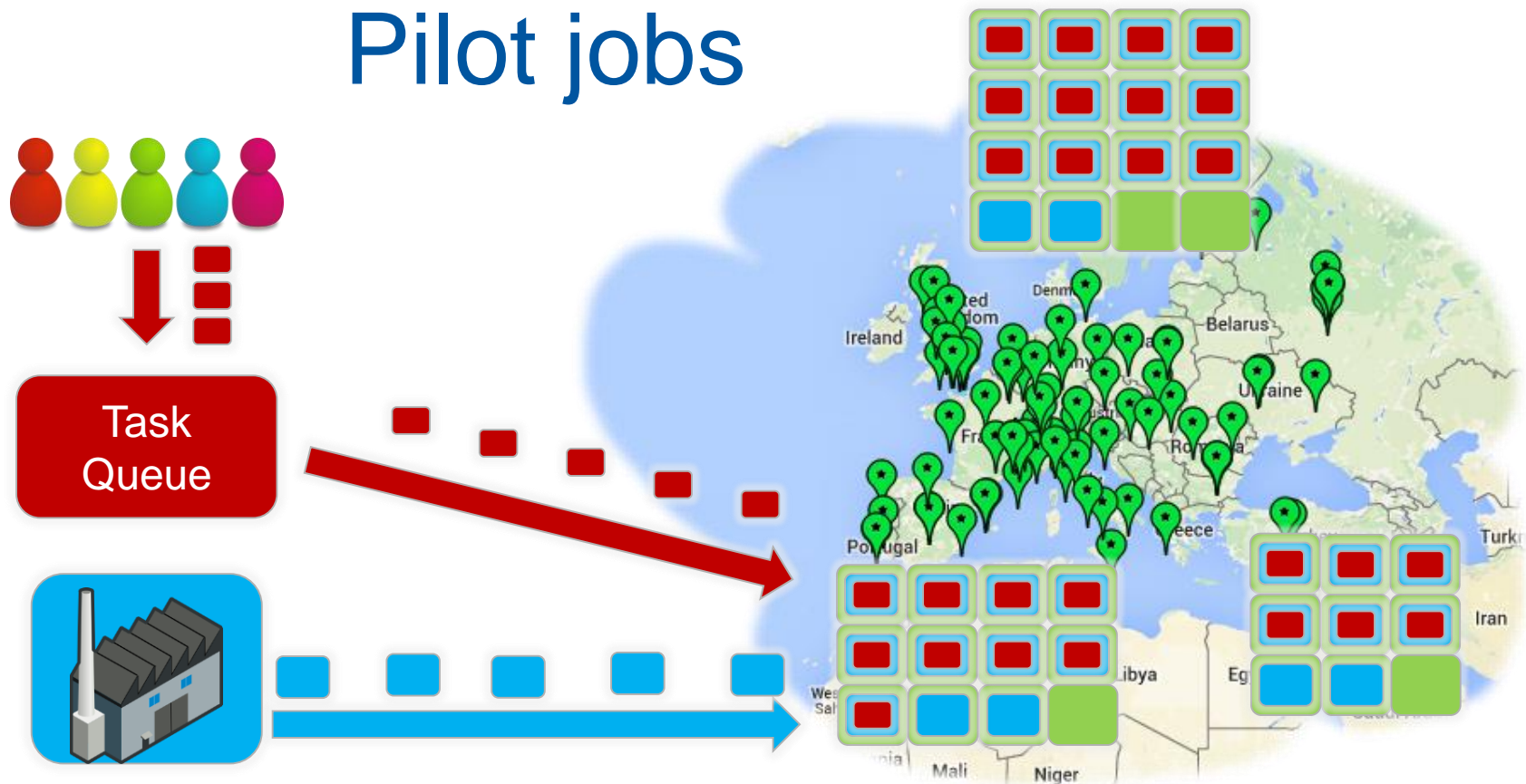


# 150 sites = 150 batch systems

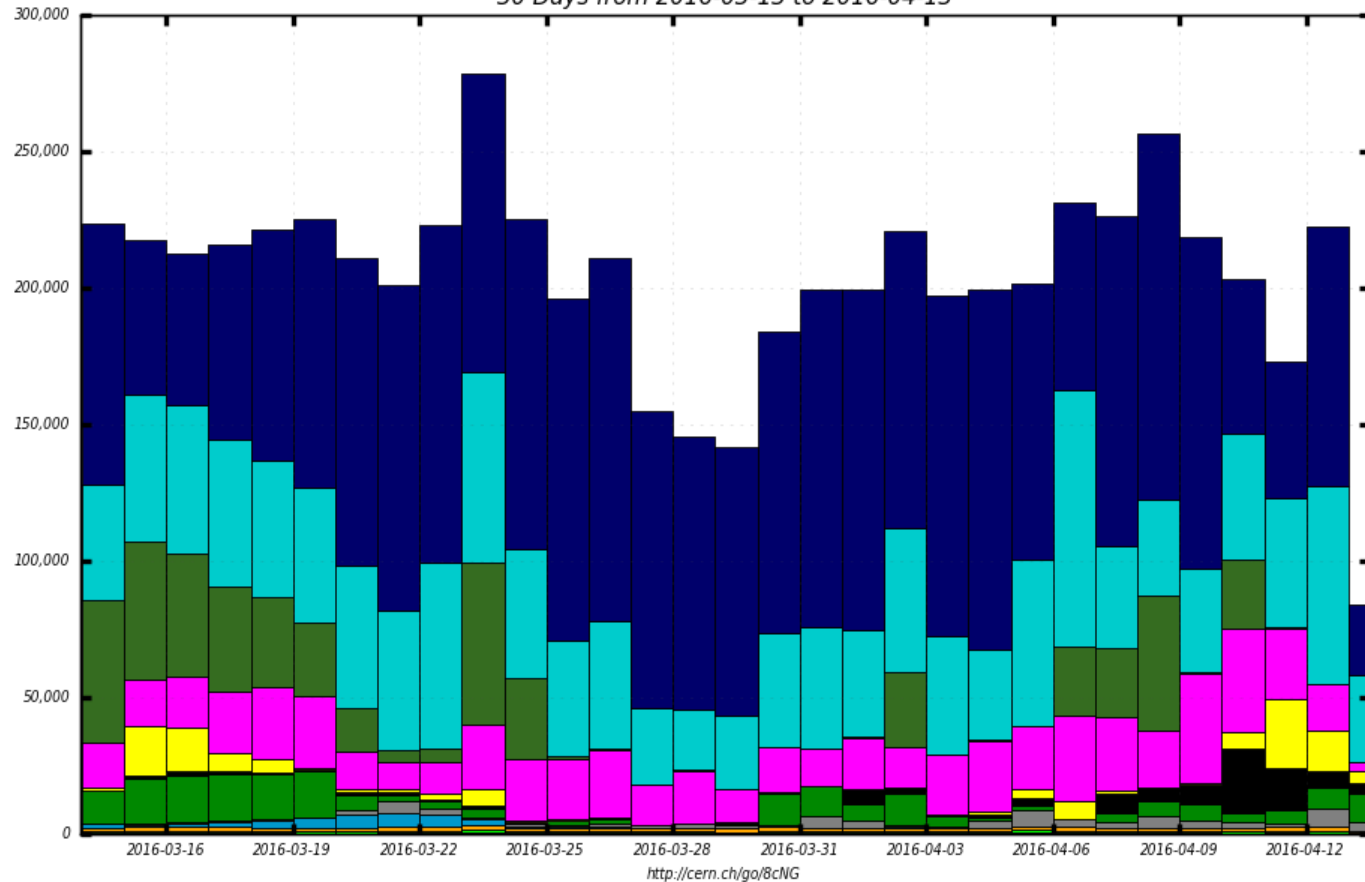




# Pilot jobs



# Slots of Running Jobs 30 Days from 2016-03-13 to 2016-04-13



MC Reconstruction  
Validation  
Testing

MC Simulation Full  
Group Production  
MC Simulation

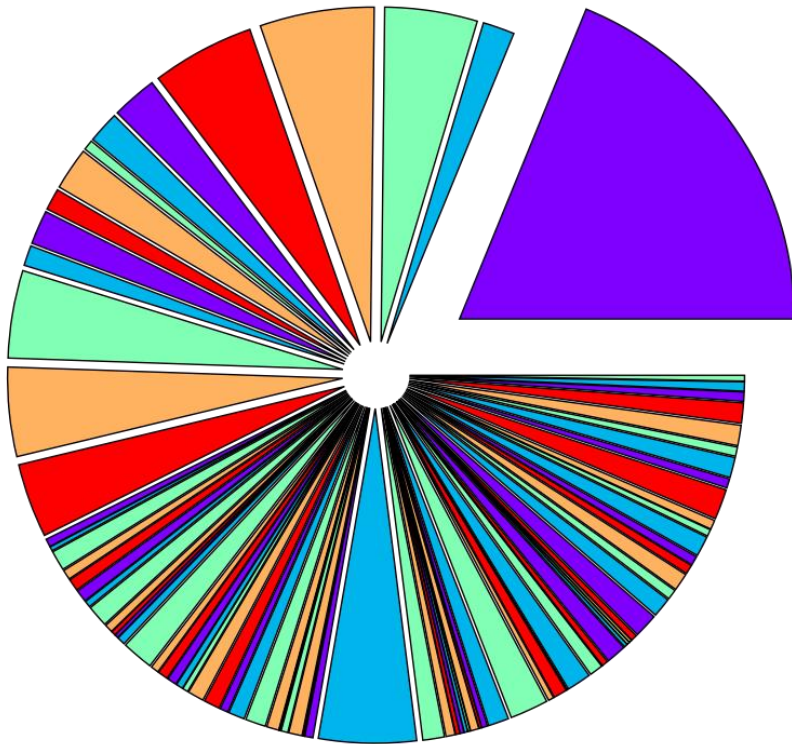
MC Event Generation  
Group Analysis  
Others

User Analysis  
MC Simulation Fast  
CAF Processing

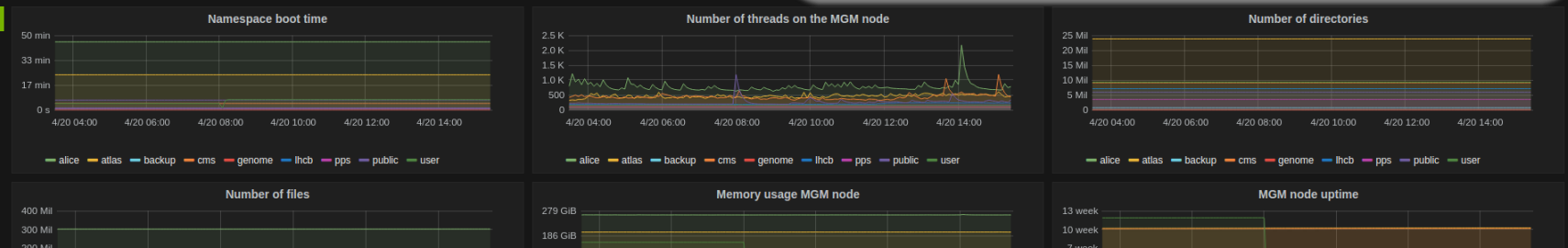
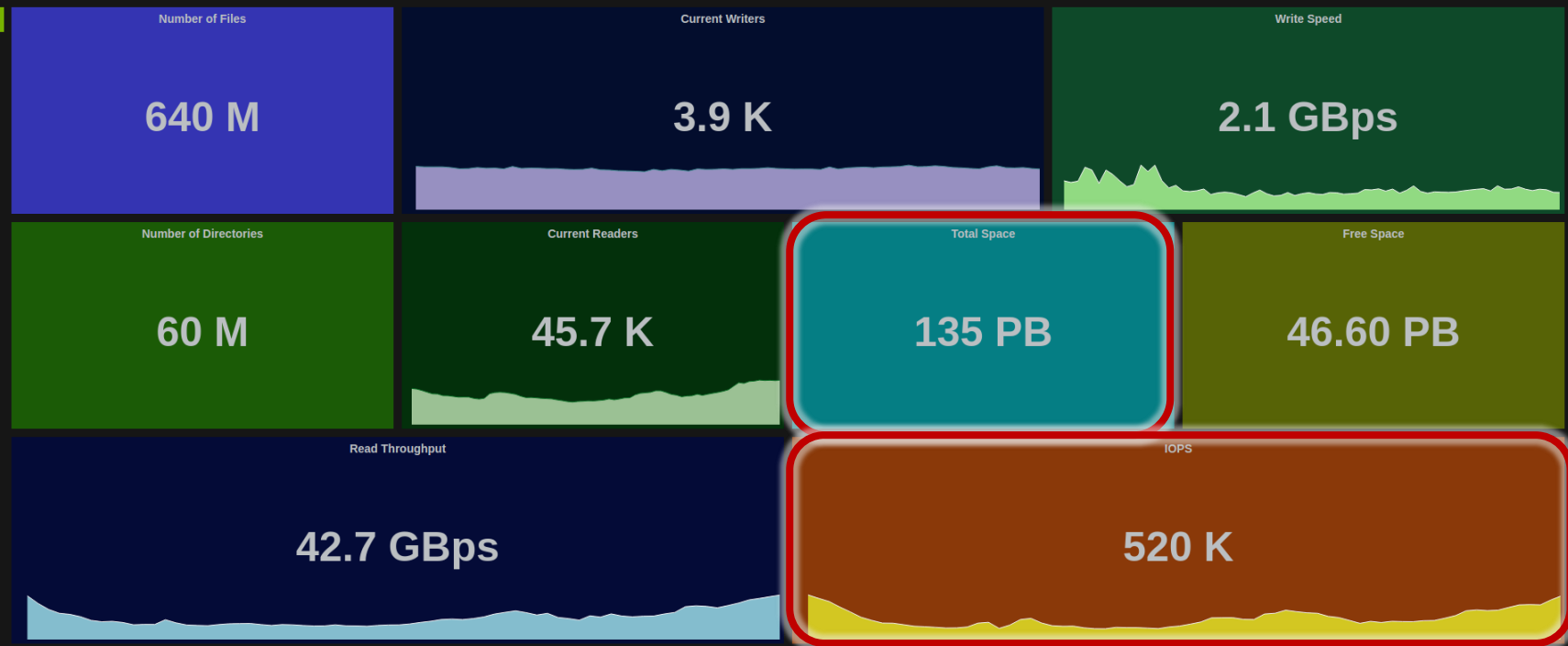
Data Processing  
T0 Processing  
unknown

Maximum: 278,655 , Minimum: 0.00 , Average: 197,483 , Current: 83,685

Disk by computer centre  
Total ~300 PB

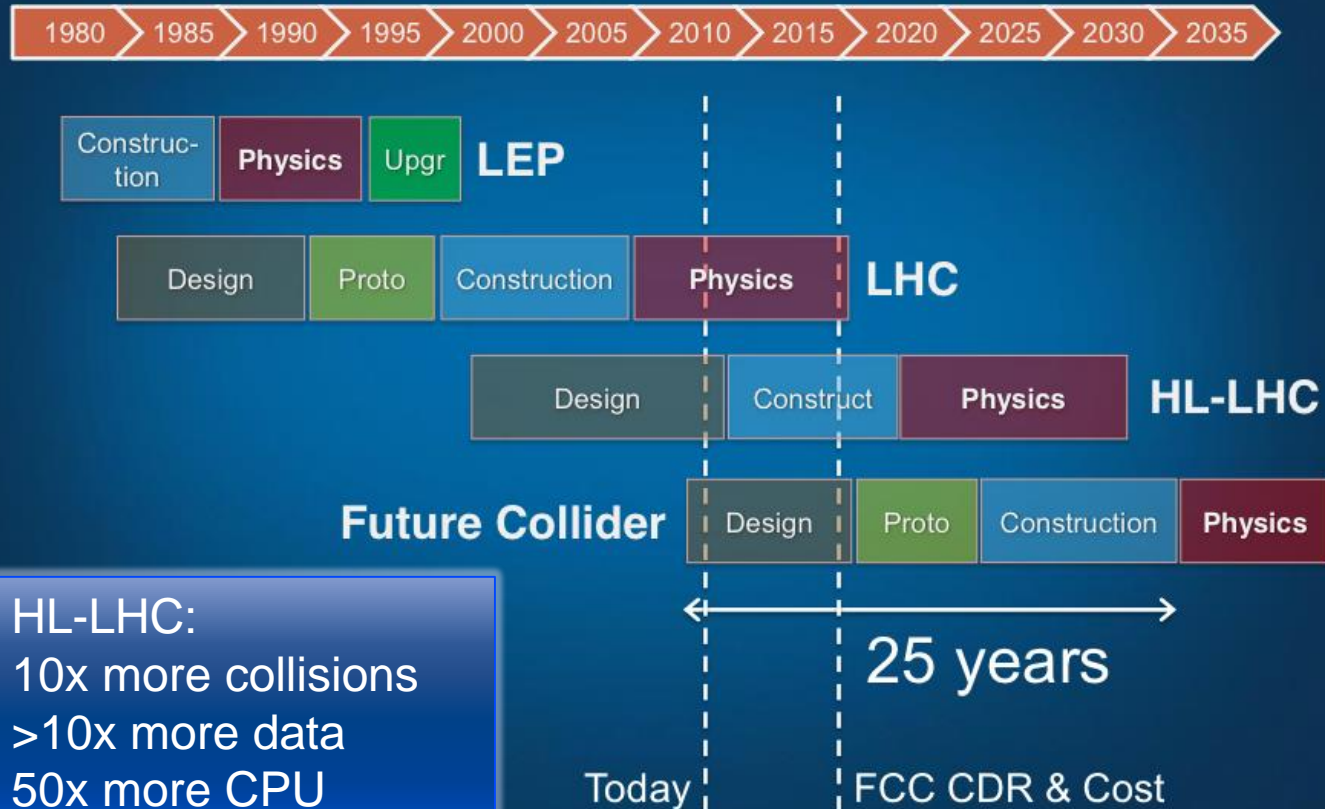


Instance: All





# HEP Timescale



1/2/2016 2:28:43 pm

Running jobs: 295481  
Active CPU cores: 405485  
Transfer rate: 9.53 GiB/sec

# THANK YOU



WLCG  
Worldwide LHC Computing Grid



US Dept of State Geographer  
© 2015 Google  
Image Landsat  
Data SIO, NOAA, U.S. Navy, NGA, GEBCO

Google earth

Imagery Date: 12/14/2015 62°09'32.53" N, 24°11'35.79" W elev 41260 m eye alt 6019.46 km

# Credits & references

- This talk represents the work of the WLCG collaboration and its experiments, technology providers, sites & users.
- Useful references for further information
  - <http://wlcg-public.web.cern.ch/>
  - <http://atlas.cern/>
  - <http://cms.web.cern.ch/>
  - <http://fts3-service.web.cern.ch/>
  - <http://information-technology.web.cern.ch/services/eos-service>