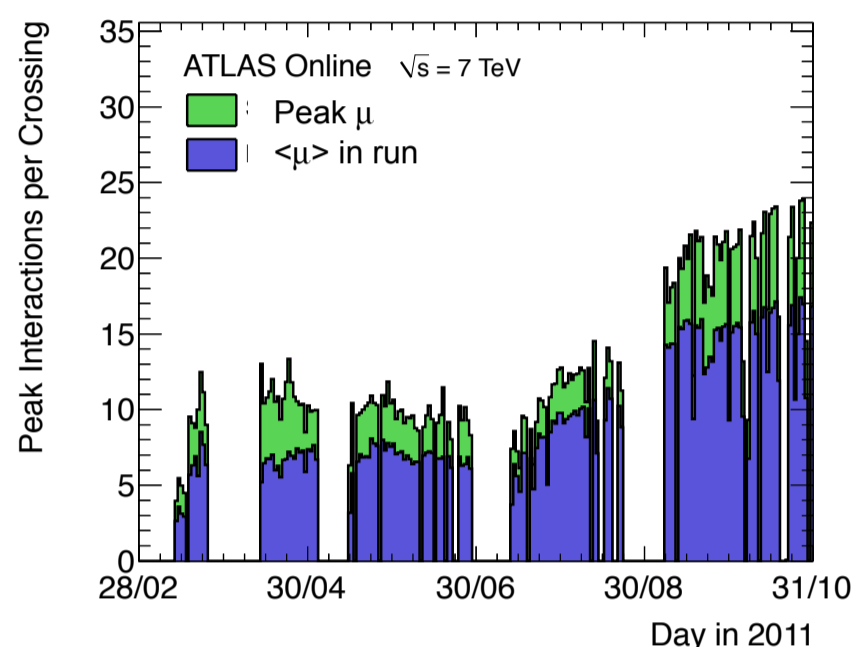
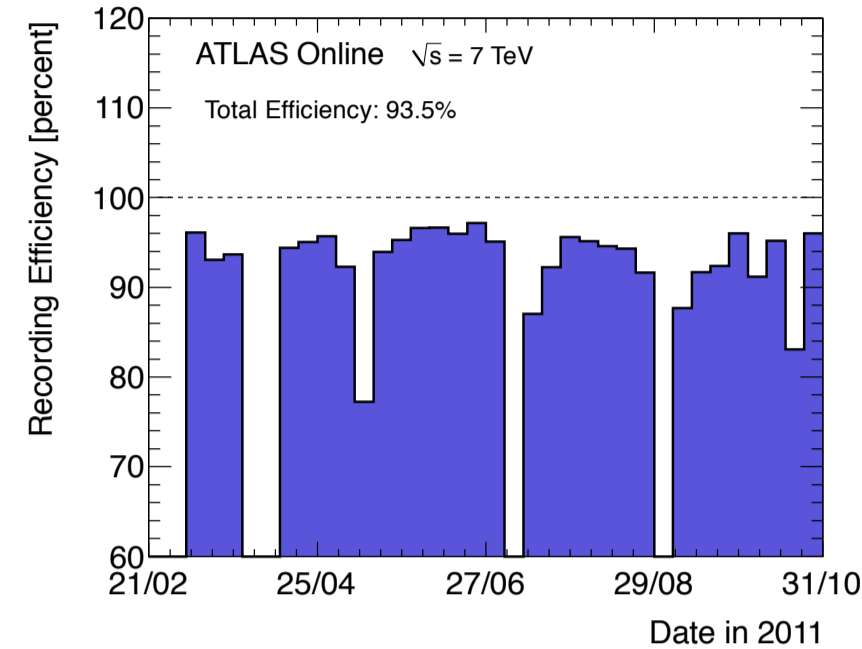
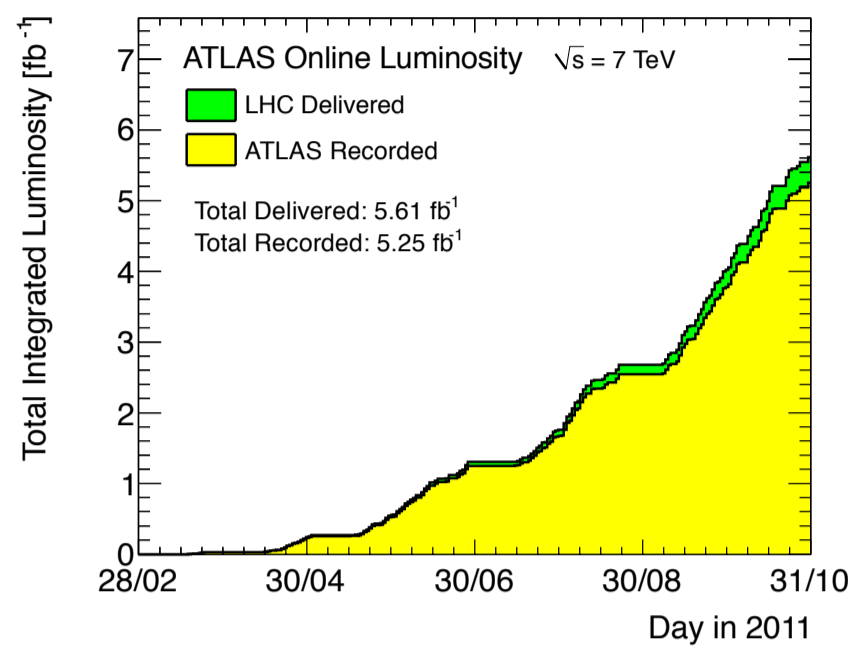


# Prompt data reconstruction at the ATLAS experiment in 2011

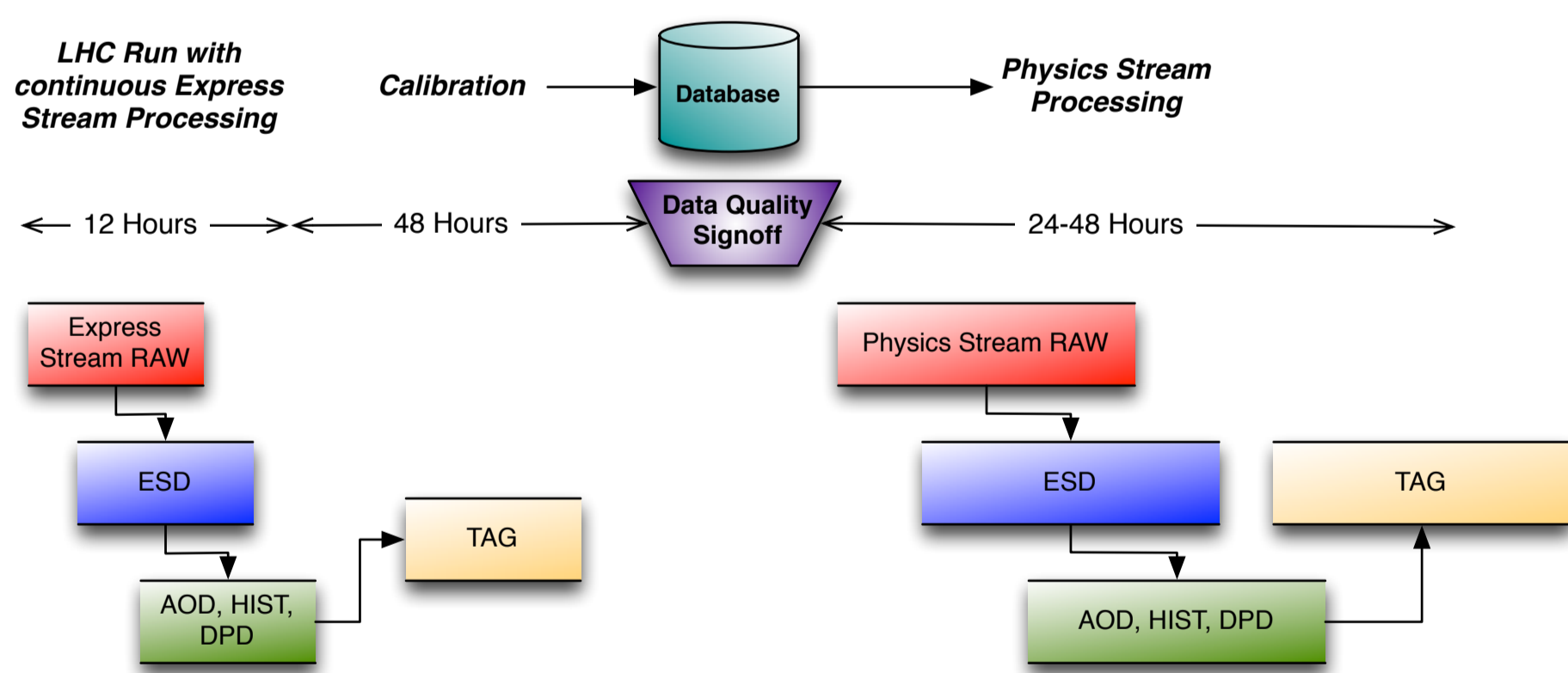
## ATLAS data taking



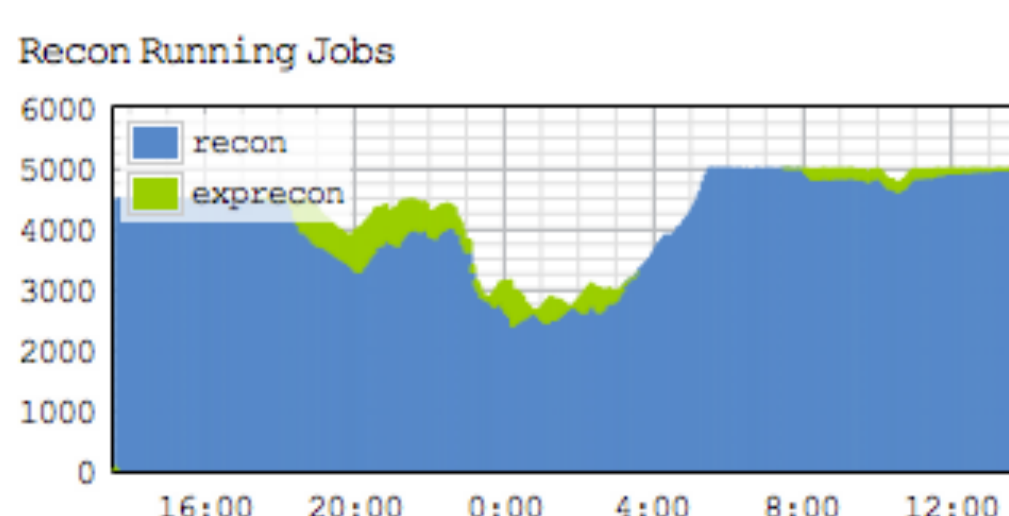
- In 2011 5.25fb<sup>-1</sup> was recorded by ATLAS at 7TeV centre of mass energy (c.f. 45pb<sup>-1</sup> in 2010).
- Data is taken in runs (usually an LHC fill) and sub-divided into Luminosity Blocks of 1 or 2 minutes
- There is a steady increase in the number of interactions per bunch crossing,  $\langle\mu\rangle$ , as LHC luminosity grows

- Data taking efficiency was 93.5% in 2011
- ATLAS data is organised into streams based on trigger information
  - An express stream is used for calibration and data quality
  - Physics streams are Egamma, Muons, JetTauEtmis, Minbias
  - Inclusive Streams: the same event can be in more than one stream
  - Calibration streams are also recorded for sub detectors
- Many data types are produced from RAW data (~0.65MB/evt, compressed): detailed Event Summary Data (ESD, 1.1MB/evt); Analysis Object Data (AOD, 0.16MB/evt); Derived Physics Data (DPD, typically 0.1MB/evt); event summary data (TAG, 10kB/evt); monitoring histograms (HIST).

## Calibration Loop



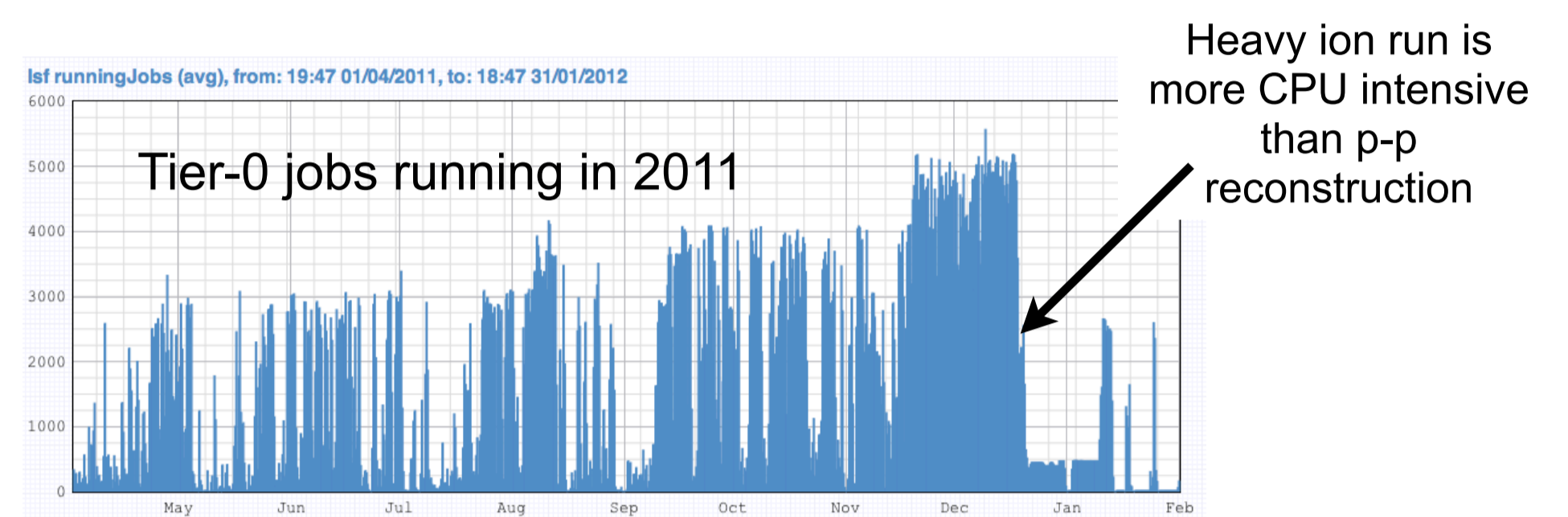
- The express stream ~10Hz of special triggers for data quality monitoring and detector calibrations
  - Processed to check data quality and determine calibration constants
  - Calibration constants uploaded to database and used to process physics streams
- Data quality is signed off after ~48 hours, but can be delayed if needed
- Bulk processing then takes 1-2 days
- Data ready for first physics analysis 3-4 days after the LHC run



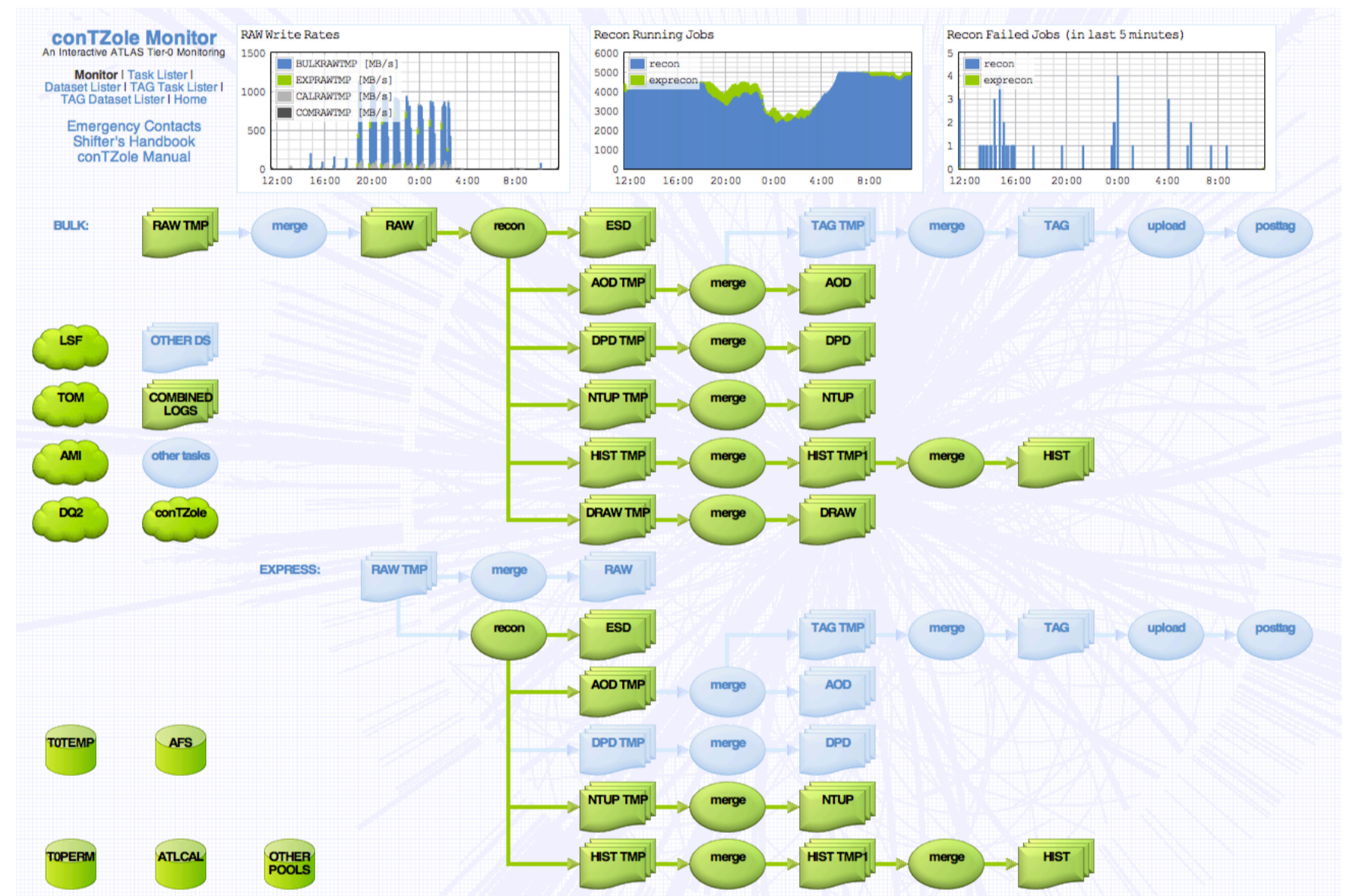
Tier-0 monitoring showing express (green) and physics (blue) processing ongoing

## Tier-0 setup and operations

- ATLAS Tier-0 at CERN is responsible for running both express stream and physics stream reconstruction
- Resources growing with more LHC data:
  - For 2010 3000 cores were used
  - For 2011 4000 cores were used for p-p collisions, rising to 5000 for Pb-Pb
  - For 2012 6000 cores are available

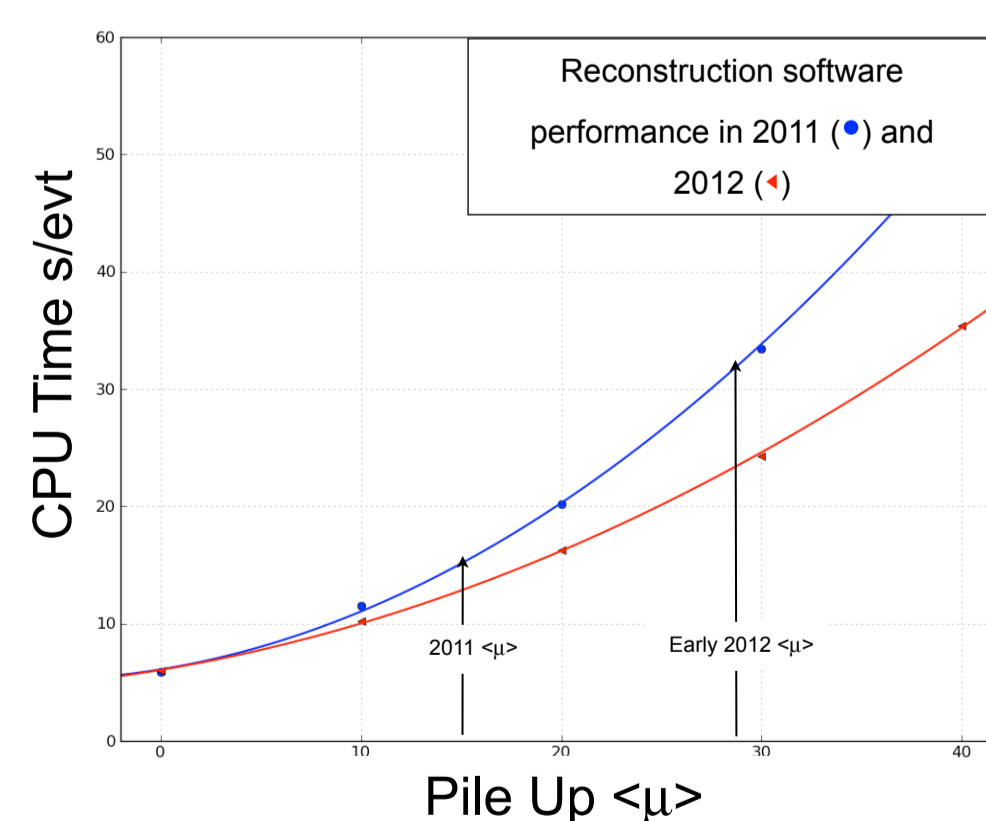


- Tier-0 jobs are monitored by shifters and experts
- Bug reports are submitted when any problem is found
- Most problems can be fixed quickly, so very little data misses the bulk reconstruction step (~0.02% in 2011)



Tier-0 Interactive Monitoring showing data processing pipelines

## Quality Control and Improvements for 2012



- Tier-0 is under constant resource pressure so efficient job processing is essential
- Improvements in ATLAS reconstruction software lead to faster reconstruction at high pile up
- The merging of small files is now done with a hybrid merger which is ~7x quicker
- Database access at Tier-0 now goes via FRONTIER, instead of direct Oracle connections

- The performance and correctness of ATLAS offline software is constantly checked via several testing frameworks
- Tier-0 software results are checked each night via the Tier-0 Chain Test, which does a byte by byte comparison of outputs to ensure adherence to the Frozen Tier-0 policy (physics results cannot change during data taking, so that all data can be analysed from Tier-0 reconstruction)