LHCC Referee Meeting

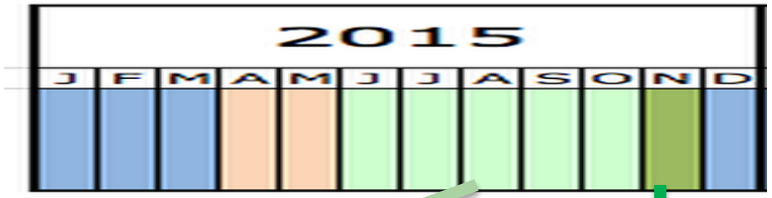
01/03/2015

ALICE Status Report

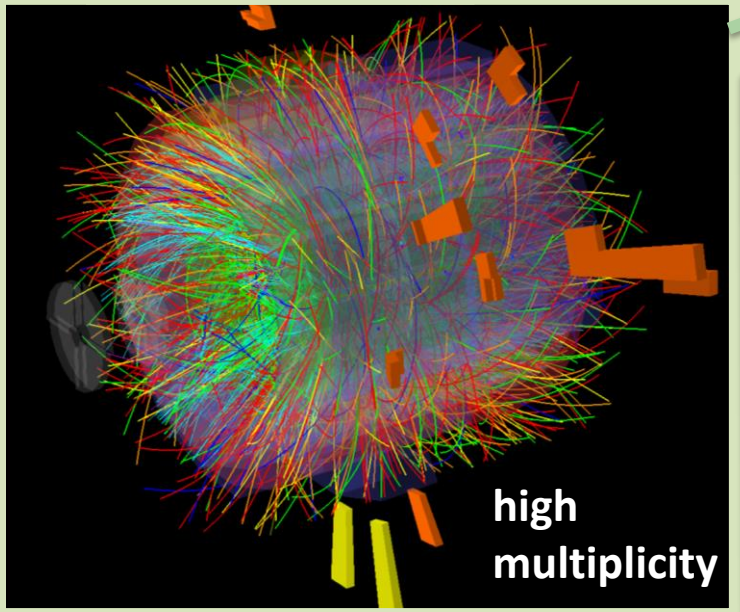
Predrag Buncic

CERN

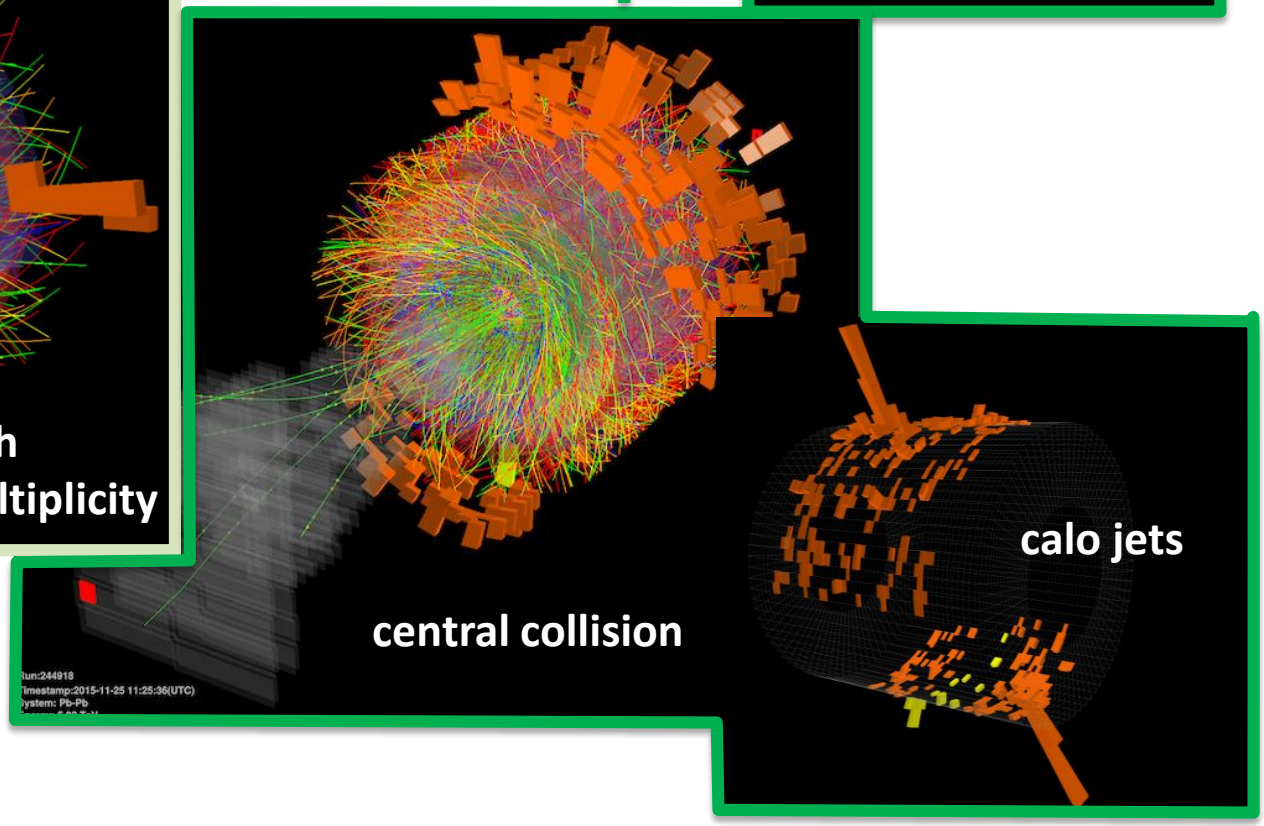
Summary of 2015 data taking



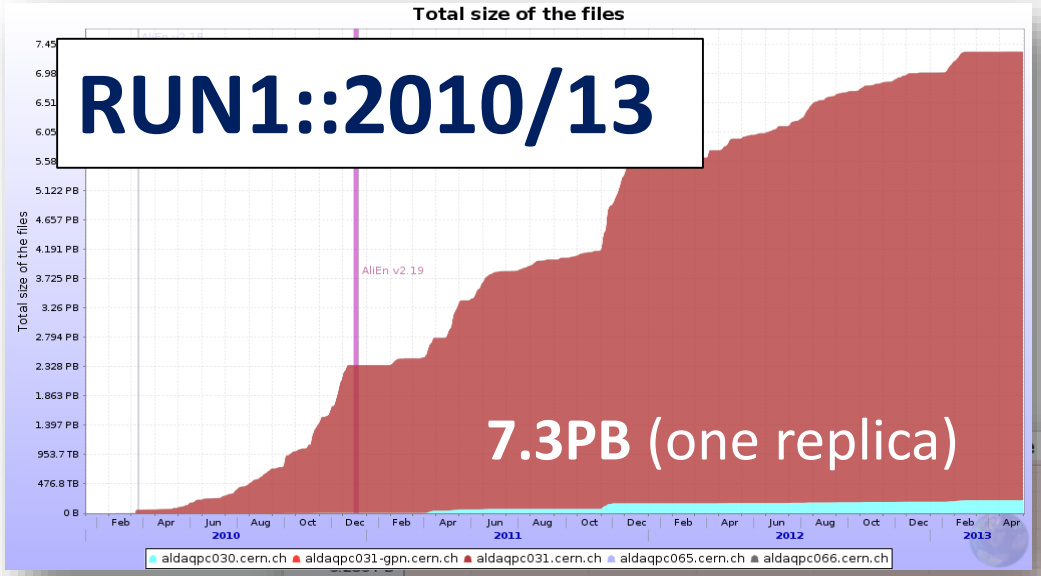
p-p @ 13 TeV



Pb-Pb @ 5.02 TeV



Run 2: Data volume

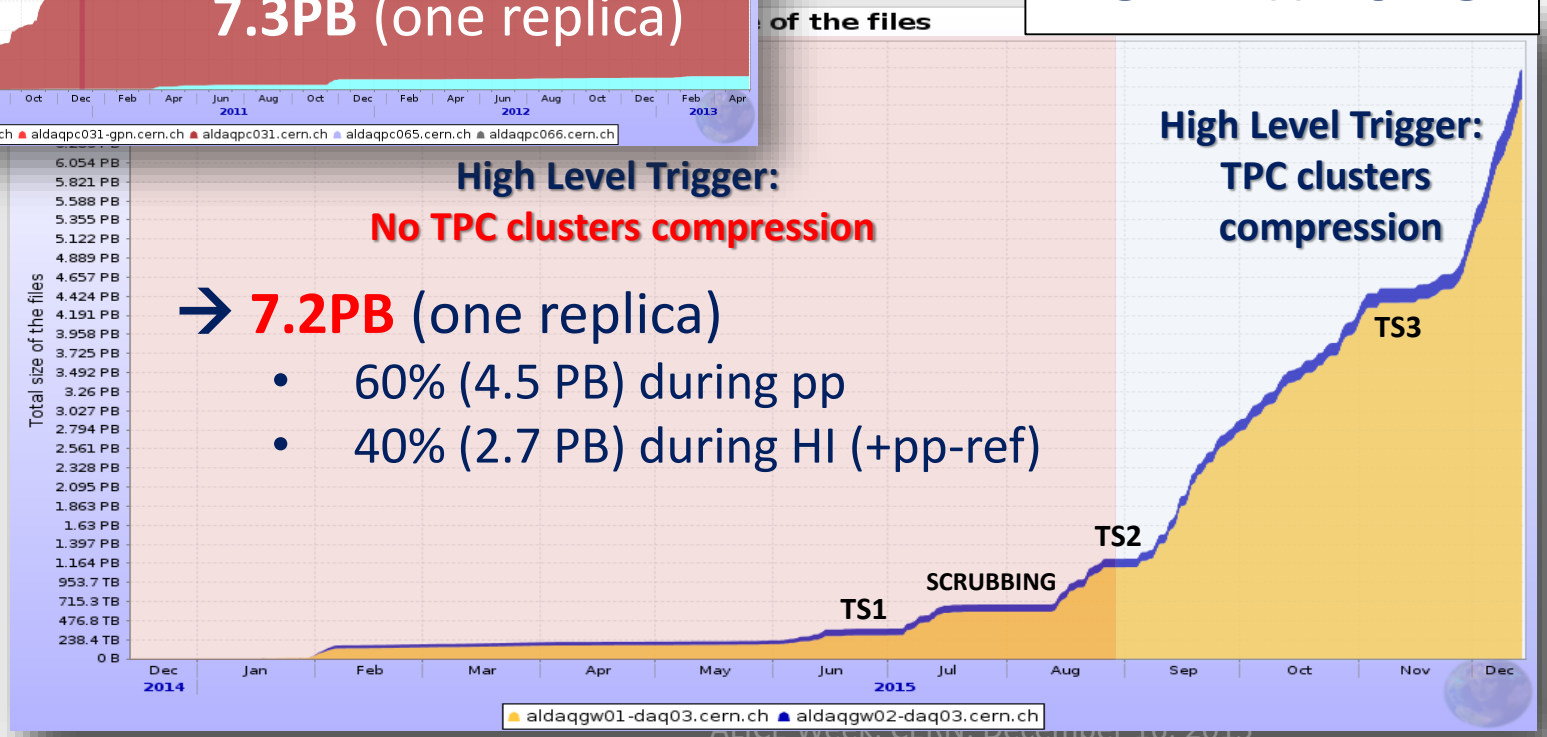


RUN2::2015

High Level Trigger:
No TPC clusters compression

→ **7.2PB** (one replica)

- 60% (4.5 PB) during pp
- 40% (2.7 PB) during HI (+pp-ref)



Production status

- Steady RAW and MC processing activities
- 2015 RAW data
  - 2x passes for Muon and Calorimeter analysis

  6.25PB of RAW reconstructed, 3,801,189,643 events
  - Full pass over all data for offline QA and barrel calibration, including the new TPC calibration objects
- 2015 MC
  - 146 simulation cycles, 2,887,273,189 events
  - Including full simulation for the Muon production cycles

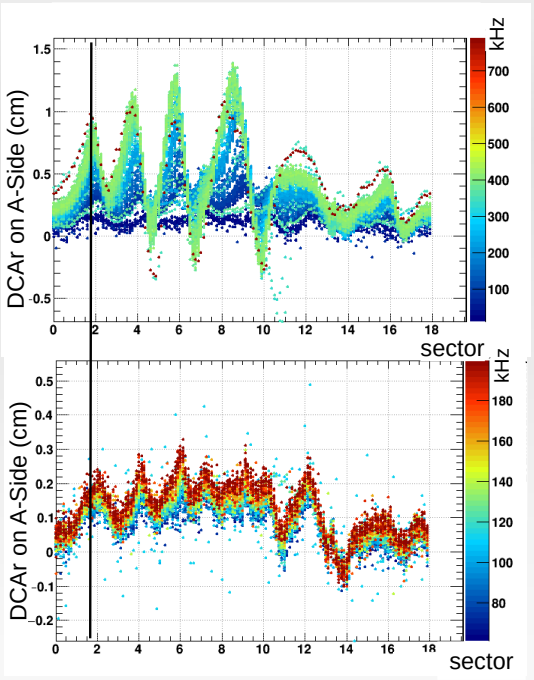
DCAs in Run2 and Run1

Comparison of distortion size

2015 pp, high IR

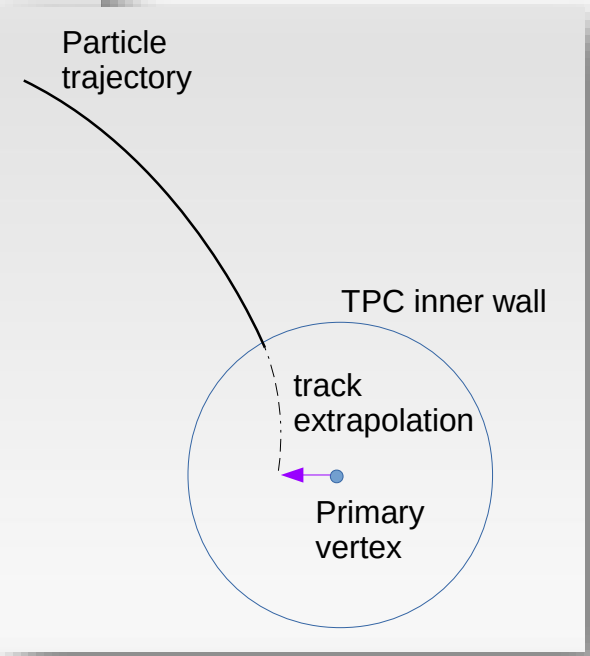
2013 pPb, high IR

color code: IR



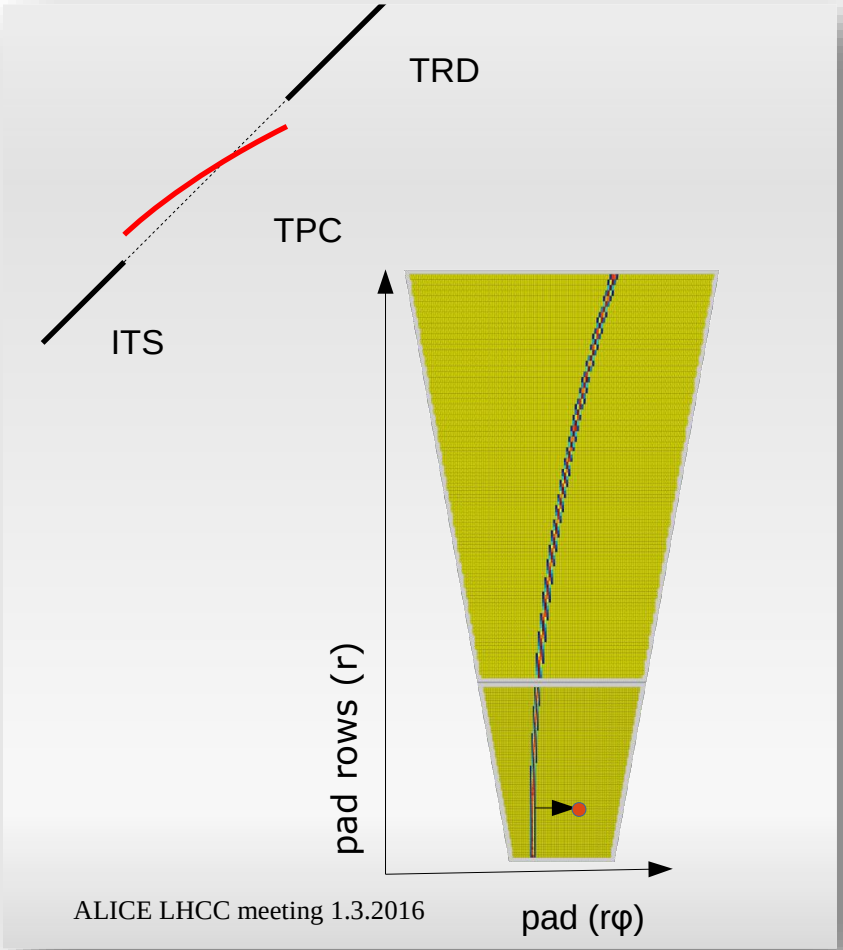
- Unexpectedly large DCAs observed in high interaction rate runs in 2015
- Very similar (but not quite identical) patterns observed in Run1 and Run2
- Magnitude very different (see discussion next slide)

DCA (distance of closest approach) of tracks to primary vertex



Dedicated presentation in today's meeting: https://indico.cern.ch/event/469078/

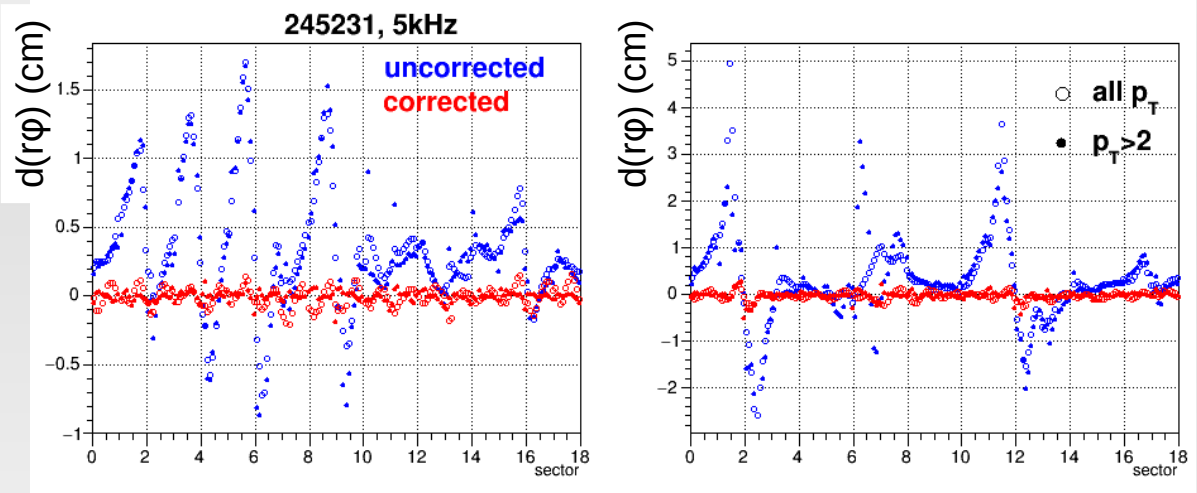
New TPC Distortion Corrections



- New distortion correction procedure had to be put in place
  - Distortions in TPC are found to be proportional to interaction rate
    - Space-charge effect
  - Correction based on ITS-TPC-TRD matching
    - Originally planned only for Run3
- Start of full pass reconstruction of Run 3 data foreseen for week 10

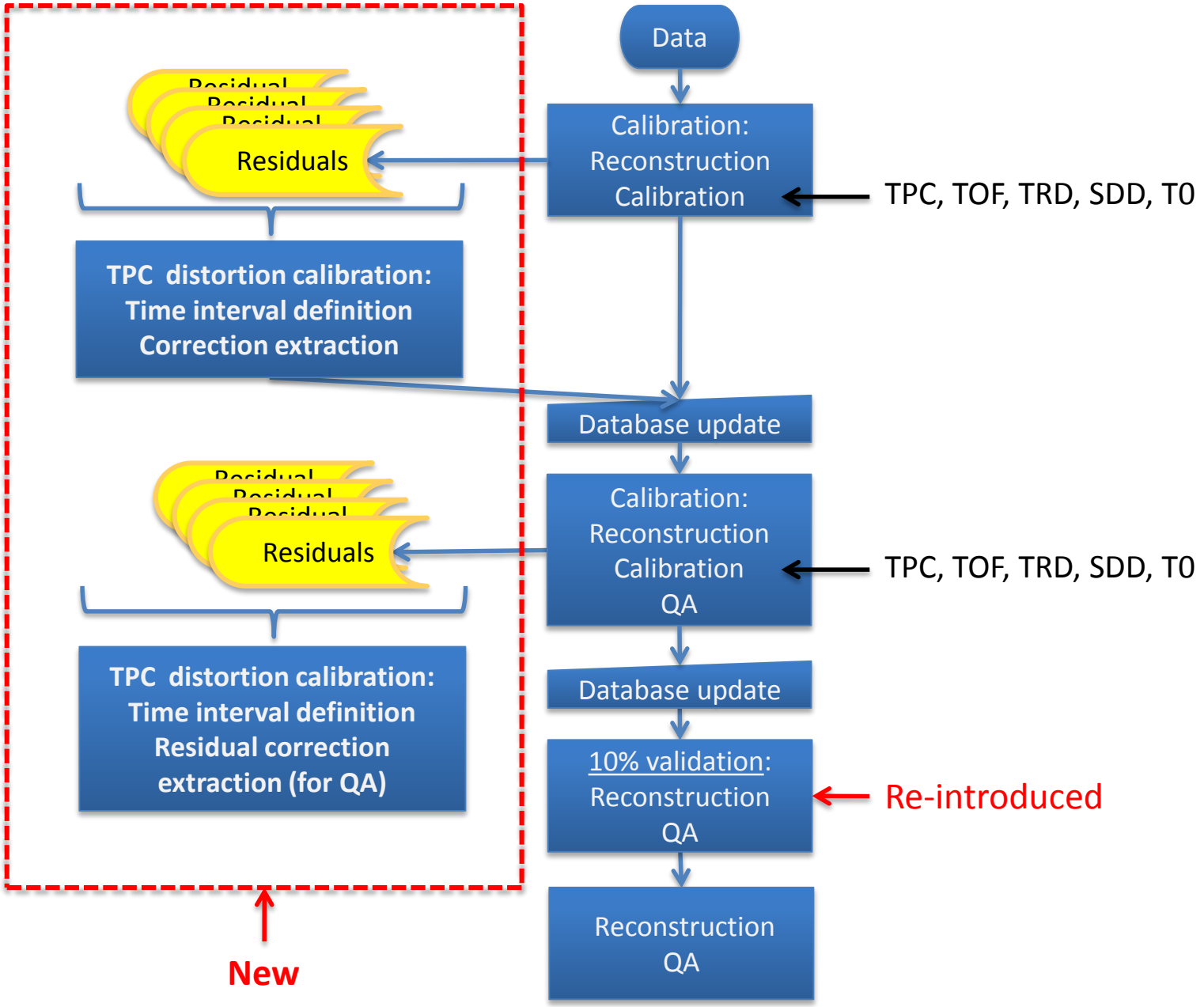
Distortion corrections

Status – Performance

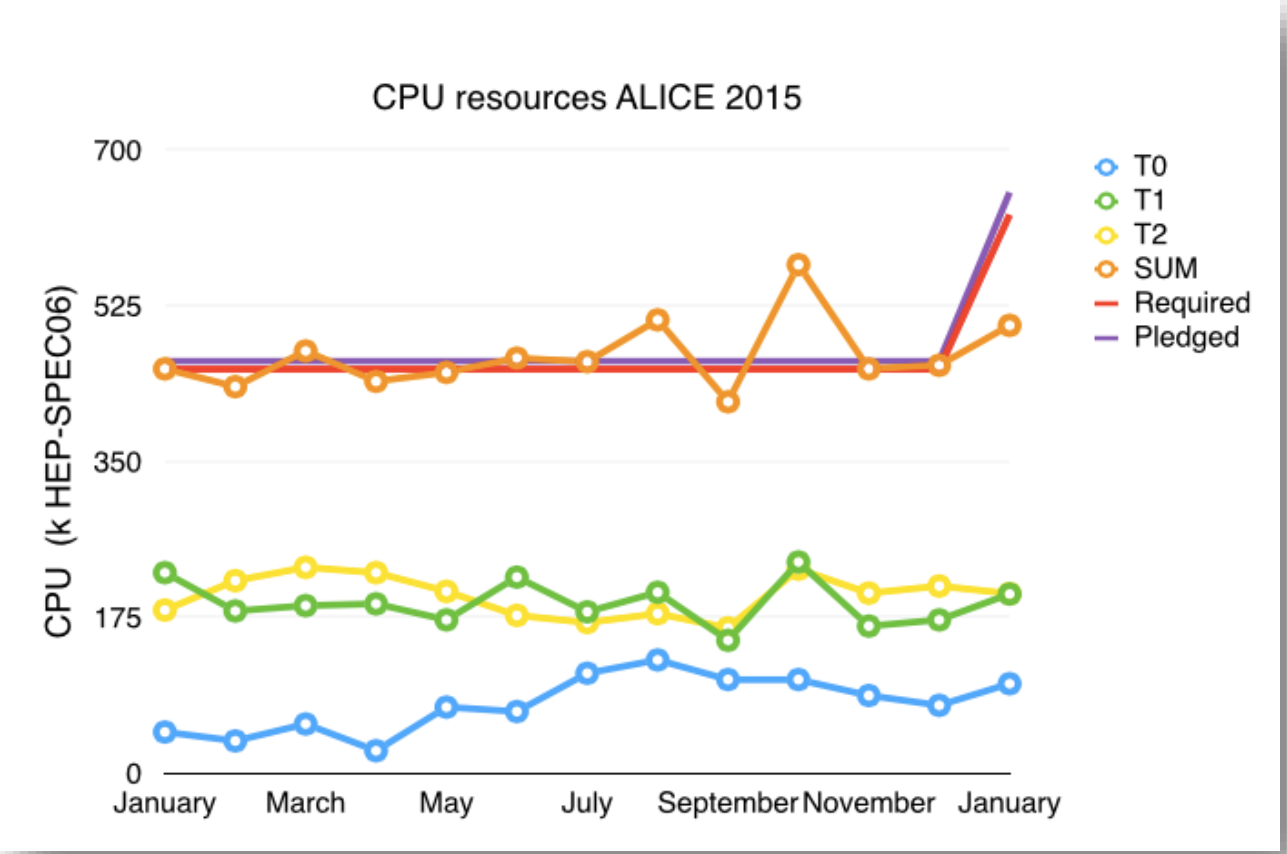


- ITS-TPC-TRD interpolation procedure developed to correct for space-point distortions
- Procedure tested and working
- Correction down to the intrinsic resolution of the TPC (~1mm)

Dedicated presentation in today's meeting: https://indico.cern.ch/event/469078/

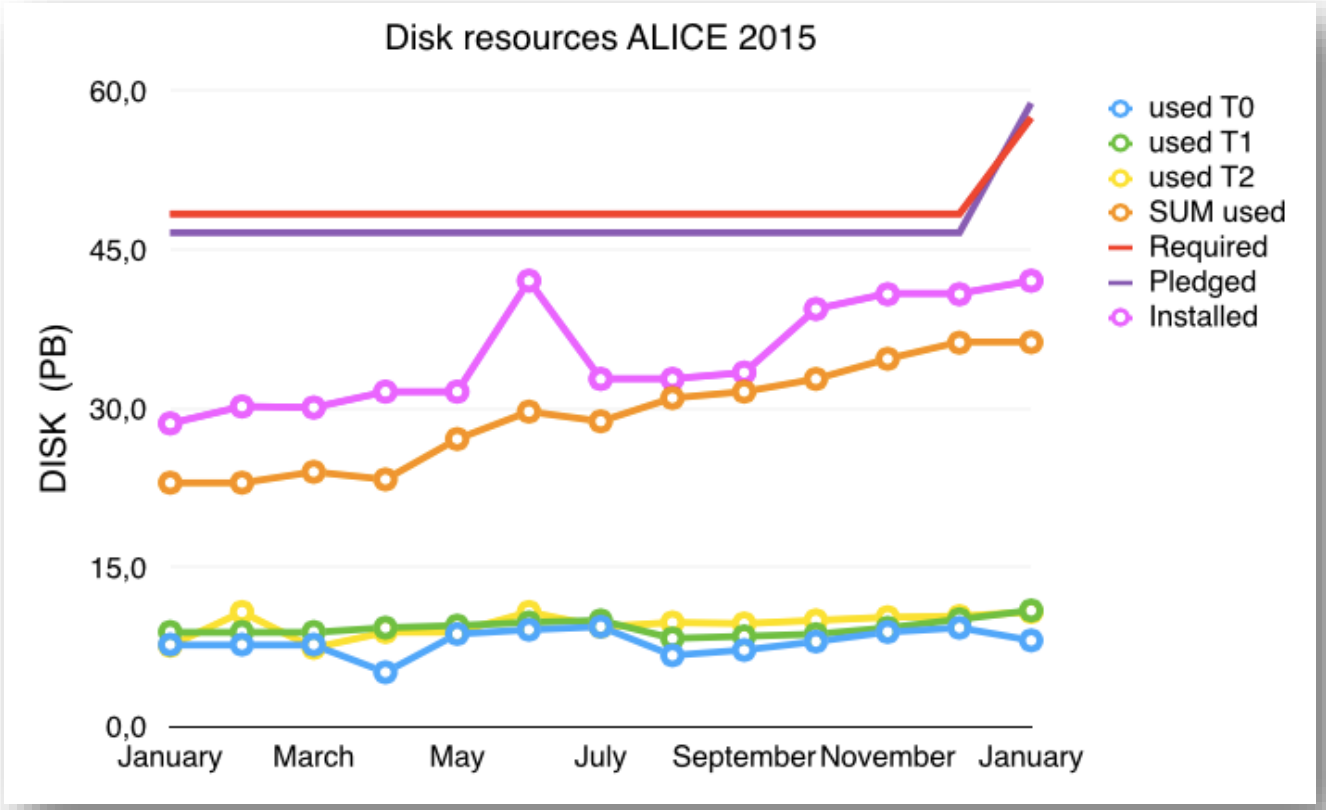

Data
Residuals
Calibration: Reconstruction Calibration
TPC, TOF, TRD, SDD, T0
TPC distortion calibration: Time interval definition Correction extraction
Database update
Residuals
Calibration: Reconstruction Calibration QA
TPC, TOF, TRD, SDD, T0
TPC distortion calibration: Time interval definition Residual correction extraction (for QA)
Database update
10% validation: Reconstruction QA
Re-introduced
Reconstruction QA
New

Resource usage: CPU



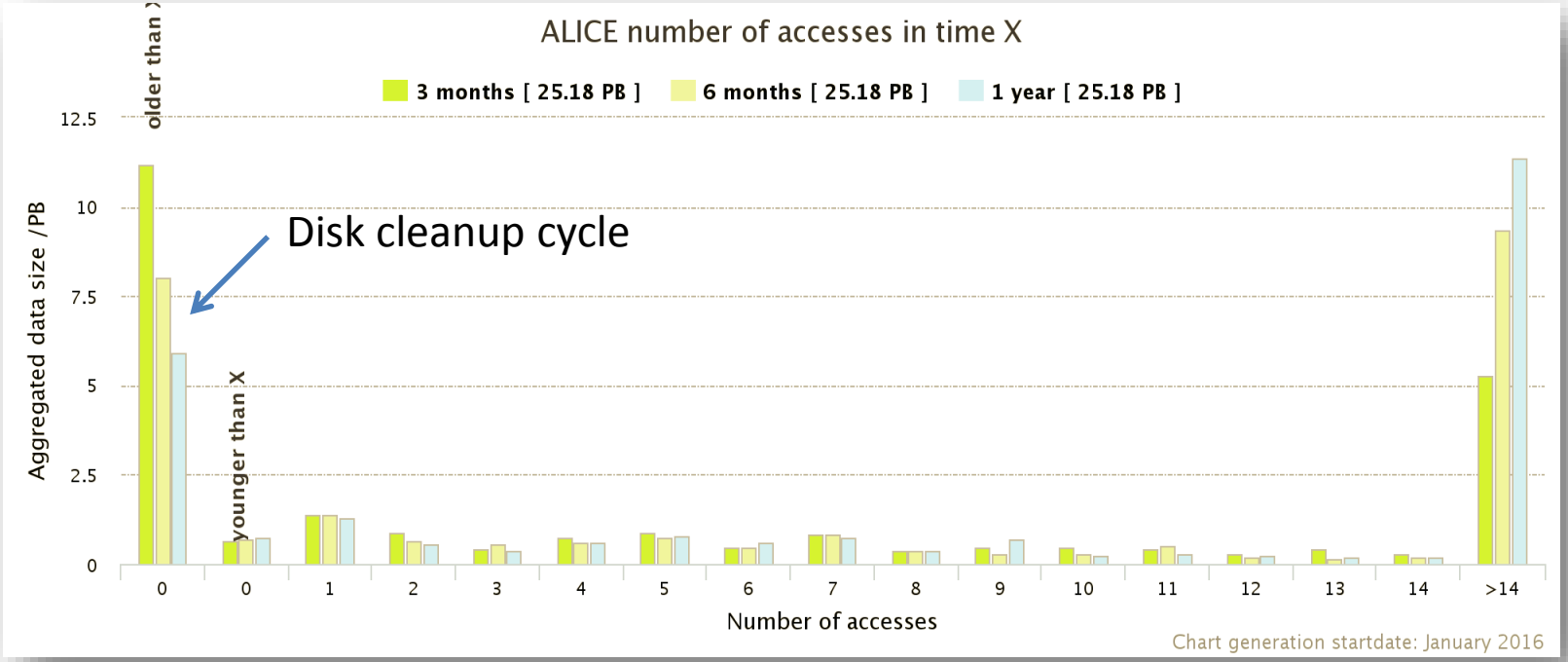
- 9% for raw data reconstruction, 69% for Monte-Carlo production, 14% for train analysis and 7% for end user analysis
- CPU/wall time job efficiency yearly average is 73% at T0, 83% at T1s and 82% at T2s.

Resource usage: Disk



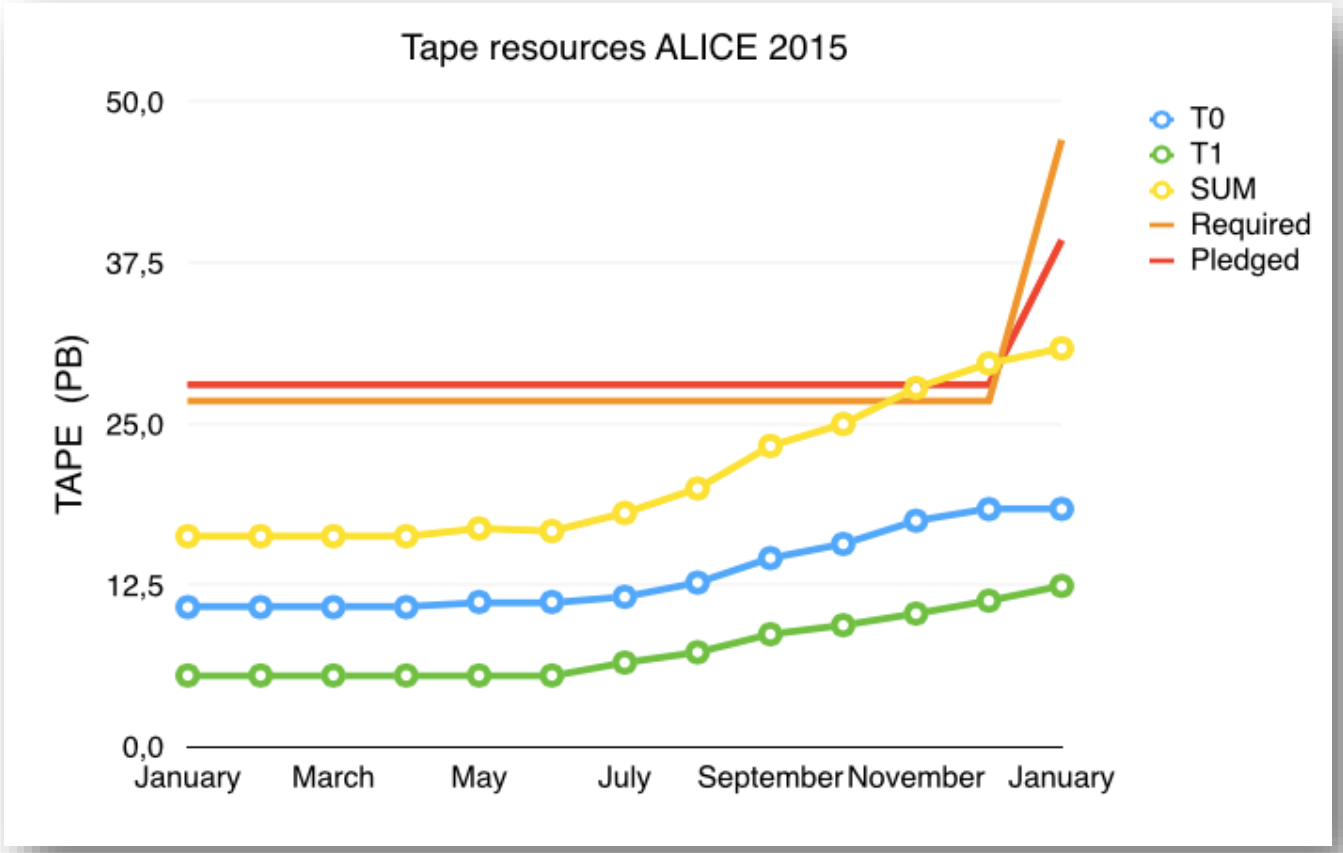
- 90% full as of December 2015
- New cleanup and replica reduction cycle started in January 2016
- Current overall fill at 80%, freed space will be used by the 2015 RAW data production cycles

Data popularity



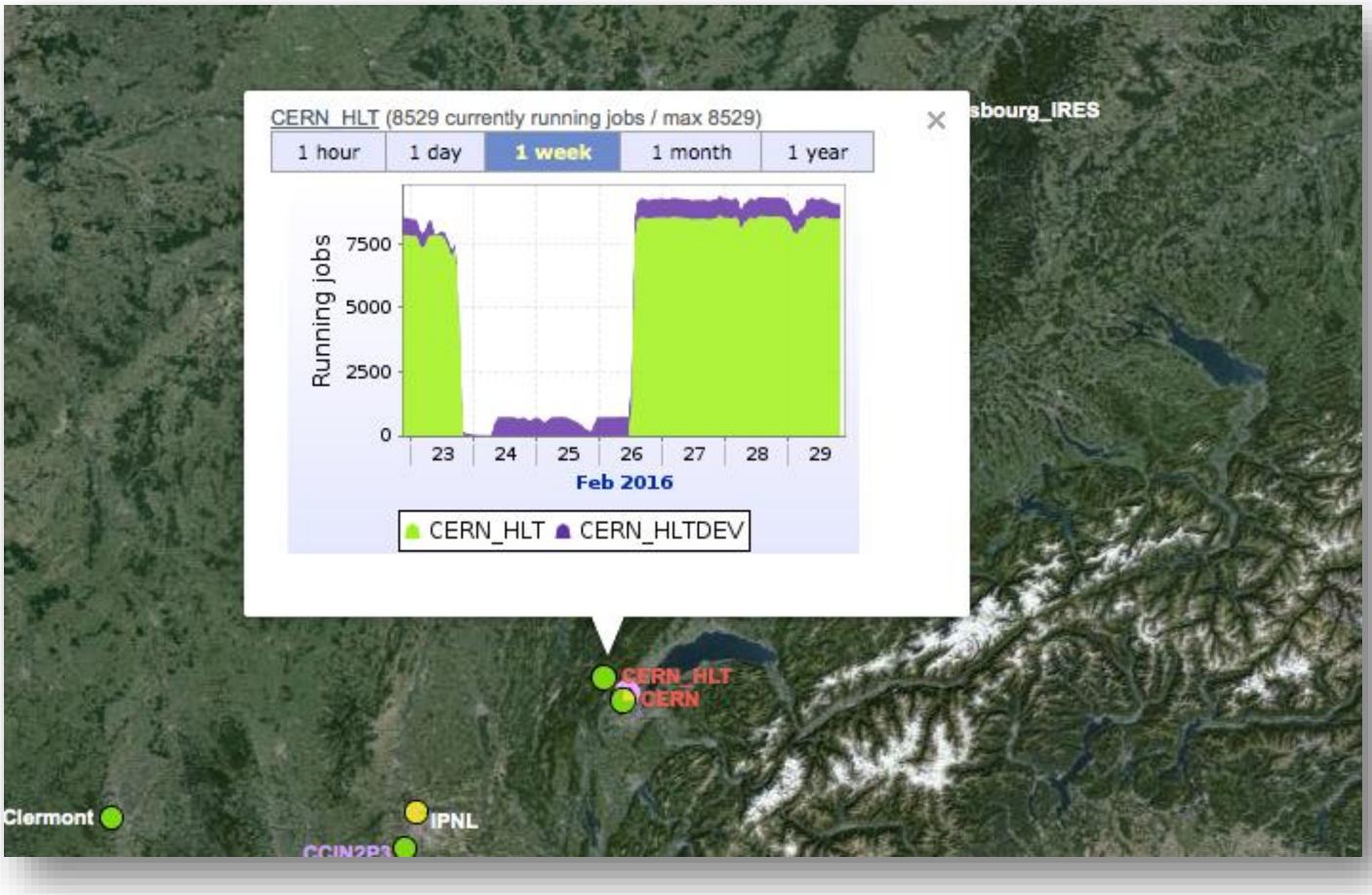
- Disk cleanup cycle aimed at ‘Older than 1 year period’
  - Aiming to remove files and replicas in this category and reduce 6PB (24% of disk) to less than 2 PB (< 8% of disk)

Resource usage: Tape



- Tapes fully utilized (reserve few hundred TBs)

Finally operational: HLT@Grid



- Up to 8500 jobs running concurrently on ALICE HLT farm
  - Simulation jobs running in VMs under OpenStack
  - Can be paused or killed on a short notice

Update of running scenario and computing model parameters

Year	System	Instant Lumi (cm-2s-1)	Interaction rate (kHz)	Running time
	pp 13 TeV	5×10**30	300	28 weeks
2016	p-Pb 5.02 TeV	1×10**29	200	4 weeks
	pp 5.02 TeV	5×10**30	300	7 days
2017	pp 13 TeV	5×10**30	300	24 weeks
	pp 13 TeV	5×10**30	300	28 weeks
2018	Pb-Pb 5.02 TeV	1×10**27	8	4 weeks
	pp 5.02 TeV	5×10**30	300	7 days

Updated required processing power in kHEPSpec per event. Updated values are in bold font.

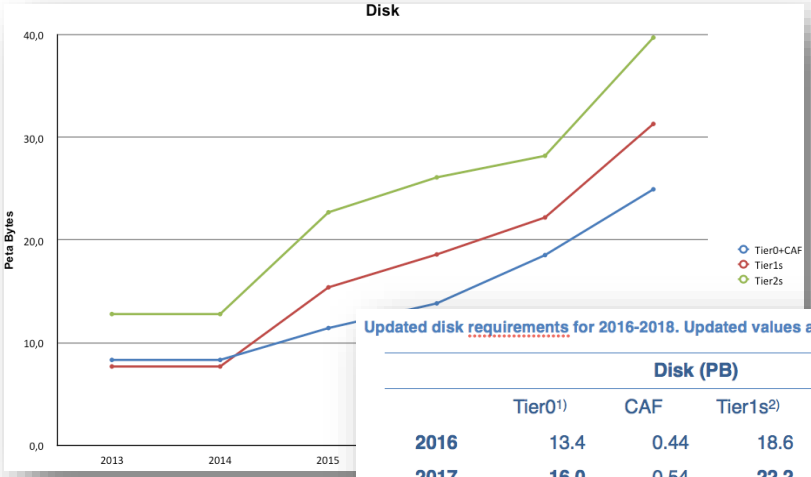
	Reconstruction	Analysis train	End user analysis	Monte Carlo
pp	**0.60**	0.20	0.01	1.00
PbPb	3.80	3.70	0.17	45.00
pPb	0.70	0.70	0.09	3.00

- As a result of high pile-up during the pp run in the 25 ns bunch spacing mode pp raw data size has been increased by x3.5
- Pb-Pb raw data size has been tentatively reduced (x0.7) to match observed output size
- Additional CPU and storage needed to handle increased calibration complexity

Updated data sizes in MB/event. Updated values are in bold.

	Raw	ESD&AOD	Monte-Carlo
pp	**3.67**	**0.32**	0.37
PbPb	**5.50**	1.55	21.09
pPb	1.63	0.32	1.73

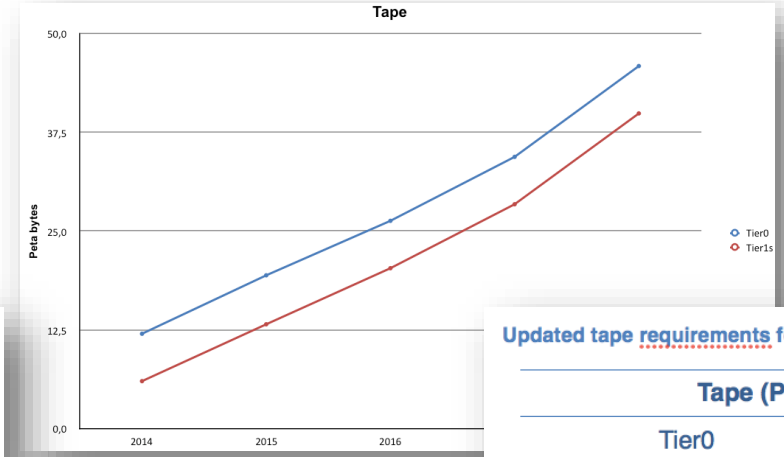
Resource Requirements



Updated disk requirements for 2016-2018. Updated values are in bold font.

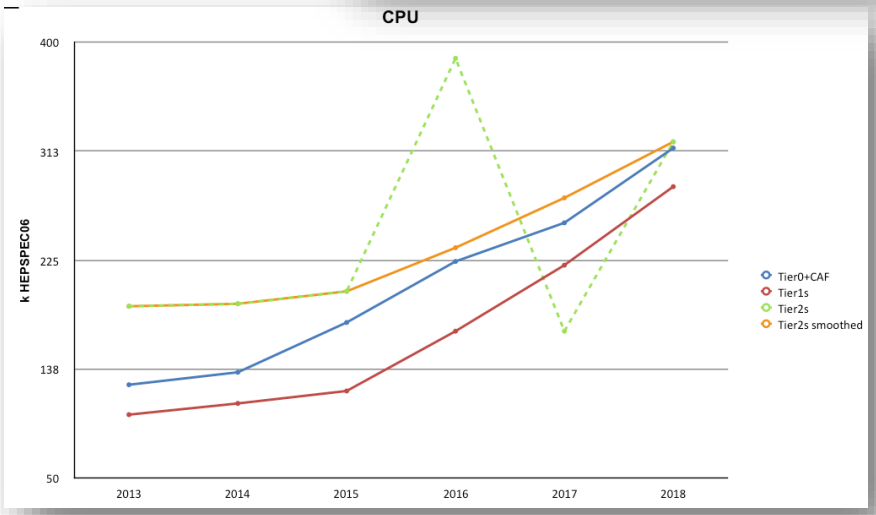
Disk (PB)	Tier0[1]	CAF	Tier1s[2]	Tier2s
2016	13.4	0.44	18.6	26.1
2017	**16.0**	0.54	**22.2**	**31.3**
2018	**20.3**	0.64	**28.2**	**39.7**

[1] Excluding the 3.0 PB of disk buffer in front of the taping system
[2] Excluding the 2.35 PB of disk buffer in front of the taping system



Updated tape requirements for 2016-2018

Tape (PB)	Tier0	Tier1
2016	**26.3**	**20.3**
2017	**34.4**	**28.4**
2018	**45.9**	**39.9**



Updated CPU requirements for 2016-2018. Updated values are in bold font.

CPU (kHEPSPEC06)	Tier0	CAF	Tier1s	Tier2s
2016	**179**	**45.0**	**168**	**387**
2017	**210**	**45.0**	**221**	**168**
2018	**273**	**45.0**	**284**	**315**

Summary

- Data processing follows usual pattern
  - All requests have been fulfilled
  - Number of tasks in the pipeline is manageable
  - MC is, as usual, the main resources user (69%), followed by analysis tasks (21%) and RAW (9%)
- Large distortions in TPC at high interaction rate required an extra calibration step and additional software development
  - Now under control but requires additional calibration iteration
  - Full reconstruction pass over Run 2 data is planned to start in Week 10
- Pileup induced increase in reconstruction output size for pp data required revision of the resource request for Run 2
  - +20% per year for tape and +5% for disk and CPU compared to our previous estimates
- HLT cluster is now operational and complements the Offline computing resources