Data Processing Update

Data Production meeting
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Exp 12 status

- 4/fb recorded (4.66/fb delivered) → ~86% avg. data taking efficiency.
  - Fixed some issue with lumi plot (no more dips)
  - Trying to produce a daily and cumulative data taking efficiency plot:
    - Currently debugging some issues (eff seems too low!)
  - Alberto Martini expressed some interest to help with this task. Thanks!

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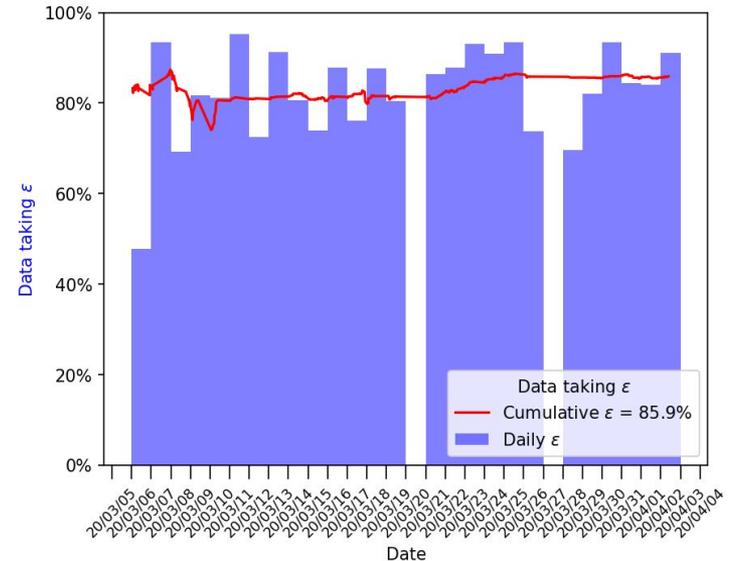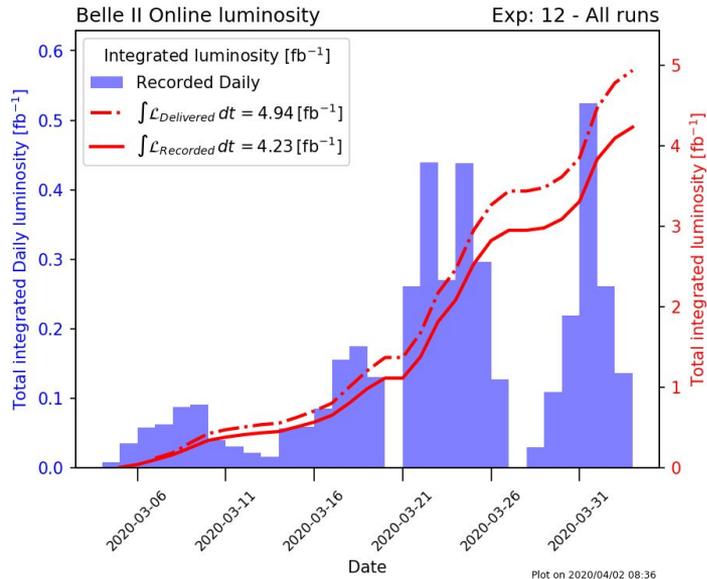
Ongoing processings (Stefano)

- Unofficial exp12 [BIIDP-2461](#)
  - Only for HLT skims = ['mumu_2trk', 'bhabha', 'gamma_gamma', 'hadron', 'bhabhaecl', 'radee']
  - GT: 'online', cdst output format → used for offline skim by Mirabelle
  - Issue with large (5GB) inputs made by CC (job length >1d), now reverted to 1 GB max
    - More on this later...
- DST production for trigger studies, exp 10 Runs 1860 - 1885 [BIIDP-2534](#)
  - ~~Done~~. By mistake made cdst... removed everything and start again, apologies.
  - Made a different mistake, so now trying for the third time: will that be the end? DONE again (?)
  - NB: similar productions to be requested again in the future.
- Non-HLT filtered samples for monopole studies [BIIDP-2504](#)
  - Request for cdst of non-HLT filtered events, for ~4 /fb
  - Initial estimate was 1.5 days and 50 TB. Wrong estimate
    - (either picked a non-representative run or I don't know math)
  - Done 0.67 /fb, in 7 days, produced 70 TB.
    - Total size estimate about 400 TB.
  - Production stopped until interested analysts develop a strategy to reduce size.

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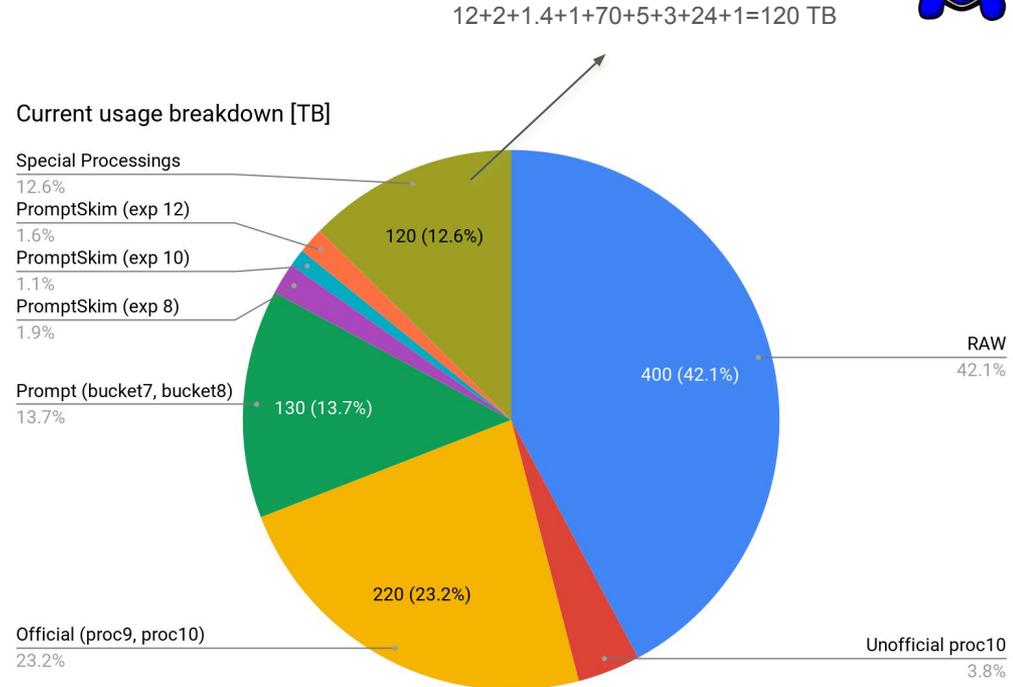# Policy definition for 'special' processings.

- So far we tried to fulfil all requests, but we need a policy/prioritization scheme.
  - CPU, disk, human resources are limited.
  - Prioritization done by hand:
    - eg : submit special processing only when b2_prod has free slots, and do not foresee load from higher priority task in the immediate future.
    - Afawk, no LSF queue priority management at KEKCC on b2_prod.

- Policy proposal:
  - Any special processing must be endorsed by a WG (via DP liaison?).
  - Plan (w/ clear resource estimation) must be presented and discussed at DP meeting.
    - Priority eventually assigned by DP management after discussion.
  - Fast lane for test on calibration, software (eg new cdst), etc ...

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`dataprod/` disk status and cleanup

- Current usage: 1.2/1.5 PB → 80% !
- Discussion on BIIDP-2537 about clean up plan, please watch the ticket!
- Proposal to remove:
  - Special processings (relevant people will be contacted beforehand)
  - RAW cosmic exp 5,9,11(?) (**should** be on tape)
  - RAW physics exp 3 (**should** be on tape)
  - Unofficial exp10
  - Bucket 7?
  - Anything else?

Current usage breakdown [TB]

12+2+1.4+1+70+5+3+24+1=120 TB

- Special Processings 12.6%
- PromptSkim (exp 12) 1.6%
- PromptSkim (exp 10) 1.1%
- PromptSkim (exp 8) 1.9%
- Prompt (bucket7, bucket8) 13.7%
- Official (proc9, proc10) 23.2%
- 120 (12.6%)
- 130 (13.7%)
- 220 (23.2%)
- 400 (42.1%)
- RAW 42.1%
- Unofficial proc10 3.8%

[TODO] Backup all official processing on tape (no prompt)
(Full events already on grid, not the case for hlt_skims)

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Preparation for proc11

- [DONE] Production workflow definition:
  - HLT skims (cdst, mdst) @ kekcc.
  - Full runs on the grid.
    - DC experts @BNL/KEKCC notified on March, 20th to stage exp7, 8, 10 RAW data.
      - No response yet, will follow up...
    - Full runs also @kekcc (backup) unfeasible w/o HLT filtering.

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Preparation for proc11

- [DONE] DP tools keep improving (and getting fixed...)
  - File metadata to get run/exp number and input number of events.
    - <u>Local</u> processing now protected against empty inputs ($\rightarrow$ no b2.FATALs).
    - Proposal on how to protect grid processing outlined at last DC meeting, experts assessing feasibility (they said will also report @ sw group).
  - Tested `release_04_02_00` [data_reprocessing_proc11_baseline + online_proc11] successfully.
    - Some hiccups w/ missing trigger payload for exp7+8, now fixed.
  - Tested production of new cdst format (changes to be committed ~now)
  - New default: no offline HLT filtering (HLT farm will run in 'monitoring' mode until summer).
  - $\rightarrow$ (Once BIIDP PR 113 merged) ready for cdst production when GT available.

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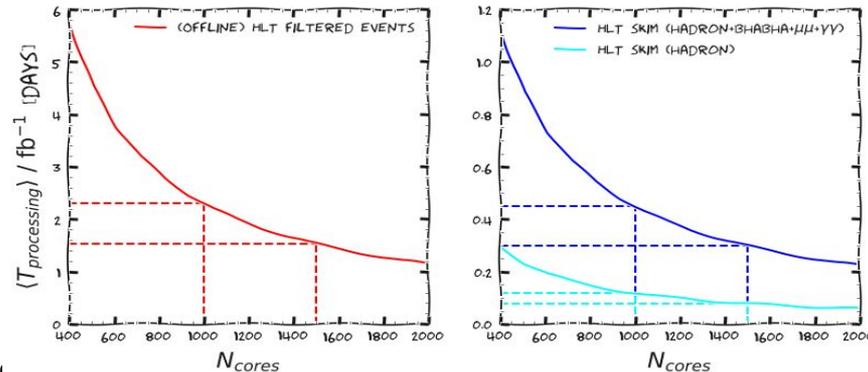
Preparation for proc11 (cont'd)

- **[DONE]** Estimate of turnaround time for processing.
  - Use stats from proc10+bucket8 (same recorded lumi as proc11 → ∫L dt = 10.57 fb^{-1})
  - NB: include correction factor (>1) for HLT filtering efficiency (plan no offline HLT filtering in proc11)
    - $\varepsilon_{HLT\ filter}$ ~ 0.20, N_{cores}=1500
    - ALL events: $\langle T_{proc11} \rangle$= (1/0.20) x 1.5 [d]/[fb^{-1}] x 10.57 [fb^{-1}] = 79 [d] , but...
      - T for the 80% of events not HLT-filtered should be scaled by a factor X (<1) to account for smaller reco time of "unphysical" events (expected to be less busy)
      - If X = T_{evt}(gam_gam)/T_{evt}(hadron) ~ 0.7 → $\langle T_{proc11} \rangle$~ 50 [d]
      - Down to 30-35 [d] w/ more grid cores available (and b/c our estimate is likely too conservative)
        - Modulo issues on production system...
    - HLT skims: $\langle T_{proc11} \rangle$= 0.3 [d]/[fb^{-1}] x 10.57 [fb^{-1}] = 3 [d]
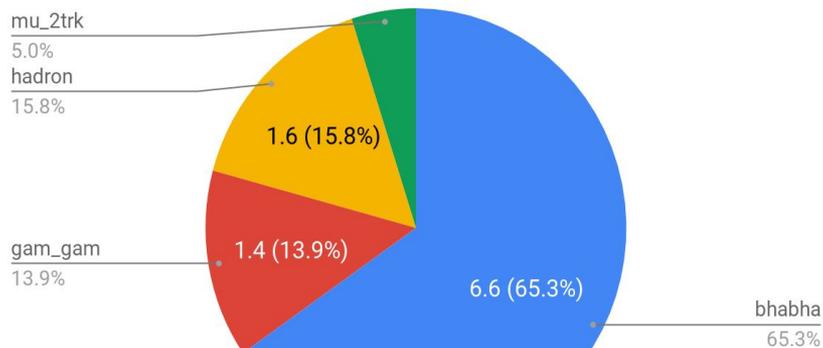

PROC10. EXPERIMENT 8

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Preparation for proc11 (cont'd)

- [DONE] Estimate of disk usage.
  - Extrapolate from stats of exp8 (proc10)

(OLD) cdst size   10 [TB/fb^{-1}]

mu_2trk
5.0%
hadron
15.8%
1.6 (15.8%)
gam_gam
13.9%
1.4 (13.9%)
6.6 (65.3%)
bhabha
65.3%

(NEW cdst: divide size by 2)

mdst size [TB/fb-1]

mu_2trk
6.7%
hadron
20.0%
0.03 (20.0%)
0.02 (13.3%)
gam_gam
13.3%
0.09 (60.0%)
bhabha
60.0%
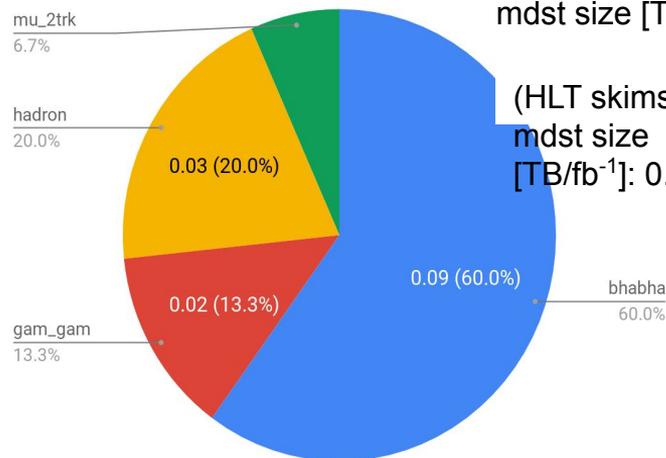
(ALL offline HLT filtered)
mdst size [TB/fb-1]: 1

(HLT skims)
mdst size
[TB/fb^{-1}]: 0.15

- TOT cdst size (HLT skims): (½) x 10 [TB/fb^{-1}] x 10.57 [fb^{-1}] = 52 TB
- TOT mdst size (HLT skims + ALL): (0.15 + (1/0.2) x 1) [TB/fb^{-1}] x 10.57 [fb^{-1}] = (2 + 52) TB
  - Mdst "all" size was scaled up by (1/$\varepsilon_{HLT\ filter}$) → conservative estimate

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Preparation for proc11 (cont'd)

- [TODO] Decide which runs (not) to process.
  - No point in wasting CPU/disk for BAD == <u>unrecoverable</u> runs + no useless bookkeeping.
  - RunDB probably not to be trusted prior to exp12 → (if so,) we need a list from the detector experts!

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Preparation for bucket9 (early 2020 prompt)

- **[CRITICAL, ~DONE]** Integration of DP prod scripts into Airflow (BIIDP-2098)
  - DP steering code made modular for seamless importing and configuration in Airflow.
  - DP package tags w/ same name as basf2 tags for Airflow, to ensure the correct version is checked out for every prompt processing.
    - BIIDP PR#103 basically ready to be merged.
    - David and Francis (PhD student in Melbourne) finalising changes and tests in Airflow.

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Other business in pipeline (sparse priority)

- Test production for HLT skim processing on the grid.
  - Need to check status of RAW HLT copy on grid SEs.
- Use RunDB info to prepare list of runs to be processed.
  - Tools being developed to use DB API
  - DQ (detector) flags defined [here](). Final agreement should be reached ~now.
- Test basf2 multi-processing mode
  - So far used only on HLT farm (w/ some black magic by Nils).
  - Will become crucial if we ever increase the size of RAW data files (esp. HLT hadron skims)
    - Now file size optimised to 1GB max for proc time to be within resources limitations.
    - However, FS would be better off with larger file size.
  - Afawk, no one ever tested it for offline processing (at least in a real life scenario)
  - Martin Ritter has kindly agreed to help, thanks!

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Other business in pipeline (sparse priority)

- ## Monitoring of HLT skim retention rates.
  - WRT HLT filtering & WRT all recorded events.
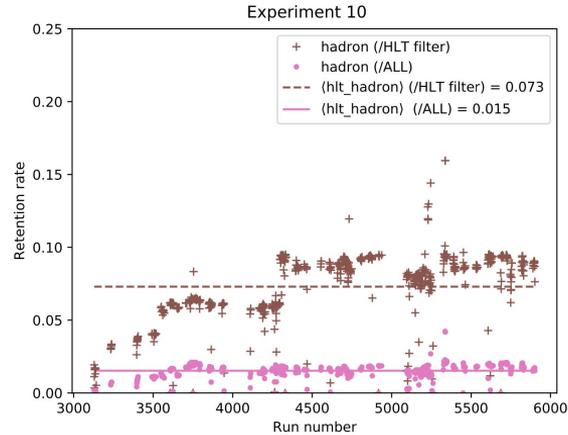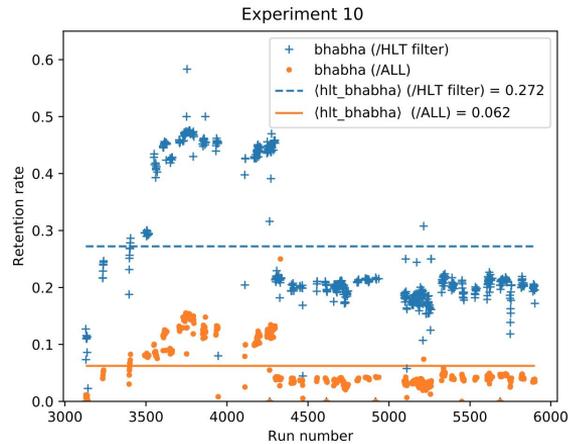
- ## So far, we do this experiment-wise, after all RAW HLT skims have been produced
  - Karim (righteously) stresses the importance of this check (BIIDP-2415, BIIDP-2509).
  - We have a feeling this monitoring is not a streamlined procedure within the HLT group…
  - Could this task be better coordinated in terms of manpower?
    - This should be fully an automated task during data taking...

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