



# Muon g-2 update

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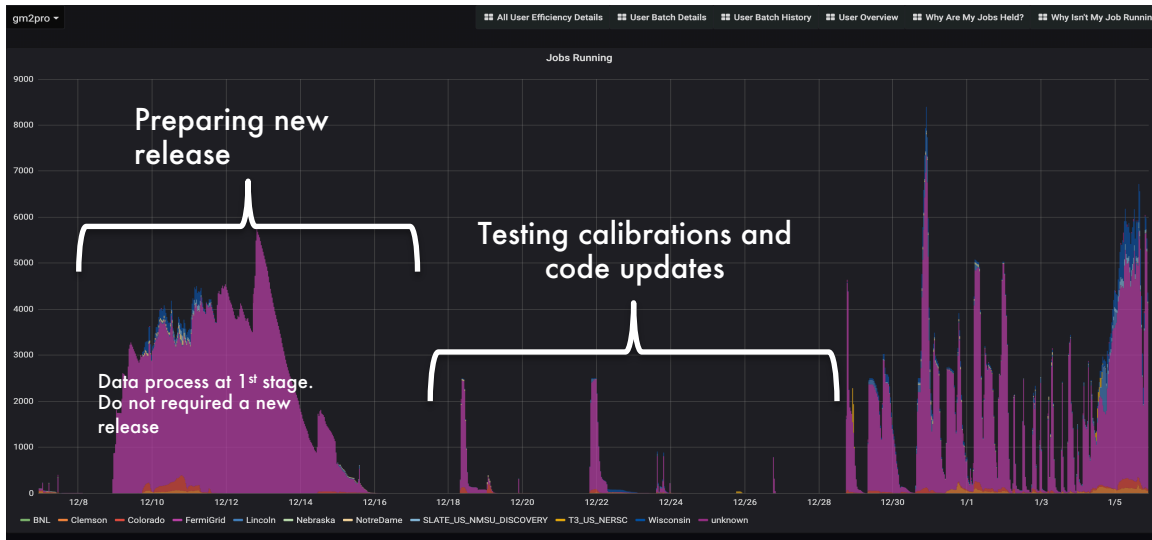
Proton PMG / AEM

07-Jan-2021

<https://indico.fnal.gov/event/47090>

GM2-doc-db-24547-v1

# Status of Offline Production



Average Efficiency

90.85%

Onsite Efficiency

91.05%

- Difficulties with production
  - The tape system for both read and write are at maximum
    - Backlog of files waiting to be transfer to tape (affected both the online and offline)
    - Receiving more tape drives for both online and offline
  - An error in the dCache code prevented running production
    - The bug is fixed
  - An art error slowed caused many jobs to fail.
    - Error has disappeared and the source remains unknown
- Reprocessing Run3 data due to calibration mistake
  - Working with art team to merge files.
  - Eliminate reprocessing the data through all systems. Only reprocess the data to remove the affected data objects.

# Rough timeline of beam startup:



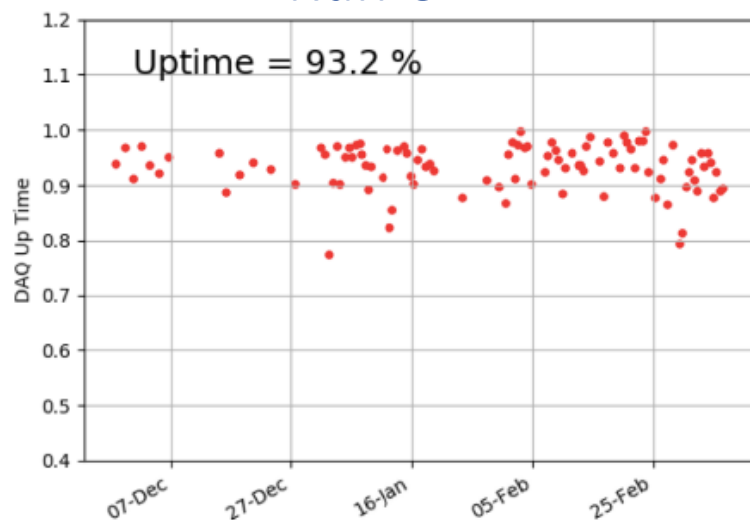
- 03 Dec 2020: last PMG / AEM of 2020
- 04 Dec: beams to MC-1 (stored muons confirmed!)
- 05 Dec: increase cycle frequency: 5s  $\rightarrow$  1.33s
- 07 Dec: increase 4  $\rightarrow$  8 pulses per cycle
- 11 Dec: POT increase to 0.6e12
- 15 Dec: increase 8  $\rightarrow$  16 pulses per cycle
- ... continued increases of POT, even over the holiday break!
- 05 Jan 2021: running at full intensity
  - Muon POT 0.99E12
- The Muon g-2 collaboration appreciates all the work of all the teams to reach this point
  - We take this opportunity to specifically thank Jim Morgan and George Deinlein, our primary interfaces with AD

# Rough timeline of Muon g-2 tune-up with beam

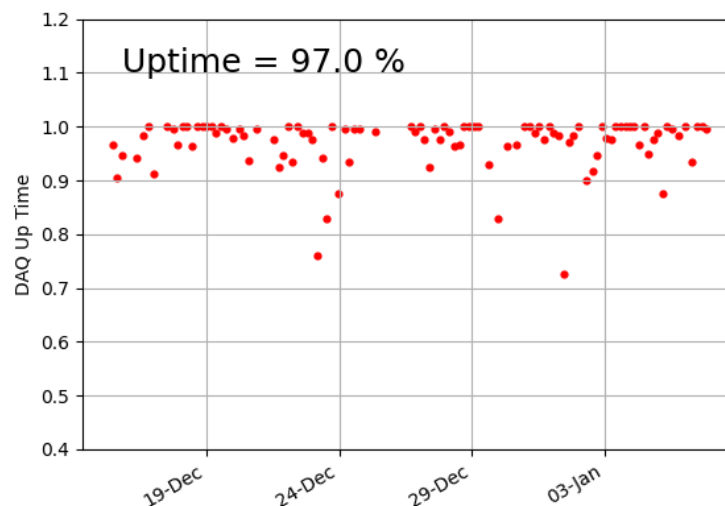
- 05 Dec: coarse kicker timing scan
- 06 Dec: inflector current scan, radial field scan
- ... all the while debugging various items due to SL7, GPU filter, etc...
- 09 Dec: Performed initial radial field study (with low intensity beam)
- 06-13 Dec: Collected beam templates
- 13 Dec: Performed tracker HV scan
- 13-15 Dec: Performed MIP calibrations
- ... at this point, AD increases from 8  $\rightarrow$  16 bunches: “Production running”
- 23 Dec: another kicker timing scan (to accommodate tuning to increase POT)
- 30 Dec: Performed detailed radial field scan (including centering)
- Incoming:
  - 07 Jan: Quad fine scan (study betatron resonances)
  - 08 Jan: IBMS1 / PWC025 cross check
  - 10 Jan: IBMS3 beam check + calibration

# Muon g-2 performance

## Run-3



## Run-4



- DAQ uptime increase due to code improvements done during summer shutdown
- Kicker & quad uptime also increase by  $\sim 1\%$  due to improved reset procedure
- At present we have  $\sim 1$  BNL in the can from Run-4
- Initial evaluation of the data look good
  - Including low muon losses, beams well-centered and stable, tracker and calorimeter performing well, temperature stability of the hall, ...
- More details to be shown at next month's PMG

# Magnet Warm-up

- When: mid-January on the week of 11 January
  - Same week AD will perform PIP-II work that requires isolating a section of ICW pipe and closing a valve that is believed to be adjacent to the ICW supply path to A0.
- Duration: 7 days
  - Comprehensive of warm-up to 80K, vacuum cryostat regeneration and cooldown to LHe
  - Fr 11 Jan 00:00: stop beam, perform trolley run, ramp down magnet
  - M 18 Jan morning: resume beam to g-2
- Thanks to PIP-II for re-scheduling their work to coincide with the g-2 magnet warm-up / regeneration

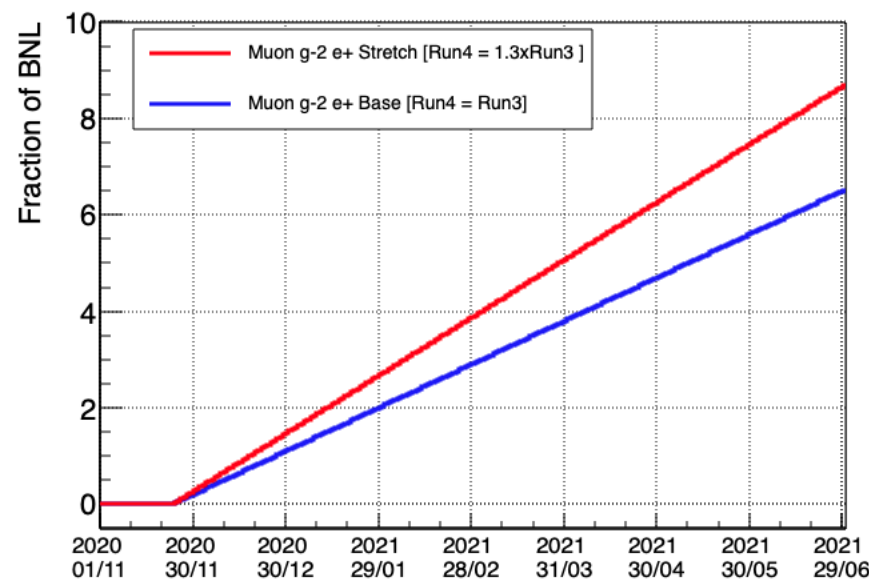
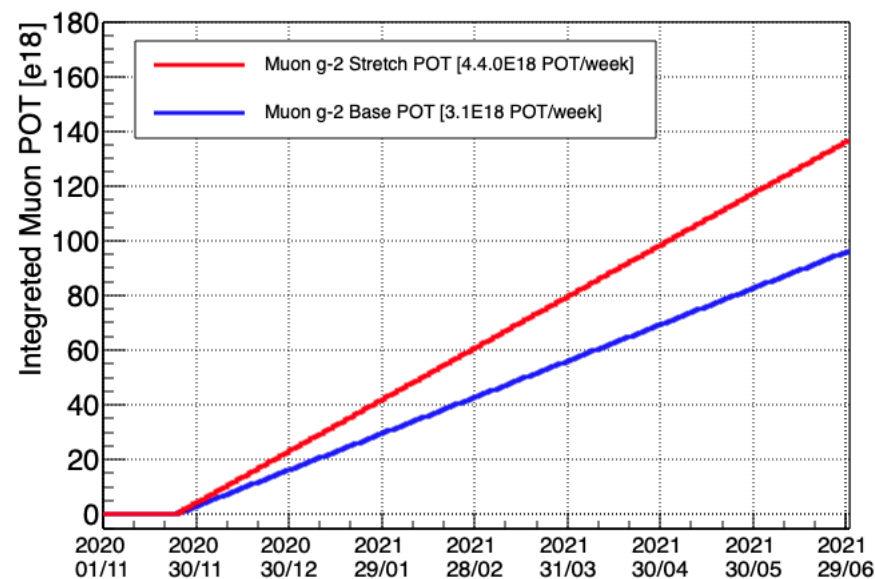
# Muon g-2 experiment shifter moved to ROC west

- Thanks to Harry Ferguson and Neutrino Division for accommodating the g-2 experiment shifter at ROC West
  - Reduces any impact of COVID quarantine on the limited crew of operations shifter
- x5449 = ROC west phone number (experiment shifter)
- x6866 = MC-1 phone number (ops shifter)
- Looking at the possibility to move to checklist shifts in the next month or two... stay tuned!

# Backup

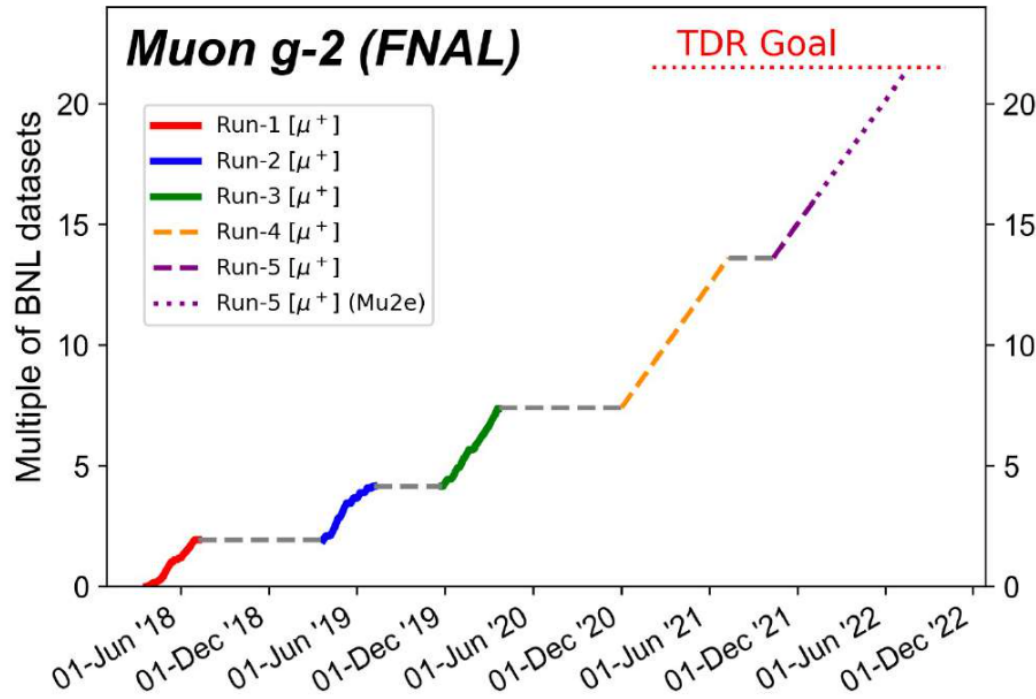
# Muon g-2: Run 4 run plan

- Assume 32 weeks for Run 4
  - 23-Nov-2020 – 30-Jun-2021
- Assume POT rate as in Run 3
  - This assumes no changes on accelerator side, expectation to be discussed w/ Jim Morgan next week
- Assume e+ rate from actuals
  - Base: e+ rate = Run 3 actual
  - Stretch: e+ rate = Run 3b actual
  - No changes on g-2 side that should affect e+ rate
- Estimate Run 4 total = 6.5 – 8.5 BNL
  - ~2x Run 3 total, due to longer run



# Stats recap and projection

- Recall: through Run-3, accumulated total 7.37x BNL



- Expect to reach total  $\sim 14x$  BNL by the end of Run-4