# Muon g-2 update

Anna Driutti (UK), Greg Rakness (FNAL) – g–2 Ops Managers

Proton PMG / AEM

15-Oct-2020

https://indico.fnal.gov/event/45816/

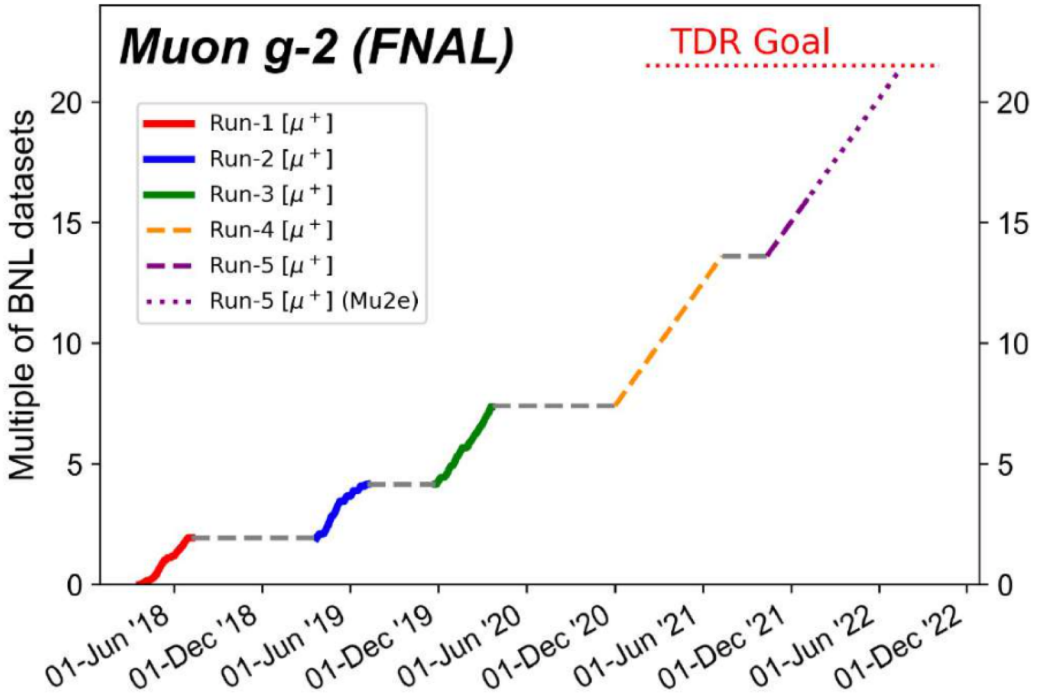
GM2-doc-db-24044-v1

# Status of Offline Production


- Run2
  - Processing is nearly completed
    - Using remaining data to be processed (10%) to train new production shifters
  - Determining if data removed by Data Quality Conditions can be recovered by relaxing conditions
- Run3
  - Production is running smoothly
- SL7 migration
  - Success running production on Fermilab
  - Updating script to run production offsite

# Stats recap and projection

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




- Expect to reach total ~14x BNL by the end of Run-4
  - Assumes ~30 weeks of running in 2020-2021 run

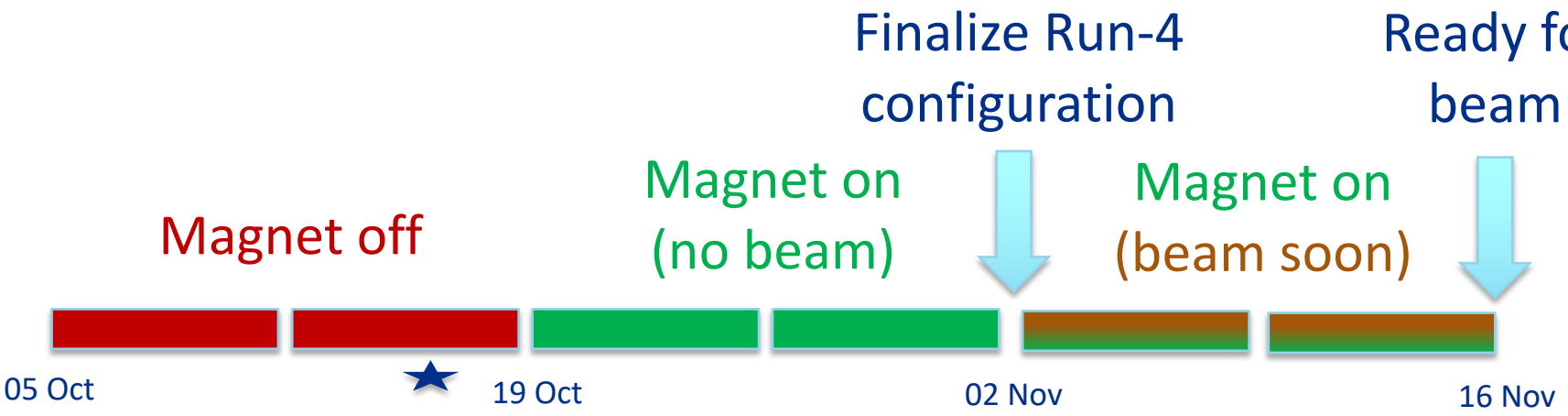
# Run-4 run plan

- Muon g-2 is creating a Run-4 run plan

- Run plan goal:  optimize our use of physics beam time by…
  - Planning to complete prep work for beam and to perform tune-up with beam as efficiently and as early as possible
  - Striving to minimize downtime as much as possible
  - Being judicious about the systematic studies that we do, and execute those studies as efficiently as possible

- The g-2 run plan has 3 main phases of work
  1. Prep before beam
     - At end of this work, we should be Ready for Beam
  2. Tune-up with beam
     - At end of this work, we should be Ready for Production Running
  3. Systematic studies
     - Proposed studies to take place after we have established production running
     - Since studies occur during beam, prioritization will take this into consideration

# Muon g-2 run plan: prep before beam




Goals:

05– 19 Oct:
- Complete work at 80K
- Prepare for "magnet-on" time

19 Oct – 02 Nov:
- Finish shutdown work
- Final validation of g-2 configuration for Run-4
- Run DAQ with SLF7 at full speed with laser on

T – 2 weeks:
- Dry run of tasks planned during "Tune-up w/ beam", using final Run-4 config

T – 1 week:
- Final prep for beam

Schedule float will add time to the Magnet on (no beam) period (i.e., if beam comes 23 Nov, we add one week of green)

# Muon g-2 run plan:  tune-up with beam

- To be done first:  confirm timing of accelerator triggers with g-2 triggers
- Then, with initial accelerator settings, get muons nicely stored in the g-2 storage ring…
  - Inflector scan + IBMS3
  - Beam centering + radial field scan
    - New procedure being developed towards also being able to use Run-4 for EDM
- Next, improve transport and reduce beam flash (need stable CTAGs)
  - M4/M5 tune + IBMS1 / PWC025 cross check
    - Beam (usually) comes up in good shape.  This is to confirm
  - Wedge tests + collimation insertion
    - This should be the “last” thing we do to optimize beam transport (i.e., after the protons on target approach the normal 1E12 per pulse and stored muons are at expected rates)
- No more upstream tuning needed (i.e., we are ready for 16 pulses):
  - Quad fine scan – map betatron resonances
  - Tracker HV scans
  - MIP calibration
  - In parallel, perform IBMS3 calibration and IBMS1 calibration
- Kick strength scan under discussion…

We are working out details / order of these tasks with Jim Morgan

# Muon g-2 shift plan

- Open up shifts to **begin when beam starts mid-Nov**, assuming 1x remote + 1x local
  - Preferentially ask collaboration to fill the first 3 months
  - Specifically ask local shifts to be filled by willing and able local people

- For shifts, need to…
  - Implement COVID controls for ops shifter + local shifter both in MC-1
  - Revamp training for remote shifter
  - Update documentation for 1x remote + 1x local

- In parallel, subsystems start addressing technical issues to go fully remote
  - During ”Prep before beam”, exercising remote operation with
    - DAQ stress-test and laser run campaign
    - “Dry run” of Tune-up with beam activities
  - Identify possible local hands from available and willing local people
  - Subsystems estimate work to go fully remote
  - If possible, subsystem do work to go fully remote
  - Define program of tests to do with remote shifters before beam comes

- After Run-4 starts and g-2 achieves production running, options include
  - If technical issues can be addressed and we can ensure that we are not adding tasks to the operations shifters, we could think about trying to switch to 2x remote shifters
  - Ask local people/institutes if they are willing to go over their shift quota (e.g., if technical issues cannot be addressed)

# Backup

# Approach taken regarding remote shifts for Run-4

- Recall:  end of g-2 Run-3 had 1x local shifter + 1x remote shifter
  - The Operations shifter will always remain local at MC-1

- Evaluated technical feasibility of operation by full-remote shift crew
  - Result:  many subsystems presently require action by local shifter
  - Work would be needed to make operation (monitor and control) possible by fully remote shifters
  - Some general concerns expressed regarding completely removing the Experiment (local) shifter…
    - E.g. Experiment shift load must not fall to the Operations shifter

- Polled collaboration for willingness/ability to be at FNAL to do shifts
  - Result:  with those willing and able, we could have a local shifter for ~4 months before the local people have filled their shift quota
  - Some general concerns expressed regarding overloading local people with shifts and hands-on work