



# Muon g-2 ORR Closing Remarks

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# Charge question #1

- Is there a completed Experiment Operations Plan (EOP) document? The document should include (a) an outline of the Science goals (b) a description of operations tasks and how they will be covered, (c) ES&H activities and how they will be managed, (d) organization charts showing the management structure for the experiment and how it interfaces with the laboratory, (e) Fermilab resources and roles as they pertain to each Division (f) the model for data processing and analysis including the computing budget and effort required, (g) a list of the identified resources available, and (h) a description of the roles and responsibilities of each institution together with a list of support required by each institution from funding agencies.
  - Yes, see the opening talk where each of the components of the EOP were highlighted
  - (b) operation tasks are covered but there are a number of areas where we are thin (see talk from BK)
  - (d) collaboration org chart is in good shape and we continue to look for opportunities to promote more junior collaborators into leadership positions
  - (e) Fermilab resource potential issues
    - PPD there are a number of operational risks that could be realized that would require an injection of effort from PPD (quad rebuild, kicker repairs, achieving vacuum spec, misc. equipment failures)
    - AD operations for the Muon Campus operations must remain strong in the g-2/Mu2e era
    - AD we will need serious attention and priority from accelerator experts to ramp up flux and transport & injection efficiencies as quickly as possible in FY18...critical to program planning
    - FNAL scientific FTEs are extremely low for an experiment of our scale of difficulty
  - f) the data processing and analysis is very mature...much further along than the BNL experiment at the same stage. However, we still need to make some improvements, particularly, in streamlining production

## Charge question #2

- Has it been demonstrated that the experiment is ready for physics-quality data taking? If not, what actions are required to make it ready? Is there a clear plan for monitoring (the beam and) the data quality and has the associated infrastructure been tested? If not, what actions are required to adequately monitor the data quality?
  - Not yet...4 major areas of concern that must be addressed
    - Need to increase the rep rate by x100 and the POT/spill by x3
    - The muon storage rate per POT was 12.7x lower than expectation in the engineering run
    - Need to achieve vacuum spec that allows for reliable operation of kickers and quads
    - Need kickers and quads to pulse with much higher reliability than the engineering run with all vacuum loads installed

## Charge question #3..part 1

- Is there a well-understood run plan for FY18, consistent with accelerator schedule and performance?
  - Yes, we have a working plan for FY18
    - Priority is with proving we can increase the rep rate by 100 and the POT/spill by 3 in the first 3 months of the run period while gaining back the additional factor of 12.7 missing factor in muons stored/POT
    - Imperative that we maintain a vacuum in the storage ring that meets the requirements for pulsed HV operation (at or below  $1\text{e-}6$  Torr)
      - Increases in pumping speed starting in stages in November allow for higher loads
    - Aim for physics quality data running to start in February with a target of 3x BNL in FY18

## Charge question #3...part 2

- Have adequate resources from the laboratory and the collaboration been identified for an efficient and safe running of the experiment and for maintenance of the detector, and is it clear who is responsible for what?
  - AD support for Muon Campus operations is sufficient...critical to maintain
  - There are some areas in organization that are low on resources
    - Kicker and quad operations
  - A number of risks not encapsulated in budget
    - Additional intervention from to aid in solving flux issues, e.g. APC
    - More pumping speed
    - Kicker and/or quads require design upgrades or repairs
    - Additional pulsed power expertise

# FY18 IF Operations Budget

- Enormous pressure on operations and research budgets
- FY18 proposed budget is substantially lower than FY17 actuals
  - 10 scientists and 3 RAs work on g-2
  - No project \$ available
  - Several scientist coming off project in FY18

MUON g-2 GROUP  
(B. Casey, Ldr)

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## Muon g-2 Operations Budget

|              | FY17 actual | FY18 budget |
|--------------|-------------|-------------|
| FTE          | 11.57       | 7.59        |
| M&S (direct) | 560k        | 440k        |

## Muon g-2 Research Budget

|     | FY17 actual | FY18 budget |
|-----|-------------|-------------|
| FTE |             |             |
| RA  | 2.33        | 2.5         |
| Sci | 1.93        | 2.5         |



## Charge question #4, #5, and #6

- Are there robust plans for data processing and data analysis? Have adequate resources from the laboratory and the collaboration been identified for data analysis to meet these goals?
  - Yes, but we are thin in a few areas especially when it comes to data production and speeding up the simulation to produce appreciable statistics
- Are there clear goals set for reporting and publishing the results from the experiment in a timely fashion?
  - Yes, see slide ### in opening talk
- Does the committee recommend further actions to ensure full exploitation of the muon  $g-2$  experimental program?
  - We would greatly appreciate any other advice and identification of additional risks that would jeopardize a successful  $g-2$  program.

## Self-recommendations based on preparing for this review

- The experiment (we) should finalize a list of critical spares, cost of the spares, lead and recovery times
- We will document the initial required run conditions, systematic targets, and required simulations for the first publication
- We need to determine the vacuum specification that allows for reliable operation of kicker and quads