

**Lattice QCD Extension III Computing Project
(LQCD-ext III)**

**Response to recommendations
from the
2021 LQCD-ext III Annual Progress Review**

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LQCD-ext III 2021 Science Review Response to Recommendations

INTRODUCTION

On May 18-19, 2021, the U.S. Department of Energy (DOE) Office of High Energy Physics conducted a virtual review of the Lattice Quantum Chromodynamics Extension III (LQCD-ext III) Computing Program. The review resulted in three recommendations.

1. Lattice calculations are essential to interpret the results of the Fermilab muon g-2 experiment. USQCD should prioritize the muon g-2 hadronic vacuum polarization calculations and seek a decisive standard model prediction for the muon g-2 before the experiment presents their next round of results.
2. The review panel had several recommendations to improve the program's internal assessment and user survey.
 - a. USQCD should conduct an anonymous survey to evaluate the Diversity, Equity, and Inclusion climate within the LQCD-ext III research program.
 - b. USQCD should design and implement a feedback mechanism enabling internal assessment of the overall effectiveness and membership selection procedures of USQCD governance, both the Executive Committee and the Scientific Policy Committee (SPC) and the effectiveness of the award allocation process to proposals.
 - c. Questions should be added to the user survey that would allow users to comment on the SPC allocation process, fairness, and scientific impact.
3. The LQCD research program should present a timeline for results in the context of the HEP and Nuclear Physics experimental timelines at the next progress review. The alignment of theoretical and experimental results should be informative for both communities.

Response to Recommendations:

Recommendation #1: Lattice calculations are essential to interpret the results of the Fermilab muon g-2 experiment. USQCD should prioritize the muon g-2 hadronic vacuum polarization calculations and seek a decisive standard model prediction for the muon g-2 before the experiment presents their next round of results.

Response: We agree with the spirit of this recommendation and, indeed, many members of USQCD are committed to decisive standard model predictions for the muon g-2 hadronic vacuum-polarization and light-by-light contributions. As noted at the review, the Scientific Program Committee awards proposals aimed at these quantities nearly their full request. Thus, the LQCD extension III project and the USQCD Collaboration are supporting this endeavor to the greatest extent possible.

That said, decisive predictions are *impossible* without sufficient resources from the leadership-class computing resources allocated via the ALCC, ERCAP, and INCITE programs. Large allocations on Exascale machines at NERSC (Perlmutter, now available for early science), OLCF (Frontier, turning on in early 2022), and ALCF (Aurora, turning on later in 2022) will be essential. The USQCD members carrying out this research are fully engaged in early science on these machines and have prepared both a three-year INCITE proposal to exploit Frontier and Aurora and an annual ERCAP for Perlmutter; they will prepare proposals for the just-announced 2022–2023 ALCC aimed at all three. They are doing everything they can, but success in g–2 will require actions from others in the allocation of leadership-class resources. (Last-minute note: the INCITE proposal mentioned here received word November 11, 2021, of a large allocation for 2022 on pre-exascale Summit but without mention of allocations on Frontier and Aurora in 2022–2024.)

Recommendation #2a: USQCD should conduct an anonymous survey to evaluate the Diversity, Equity, and Inclusion climate within the LQCD-ext III research program.

Response: We thank the review panel for this recommendation. A survey has been crafted in consultation with the DEI offices of Fermilab and JLab. It will be circulated to the community in January 2022. This date has the advantage of filling a gap in the USQCD schedule between a new Call for Proposals for long-term storage (before the end of 2021), and the winter-spring Call for Proposals for cluster computing.

Recommendation #2b: USQCD should design and implement a feedback mechanism enabling internal assessment of the overall effectiveness and membership selection procedures of USQCD governance, both the Executive Committee and the Scientific Policy Committee (SPC) and the effectiveness of the award allocation process to proposals.

Response: The 2022 USQCD All Hands' Meeting will include a roundtable discussion on governance. The User Survey has always had numerous questions on the SPC allocation process, with an opportunity for open-ended comment.

Recommendation #2c: The review panel recommends adding questions to the User Survey that allows users to comment on the SPC allocation process, fairness, and scientific impact.

Response: In response to this recommendation, we fine-tuned these questions to bring out more clearly the issues of fairness and scientific impact. The changes were designed not to spoil the charts showing year-to-year tracking of satisfaction, as they have been useful to project, collaboration, and review panels. The revised questions were included in the User Survey that is currently underway.

Recommendation #3: The LQCD research program should present a timeline for results in the context of the HEP and Nuclear Physics experimental timelines at the next progress review. The alignment of theoretical and experimental results should be informative for both communities.

Response: This recommendation is quite a challenge, but we agree that it will be worth the effort. Engaging the whole USQCD community will be important in this endeavor. (Recall that the FWP's narrative was derived from the community-authored whitepapers.) It seems the best place to develop and present the LQCD timeline is on the USQCD website, www.usqcd.org. This site is outdated in content and implementation. We will move it to a WordPress implementation (the standard for Fermilab-based websites), which, to the best of our knowledge, will also provide tools for such a timeline. Individual USQCD project PIs will be asked to share their plans. The end goal is a format that will be transparent to future review panels, other members of USQCD, and interested visitors to the web site.