

Report from the Executive Committee

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Fermilab

USQCD All Hands' Meeting
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Thanks, Paul!!!

USQCD has had two superb spokespersons: Bob Sugar and Paul Mackenzie.

New setup: spokesperson + deputy spokesperson, with three-year terms.

Deputy succeeds spokesperson.

Balance between HEP & NP.



USQCD Executive Committee

- Richard Brower
- Norman Christ (interim chair November–April; superbly managed)
- Carleton DeTar
- Will Detmold (elected; now permanent; thanks Martin!)
- Robert Edwards (deputy)
- Aida El-Khadra (ex officio)
- Anna Hasenfratz
- Andreas Kronfeld (interim member; now chair \Leftrightarrow spokesperson)
- Candidate L (new junior member to be elected)
- Swagato Mukherjee (thanks Frithjof!)
- Kostas Orginos

Scientific Program Committee

- Tom Blum
 - Aida El-Khadra (chair)
 - Steven Gottlieb
 - Keh-Fei Liu
 - Swagato Mukherjee
 - Ethan Neil
 - David Richards

 - Thank you Anna, for your leadership of the SPC the past three cycles.
- Type A proposals: this [Call](#).
 - Type B proposals: submit to [Aida](#) any time; response in ~1 week.
 - Type C proposals: submit to site contacts; response asap:
 - BNL: [Bob Mawhinney](#);
 - Fermilab: [Jim Simone](#);
 - JLab: [Chip Watson](#).
 - No response? Send follow-up.

Science Advisor Board

- Ayana Arce (ATLAS; strongly-coupled BSM searches)
- Daniel Cebra (STAR; heavy-ion physics)
- Lawrence Gibbons ($\mu 2e$; lepton-flavor physics)
- Krishna Rajagopal (nuclear theory; NSAC member)
- Alan Schwartz (Belle, Belle 2; quark-flavor physics)
- Matthew Shepherd (BES II, GlueX; particle and nuclear physics)
- Jure Zupan (particle theory: DM, flavor)
- Will consult with USQCD on this year's whitepaper style & substance.

Outline

- Not in this talk:
 - inventory of all USQCD computing resources (see [Aida's talk](#), [Bill's talk](#), [Chip's talk](#), the [Call for Proposals](#), [Paul's 2017 talk](#)).
- In this talk:
 - funding landscape in “interesting” times;
 - USQCD whitepapers;
 - sharing our expertise;
 - the structure for the infrastructure.

Nag, Nag, Nag

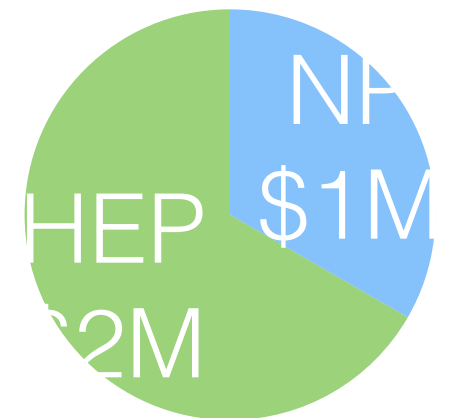
- When you (as PI) submit a proposal, you tacitly agree that, should you receive an allocation,
 - you and all active users on your project fill out the User Survey;
 - you will set up a web page describing the project's progress and publications;
 - you will acknowledge USQCD resources in publications.
- “Computations for this work were carried out with resources provided by the USQCD Collaboration, [other sources]. USQCD resources are acquired and operated thanks to funding from the Office of Science of the U.S. Department of Energy.”

Jargon

- LQCD refers to an infrastructure project; lattice QCD means the science.
- HEP refers to the Office of HEP; particle physics means the science.
- NP refers to the Office of NP; nuclear physics means the science.
- In lattice QCD, the distinction between particle physics and nuclear physics is blurry and can be both unhelpful and helpful.
- We are accustomed to periodic boundary conditions and have to cope with stovepipe boundary conditions.

LQCD Infrastructure

- Pre FY06: funding from labs and SciDAC to explore clusters; from DOE for a QCDOC.
- LQCD: \$9.2M for FY06–FY09 (inclusive); delivered > baseline.
- LQCD extension: \$18.5M FY10–FY14 (inclusive); delivered > baseline.
- LQCD ext. II: \$2.0 M for FY15, \$3.0M FY16–FY19:
 - funding for FY18 (and beyond) is the focus of next few slides;
 - \$2.0M (total) roughly suffices for operations of existing hardware.
- In FY19, we will have to make the case for funding in FY20–FY24.



LQCD ext. II Hardware: Present Status

- BNL (220 M Jpsi-core-hours + 5 M GPU-hours for coming allocation):
 - recently retired 1/4-rack of BlueGene Q;
 - operating CPU+GPU “Institutional Cluster” & KNL cluster; procuring (with FY17 \$\$) “Skylake” CPU cluster.
- Fermilab (114 M Jpsi-core-hours + 2.4 M GPU-hours for coming allocation):
 - “pi0” and “pi0g” clusters procured in FY15, reaching end of useful service;
 - need plan to rejuvenate the Fermilab facility (or deal with consequences, if not).
- JLab (360 M Jpsi-core-hours):
 - KNL cluster procured FY16 [now operated under NPPLC];
 - [procurement(s) with NPPLC funding in FY18 (see Chip’s talk)].

USQCD

~~LQCD~~ ext. II Hardware: Present Status

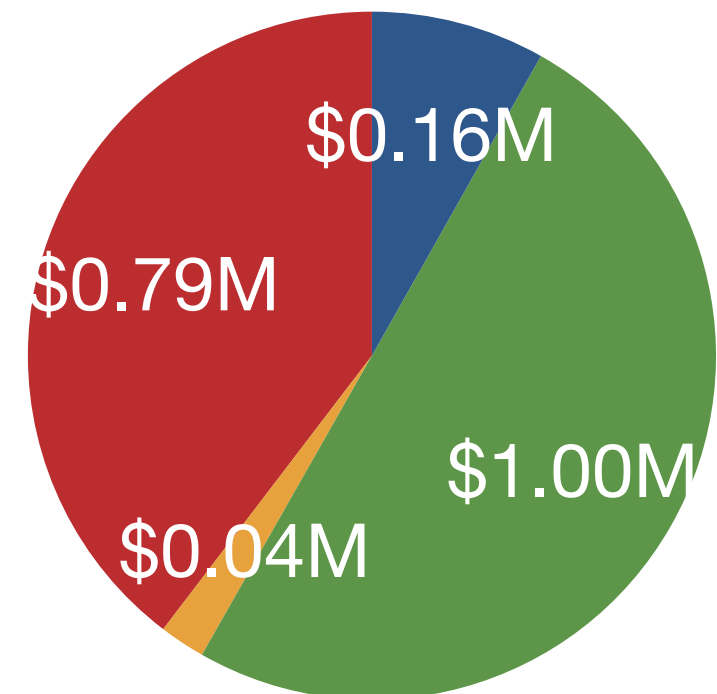
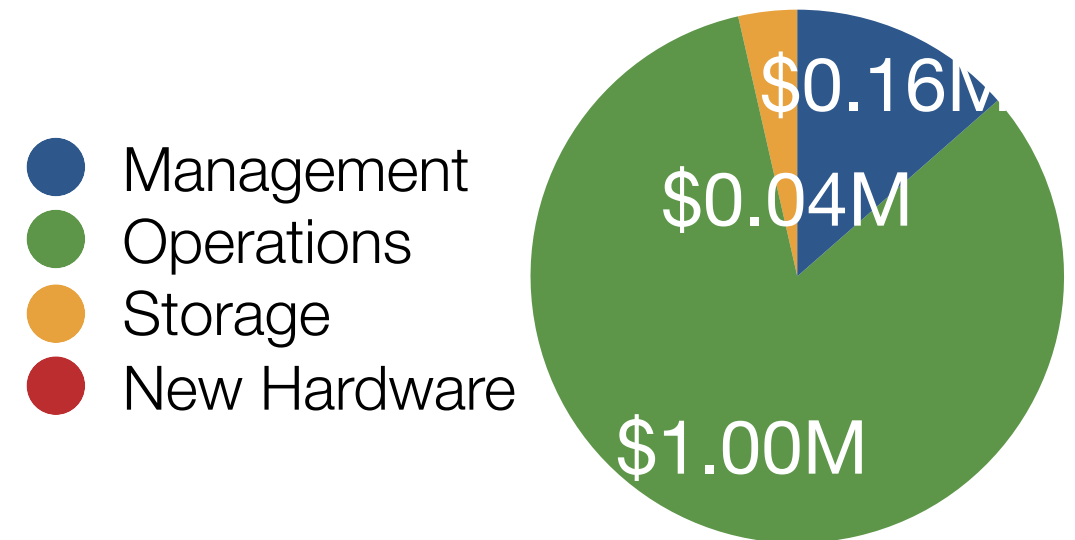
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Past 14 Months in Brief

- Uncertainty in out-year budgets led HEP (NP) to consider ending (pausing) LQCD ext. II in FY17. Didn't happen (would have ceased operations) but:
 - delay in releasing HEP funding led to delay in FY17 acquisition at BNL.
- HEP has decided to adopt model of “institutional clusters”:
 - endorsed by BNL and Fermilab; BNL's IC exists, Fermilab's not yet clear;
 - as long as communications latency is low and memory bandwidth is high, the difference between IC and dedicated hardware is in management.
- NP continues to prefer dedicated hardware model and views HEP's switch to the IC model as ending the inter-office Project.
- At the beginning of FY18, \$0.3 M provided to Project, of which \$0.1 M to JLab.

Next Few Months in Brief

- NP funding JLab; *cf.* Chip's talk.
- Half of remaining HEP \$1.7 M due to arrive in April.
- Second half slated for June/July:
 - pending successful hardware review, May 21, 22 (at BNL);
 - would enable FY18 IC procurement;
 - on the science side, we need a compelling case that looks to FY19 and beyond.



Allocations with Two Hardware Projects

- Both Offices (according to > 1 person per Office)
 - find the USQCD allocation process to work well;
 - want the SPC to allocate its computer resource together with the other Office's;
 - encourage the SPC to neglect the source of funding.
- That said, both Offices will want to see high-quality, relevant results:
 - “relevant” depends on perspective.
- We have many calculations that are relevant to both Offices, perhaps for slightly different reasons: we need to make the most of this.

USQCD with Two Hardware Projects

- An important motivation for adding the role of deputy spokesperson is to keep us scientists unified:
 - spokesperson is the principal point of contact;
 - spokesperson and deputy confer frequently to stay aligned;
 - deputy will relieve the spokesperson of some tasks (still being explored).
- Possible to “share” hardware reviews, such that science is presented and discussed in a unified, coherent way, while the Offices have flexibility to call on an overlapping but not identical set of panelists for the Projects.
- What does the *hardware* review look like in the IC model?

Whitepapers

- As promised in last year's EC report, 2018 is a good time to take stock of our research by documenting our achievements and aspirations.
- We last wrote whitepapers in 2013, a year before the end of LQCD ext.
- The end of LQCD ext. II is the logical time, made more timely by Offices' evolving views on support for our computing.
- In the past, we had the standard four thrusts: QCD thermodynamics, Cold NP, QCD for HEP, BSM.
- To show more clearly that some calculations serve both offices, we've resliced Cold NP and QCD for HEP to highlight calculations relevant to the Fermilab neutrino program and to fundamental symmetries.

Whitepaper Coordinators

- QCD thermodynamics Frithjof Karsch & Swagato Mukherjee
- Cold nuclear physics Will Detmold & Robert Edwards
- Fundamental symmetries Zohreh Davoudi & Taku Izubuchi
- Neutrino-nucleon (-nucleus) ASK & David Richards
- Quark- and lepton-flavor physics Christoph Lehner & Stefan Meinel
- Non-QCD LGTs beyond the SM Rich Brower & Anna Hasenfratz
- LGT computing Balínt Joó & Chulwoo Jung

Whitepaper on Computing

- A very timely idea.
- Some LGT algorithms have a wide reach: HMC is used in Bayesian inference and machine learning; cross-fertilization with solvers (ECP).
- Experimenters will have to port codes to HPC platforms with GPU, Xeon Φ , Power9, etc. Collaborate on FPGAs?
- We have experience and valuable expertise.
- There have not been many places to communicate the experience and expertise. Examples: “Snowmass” WG on computing. So:
 - “Lattice Meets Experiment—Computational Techniques”, or even
 - “Lattice Teaches Experiment—Computational Techniques”.

Structure of USQCD

- Executive Committee started with SciDAC support to develop software, and soon became steward of a QCDOC and dedicated clusters.
- It now encompasses
 - LQCD ext. II;
 - SciDAC (NP+HEP for several cycles; now NP only);
 - INCITE allocations; renew three-year proposal for Mira and Titan (July 27);
write new proposal for Summit (June 22);
 - Blue Waters allocation;
 - Exascale Computing Project.
- Software Committee.

Structure of USQCD

- Executive Committee started with SciDAC support to develop software, and soon became steward of a QCDOC and dedicated clusters.
- It now encompasses
 - LQCD ext. II; USQCD charter emphasizes this series of Projects;
 - SciDAC (NP+HEP for several cycles; now NP only);
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Working Groups

- EC is forming two working groups to address some overarching issues.
- Quantum information science (QIS) is becoming prominent throughout the Office of Science, e.g., [Dear colleague letter](#) from Stephen Binkley:
 - Martin Savage has kindly agreed to lead a WG to explore synergy between LGT and QIS.
- All proposals these days require a data management plan. Last review of USQCD noted the lack of a collaboration-wide plan:
 - Robert Edwards has kindly agreed to lead a WG to develop a plan:
 - in addition to making sense for USQCD, it should be something all members can use in our own grant proposals.

NP Funding

- This report has not talked about NP funding yet.
- NP Office understands the centrality of lattice QCD to fulfill its mission.
- The NP hardware project is new. To reiterate some things—
 - the Offices want to keep the science unified under USQCD auspices;
 - the science of USQCD is *de facto* reviewed with the hardware;
 - thinking about coordinating hardware reviews has begun, but details need to be understood;
 - two distinct models (IC & dedicated hardware) in one review: hmm.

- A challenge is the desirable goal of the same level of funding from NP as from HEP:
 - without lowering HEP funding.
- NSAC has laid out milestones that require lattice QCD.
- Are there persuasive arguments to go beyond satisfying these milestones?
- HEPAP hasn't laid out such milestones; the argument then is phrased as “the interpretation of an approved requires lattice-QCD calculations”.
- Can any of this be adapted for the NP Office?
- An advantage of the new leadership setup is that the EC (and hence the collaboration) will be led by two people with connections to both Offices.

Summary and Outlook

- Thanks to John Kogut, Ted Barnes, and Elizabeth Bartosz for their advocacy in the Offices.
- USQCD has to continually sharpen the case for funding: “Be relevant!”
- Understand what “relevant” means by interacting with experimenters not only on physics, but also on computing.
- Collaboration work (thanks in advance for your help):
 - proposals and whitepapers;
 - working groups and procurement advice.
- Interact with colleagues in physics and computing.

Questions and Discussion

Backups