Report from the Executive Committee

Andreas S. Kronfeld Fermilab

USQCD All Hands' Meeting virtually MIT | April 30–May 1, 2021





USQCD Executive Committee

Spokesperson = EC Chair

- Tom Blum
- Norman Christ
- Carleton DeTar
- Will Detmold
- Robert Edwards (Deputy)
- Anna Hasenfratz
- Andreas Kronfeld (Spokesperson)
- Huey-Wen Lin (elected junior member) 2
- Swagato Mukherjee
- Kostas Orginos
- David Richards (ex officio, SPC Chair)

Spokesperson, starting October 1

until September 30

2020 Election

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Deputy, starting October 1

Spokesperson, starting October 1

until September 30

2020 Election

Scientific Program Committee

- Alexei Bazavov
- Tanmoy Bhattacharya (Deputy)
- Jack Laiho
- Meifeng Lin
- Ethan Neil
- David Richards (Chair)
- Sergey Syritsyn

 Thank you Keh-Fei for your work on the SPC the past few cycles, and David as Chair last year and now.

- Type A proposals: this Call.
- Type B proposals: submit to David any time; response in ~1 week.
- Type C proposals: submit to site contacts; response asap:
 - BNL: Peter Boyle;
 - Fermilab: Jim Simone;
 - JLab: Robert Edwards.
- No response? Send follow-up.

USQCD Scientific Advisory Board

- Current members:
 - Ayana Arce (Duke, ATLAS)
 - * Roy Briere (Carnegie Mellon, Belle II, BES III)
 - * Abhay Deshpande (Stony Brook, RHIC, EIC)
 - Lawrence Gibbons (Cornell, mu2e)
 - * Kendall Mahn (MSU, T2K, DUNE)
 - Krishna Rajagopal (MIT, theory)
 - Matthew Shepherd (Indiana, GlueX, BES III)
 - Jure Zupan (Cincinnati, theory)





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. III research program;
 - NPPLC initiative;

Same SPC Overlapping hardware committees

- SciDAC (NP+HEP for several cycles; now NP only);
- Exascale Computing Project (in practice, has subsumed Software Committee).
- (Like last year, USQCD steps aside for INCITE.)

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."

Confidentiality and Transparency

- The All Hands' Meeting is a collaboration meeting:
 - everything discussed here is collaboration confidential;
 - applies particularly and especially to scientific ideas and plans.
- From the CfP:

- "The investigators whose proposals have been selected by the Scientific Program Committee for a possible award of USQCD resources shall agree to have their proposals posted on a password protected website, available only to our Collaboration, for consideration during the All Hands' Meeting."
- Posting proposals and allocations necessary for transparency. Obviously must be treated as collaboration confidential.

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.

Outline

- Not in this talk:
 - inventory of all USQCD computing resources (see David's talk, Bill's talk, Robert's talk, the Call for Proposals); ECP Software (see Carleton's talk last year).
- In this talk:
 - HEP proposal & review for FY2020-2024 funding;
 - jeopardy policy, especially w.r.t. the BNL IC;
 - APS Division of Particles & Fields (DPF) "Snowmass" planning;
 - diversity and inclusion.

USQCD Resources

"Research Program" and "Initiative"

- LQCD extension III research program (Bill Boroski, PI):
 - (currently) \$2.2 M/year from DOE HEP for node-hours;
 - \$0.3M/year from DOE HEP for long-term storage facility (TB-years);
 - reviewed annually (*e.g.*, May 19–20, 2021; September 9–10, 2020);
 - contacts John Kogut and Bill Kilgore.
- Nuclear and Particle Physics Lattice-QCD Computing initiative (Robert Edwards, PI):
 - (currently) \$1.0 M/year from DOE NP for nodes;
 - JLab provides long-term storage of NP-relevant data (TB);
 - reviewed quadrennially as part of the Comparative Review of NP national lab theory groups (*i.e.*, this year if not postponed to next year);
 - contact Paul Sorensen and Xiaofeng Guo.

- Both Offices instruct USQCD to develop the strongest possible program in lattice QCD and other lattice field theories:
 - the SPC, with guidance from the EC, formulates the program.
- However, HEP part has to be responsive to the proposal narrative that secured LQCD ext. III funding—
 - "strongest possible" has to be interpreted mindful of the opinions of scientists serving on review panels:
 - HEP experimenters, theorists, and computing experts annually;
 - NP theorists quadrennially.
- HEP proposal anticipates the imbalance of larger HEP funding but closer to 50:50 leanings of members: many nucleon matrix elements for HEP experiments. David calls projects that serve both Offices "dual use".
- "Never say 'parton distribution' without saying 'Large Hadron Collider'."

Data Management Plan

- Advent of the LQCD long-term storage facility being funded and stood up, data-management plan (DMP) developed (Robert Edwards, Jim Simone, A.S.K.): linked from collaboration page <u>www.usqcd.org/collaboration.html</u>:
 - outlines responsibilities of LQCD and NPPLC, USQCD governance, USQCD members, and the three sites;
 - mentioned in the CfP.
- LQCD storage facility cannot store everything forever: the SPC determines the community nature of the data: project specific data of long-term value have to be brought back to your own institution.
- Funding agencies, scientific journals, etc., are increasingly calling for datamanagement plans:
 - appeal to the USQCD DMP as part of the DMP of grant proposals.



some emphasis on Annie & LQCD ext. III interplay

Problem & Solution

- The Allocation Year (AY) starts July 1 difficult to change.
- July and August almost always suffer from under-usage:
 - new users (at a given site) need time to ramp up;
 - Independence Day holiday and summer travel.
- Fixes:
 - rolling start in June—as soon as SPC announces allocations, each site gives its new users a Type C project;
 - fewer nodes contracted in July & August w/ BNL & Fermilab;
 - jeopardy policy: run at pace or you will lose allocation (all 3 sites).

Remarks

- A cycle lost is a cycle lost:
 - It is inefficient to stop running to look for ~20% better performance.
 - It is the site managers' job to enforce fairness in the queue.
 - If run problems arise, notify the service desk!
 - Take your run plan (the one in your proposal) seriously—it tells you what to do until exceptional circumstances arise:
 - revise it when you learn your allocation (as requested by SPC);
 - run plan = "We will run ensemble-A gauge fields in Q1, ensemble-A quark propagators in Q2,"
 - run plan \neq "We will use 25% of our allocation each quarter".

BNL IC ↔ LQCD ext. III

- The BNL IC (the GPU cluster "Annie") is a large cluster with several customers besides USQCD (see <u>Zhihua's talk</u>).
- Contrast with
 - predominant USQCD fraction of BNL Skylake, Fermilab LQ1;
 - USQCD + Lehner's ECA on BNL KNL;
 - "dedicated cluster" model at JLab.
- Key institutional-cluster concept is various customers filling in each others' lulls in running ("provision to baseline" vs. "provision to peak"):
 - Iulls common at the start of an allocation year: we start July 1, others start October 1 or January 1.
- LQCD ext. III purchases a certain number of node-hours each year.

- BNL does not allow the other customers to eat into the node-hours LQCD purchases for USQCD (obviously), so ...
 - BNL cannot allow USQCD to eat into other customers' node-hours.
- Especially in the "institutional cluster" model, unused cycles review poorly; the USQCD EC & SPC and the LQCD ext. III research program:
 - encourage you to run as hard as you can;
 - impose rewards if you do and jeopardy penalties if you <u>dawdle</u>;
 - ask BNL to let USQCD projects at >100% allocation run in scavenger mode.
- BNL has to charge an account for these scavenged cycles:
 - it charges LQCD ext. III; there is no other customer to charge;
 - when all LQCD ext. III node-hours are used, BNL has to put all USQCD projects into scavenger mode.
- Scavenger mode is pretty bad: your jobs can be preempted while underway.

Outcome [https://monitoring.sdcc.bnl.gov/pub/allocation/lqcd.html]:

BNL SDCC LQCD Projects Usage Sumary

Institutional Cluster

(Sky Core Hours)

	Clus		ter	Account	Start Date		End Date	Allocation		Usage		Usage(%)	
		Annie-IC		lqcd-20-21	2020-07-01		2021-06-30	37,905,00		39,897,999		105.26%	
	Project		Origin	al SPC Allocation	Adjustment	Adj	usted SPC Allocation	Usage	Progre	ess(%) 🔻	Remain	30Day Usage	30Day BurnRate
1	piongpd-20-21			2,992,500	340,595		3,333,095	6,160,189		184.82%	0	515,720	15.47%
2	axialgpu-20-21			3,325,000	8,505		3,333,505	5,662,137	·	169.86%	0	1,469,696	44.09%
3	stagmug-2-20-2	1		4,655,000	(734,289)		3,920,711	4,407,099)	11 2.41%	0	910,075	23.21%
4	exclhvp-20-21			3,990,000	223,767		4,213,767	4,475,400)	106.21%	0	181,358	4.30%
5	qgpd-20-21			3,657,500	40,207		3,697,707	3,669,330)	99.23%	28,377	0	0.00%
6	protongff-20-21			4,821,250	(107,88 1)		4,713,369	4,439,285	;	94.18%	274,083	0	0.00%
7	a1res-20-21			2,992,500	4,321		2,996,821	2,492,450)	83.17%	504,371	510,932	17.05%
8	nucstructclover-	20-21		4,555,250	208,679		4,763,929	3,929,348	3	82.48%	834,581	0	0.00%
9	sextet-20-21			3,657,500	8,329		3,665,829	2,825,890)	77.09%	839,939	912,219	24.88%
10	semibdff-20-21			2,926,000	7,768		2,933,768	1,836,872	2	62.61%	1,096,895	3,774	0.13%
11	lqcd-other			0	0		0	C)	0.00%	0	0	0.00%
12	UnAllocated:			332,500	2		332,502	C		0.00%	0	0	0.00%

updated: 2021-04-29 00:03:33

- LQCD ext. III is happy (got what it paid for).
- Some USQCD projects unhappy (may not get 100%).
- LQ1 has similar problem; stems from finiteness of year, not purchase.

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4	exclhvp-20-21		3,990,000	223,767	4,21	3,767	4,475,400	106.21%	0	181,358	4.30%
Topic for discussion											
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Community Activities

DPF Snowmass Study

- Computational Frontier: Steve Gottlieb
 - Theoretical Calculations and Simulations: Peter Boyle
 - Machine Learning: Phiala Shanahan
 - Quantum Computing: Martin Savage
- Theory Frontier: Aida El-Khadra
 - Lattice Gauge Theory: Zohreh Davoudi, Taku Izubuchi, Ethan Neil
 - QIS: Simon Catterall
- Frontier: Convener
 - Topical Group: Leader

- Energy Frontier:
 - QCD—Hadronic Structure: Huey-Wen Lin
 - QCD—Heavy Ions: Swagato Mukherjee
- Rare Processes and Precision Frontier:
 - Weak Decays of *b* and *c* Quarks: Stefan Meinel
 - Fundamental Physics in Small Experiments: Tom Blum
 - Hadronic Spectroscopy: Sasa Prelovsek (Ljubljana)
- Nearly <u>50</u> LOIs w/ USQCD authors.

USQCD Meets Neutrino-Nucleus Scattering

- Snowmass TF11 (Theory of neutrino physics) and USQCD are organizing a workshop on neutrino-nucleus scattering (week of August 23):
 - Lattice QCD calculations for neutrino-nucleus scattering: Mike Wagman
 - Ab initio nuclear many-body studies for neutrino-nucleus scattering: Joe Carlson
 - Coherent elastic neutrino-nucleus scattering: Louis Strigari
 - Neutrino-induced shallow and deep inelastic scattering: Natalie Jachowicz
 - The needs of the neutrino experimental program: Kendall Mahn
 - Neutrino event generators: Steven Gardiner
- Further organizers: Baha Balantekin, Vincenzo Cirigliano, Zohreh Davoudi, André de Gouvêa, Rajan Gupta, A.S.K., Keh-Fei Liu, Irina Mocioiu

Other Community Activities

- Workshops series on Parton Distributions and Lattice QCD Calculations [e.g., Community White Paper, H.-W. Lin et al., <u>arXiv:1711.07916</u>].
- Muon *g*–2 Theory Initiative:
 - Aida El-Khadra and Christoph Lehner, co-chairs;
 - many phenomenology experts and experimenters involved;
 - community consensus report [arXiv:2006.04822]:

$$a_{\mu}^{\mathrm{HLbL}} = +92(18) \times 10^{-11}$$

includes lattice-QCD result for HLbL! (cf. Lee's & Ruth's talks)

• DOE HEP seems to be extremely pleased with this initiative!

Diversity, Equity, and Inclusion

Committee on Diversity, Equity, and Inclusion

- CDEI members:
 - Will Detmold (MIT, chair)
 - Kimmy Cushman (Yale)
 - Joel Giedt (RPI)
 - Aida El-Khadra (UIUC)
 - Huey-Wen Lin (MSU)
 - Andreas Kronfeld (*ex officio* ← slot for the EC chair)
- Aim to be representative: looking for postdocs and tenure-track faculty to join. If you are interested, please contact <u>Will</u>. Also if you're interested sometime in the future.

WD & ASK had a first meeting with Sandra Charles (Chief DEI Officer, Fermilab).

Code of Conduct

- We want every member of USQCD to feel welcome in every activity of the collaboration:
 - AHM (including the CfP) is the highest profile, but also, for example, we openly solicited participation in the 2019 white papers.
- CDEI crafted a <u>code of conduct</u>, which EC adopted.
- Membership responsibilities (from the USQCD charter):

Members are expected to abide by the rules of USQCD on the use of community gauge configurations for noncompeting projects and not to compete with USQCD's proposals for funding or computing resources. Specifically, USQCD members should not appear as PIs or Co-PIs on competing proposals. These USQCD proposals can be found on the collaboration web site: http://www.usqcd.org/.

will be modified to refer to the code of conduct.

Other Activities

- Research Experience for Undergraduates (REU):
 - would like to organize a virtual workshop for all lattice-QCD REU students + any undergrad working in our field;
 - let the CDEI know if you will host an REU(-like) student this summer;
 - if successful, USQCD can apply to <u>NSF->REU</u> for funding for a live workshop in Summer 2022.
- USQCD meets DEI Workshop:
 - prelude to engaging <u>APS Inclusion, Diversity, and Equity Alliance</u>.
- Collecting data on how USQCD allocations are distributed among members by gender & career stage (Ph.D. students, postdocs, junior faculty).

plan

idea

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Topics for discussion

- USQCD meets DEI Workshop:
 - prelude to engaging <u>APS Inclusion, Diversity, and Equity Alliance</u>.
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plan

idea

Final Remarks



US Lattice Quantum Chromodynamics

- This is a collaboration meeting for USQCD members.
- Don't forget the remarks about confidentiality:
 - since not everyone has an account on indico.mit.edu, we will keep the agenda and slides public — post a suitable version for posterity.
- Many non-members registered—they all turned out to be students or postdocs working with senior members of USQCD.
- Recall membership is open to researchers at U.S.-based institutions working on lattice QCD or other field theories and similar subjects—
 - but newcomers (or their supervisors) have to ask to join, by sending an email to the spokesperson or deputy.
- We have a website, <u>www.usqcd.org</u>, with all this info.

Discussion Session

- Simple questions about this talk.
- DEI issues—further ideas on what the CDEI could be doing \leftrightarrow STEM.
- Intersection of LQCD purchase (use 100% of finite resource), USQCD jeopardy policy (run as fast as you can), and BNL accounting (need to charge someone).
- Other issues, complaints, concerns, comments, remarks.

Backup: Snowmass LOIs

Computational Frontier

- CompF2/017 <u>Numerical Lattice Gauge Theory</u> (USQCD; POC = Kronfeld); Andreas Kronfeld, Robert Edwards, Thomas Blum, Norman Christ, Carleton DeTar, William Detmold, Anna Hasenfratz, Huey-Wen Lin, Swagato Mukherjee, Konstantinos Orginos, David Richards
- CompF2/040 Lattice Calculation of Neutrino-Nucleon Cross Section (χQCD; POC = Liu); Keh-Fei Liu, Terrence Draper, Jian Liang, G. Wang, Yi-Bo Yang, Yong Zhao
- CompF3/061 <u>Machine Learning for Sampling in Lattice Quantum Field Theory</u> (POC = Hackett, Shanahan); M. S. Albergo, D. Boyda, K. Cranmer, D. C. Hackett, G. Kanwar, P. E. Shanahan, J. M. Urban
- CompF3/096 <u>Machine Learning for Lattice QCD Simulations on Classical and Quantum Computers</u> (POC = Yoon); Tanmoy Bhattacharya, Rajan Gupta, Huey-Wen Lin, and Boram Yoon
- CompF3/131 <u>Machine Learning and Neural Networks for Field Theory</u> (POC = Foreman); Sam Foreman, Xiao-Yong Jin, and James C. Osborn
- CompF3/131 <u>Machine Learning and Lattice QCD</u> (POC = Tomiya); Tom Blum, Peter Boyle, Taku Izubuchi, Luchang Jin, Chulwoo Jung, Christoph Lehner, Meifeng Lin, and Akio Tomiya

Cosmic Frontier

 CF1/166 <u>Composite Dark Matter from Strong Dynamics on the Lattice</u> (LSD; POC = Vranas); Thomas Appelquist, Richard C. Brower, Kimmy K. Cushman, George T. Fleming, Andrew D. Gasbarro, Anna Hasenfratz, Dean Howarth, Xiao-Yong Jin, Joe Kiskis, Graham D. Kribs, Ethan T. Neil, James C. Osborn, Curtis Peterson, Claudio Rebbi, Enrico Rinaldi, David Schaich, Pavlos M. Vranas, and Oliver Witzel

Energy Frontier

- EF2/188 <u>Composite Higgs from Strong Dynamics on the Lattice</u> (LSD; POC = Vranas, Witzel); Thomas Appelquist, Richard C. Brower, Kimmy K. Cushman, George T. Fleming, Andrew D. Gasbarro, Anna Hasenfratz, Dean Howarth, James Ingoldby, Xiao-Yong Jin, Joe Kiskis, Graham D. Kribs, Ethan T. Neil, James C. Osborn, Curtis T. Peterson, Claudio Rebbi, Enrico Rinaldi, David Schaich, Pavlos M. Vranas, Oliver Witzel
- EF4/192 Probing Scalar and Tensor Interactions at the TeV Scale (PNDME, NME; POC = Gupta, Mereghetti); Simone Alioli, Tanmoy Bhattacharya, Radja Boughezal, Vincenzo Cirigliano, Rajan Gupta, Yong-Chull Jang, Huey-Wen Lin, Emanuele Mereghetti, Santanu Mondal, Sungwoo Park, Saori Pastore, Frank Petriello, Boram Yoon, Albert Young
- EF4/249 <u>Unitarity of CKM Matrix, |Vud|, Radiative Corrections and Semileptonic Form Factors</u> (PNDME, NME; POC = Gupta, Cirigliano); Tanmoy Bhattacharya, Steven Clayton, Vincenzo Cirigliano, Rajan Gupta, Takeyasu Ito, Yong-Chull Jang, Emanuele Mereghetti, Santanu Mondal, Sungwoo Park, Andrew Saunders, Boram Yoon, Albert Young
- EF5/257 Lattice-QCD Determinations of Quark Masses and the Strong Coupling as (Fermilab Lattice, MILC, TUMQCD; POC = Kronfeld); A. Bazavov, C. Bernard, N. Brambilla, C. DeTar, A.X. El-Khadra, E. Gámiz, Steven Gottlieb, U.M. Heller, W.I. Jay, J. Komijani, A.S. Kronfeld, J. Laiho, P.B. Mackenzie, E.T. Neil, P. Petreczky, J.N. Simone, R.L. Sugar, D. Toussaint, A. Vairo, A. Vaquero Avilés-Casco, R.S. Van de Water, J.H. Weber
- EF6/085 Parton Distribution Functions from Lattice QCD (POC = Jin); Peter Boyle, Taku Izubuchi, Luchang Jin, Peter Petreczky, Swagato Mukherjee, and Sergey Syritsyn
- EF6/143 <u>Gluon-helicity and Parton-orbital-angular-momentum Contribution to the Proton Spin</u> (POC = Zhao); Yoshitaka Hatta, Xiangdong Ji, Luchang Jin, Jian Liang, Keh-Fei Liu, Swagato Mukherjee, Peter Petreczky, Sergey Syritsyn, Gen Wang, Yi-Bo Yang, Feng Yuan, Jian-Hui Zhang, and Yong Zhao
- EF6/205 <u>Hadronic Tomography at the EIC and the Energy Frontier</u> (POC = Hobbs); S. Fazio, T. J. Hobbs, A. Prokudin, A. Vicini (editors) *et al.*
- EF9/230 <u>Constraining Physics Beyond the Standard Model using Electric Dipole Moments</u> (PNDME, NME; POC = Bhattacharya); Tanmoy Bhattacharya, Vincenzo Cirigliano, Vouter Dekens, Jordy de Vries, Rajan Gupta, Emanuele Mereghetti, Christopher Monahan, Andrea Shindler, Boram Yoon

Neutrino Frontier

- NF6/094 <u>Neutrino-induced Shallow- and Deep-Inelastic Scattering</u> (POC = Katori); L. Alvarez-Ruso, A. M. Ankowski, M. Sajjad Athar, C. Bronner, L. Cremonesi, K. Duffy, S. Dytman, A. Friedland, A.P. Furmanski, K. Gallmeister, S. Gardiner, W.T. Giele, N. Jachowicz, H. Haider, M. Kabirnezhad, T. Katori, A. S. Kronfeld, S. W. Li, J.G. Morfín, U. Mosel, M. Muether, A. Norrick, J. Paley, V. Pandey, R. Petti, L. Pickering, B.J. Ramson, M. H. Reno, T. Sato, J.T. Sobczyk, J. Wolcott, C. Wret, and T. Yang
- NF6/111 <u>Nucleon Form Factors for Neutrino Physics</u> (POC = Meyer); Taku Izubuchi, Christoph Lehner, Aaron S. Meyer, Shigemi Ohta, Sergey Syritsyn
- NF6/144 Event Generators for Accelerator-Based Neutrino Experiments (POC = Jay, Machado); Joshua Isaacson, William I. Jay, Alessandro Lovato, Pedro A. N. Machado, Noemi Rocco; Joseph A. Carlson, Alexander Friedland, Rajan Gupta, Deborah Harris, Or Hen, Kevin J. Kelly, Andreas S. Kronfeld, Ivan J. Martinez-Soler, Ornella Palamara, Saori Pastore, Yuber F. Perez-Gonzalez, David Schmitz, Hirohisa A. Tanaka, Jessica Turner, Yu-Dai Tsai, Michael Wagman
- NF6/167 <u>Theoretical Predictions of Neutrino-nucleus Interactions</u> (POC = Gupta, Gandolfi); Tanmoy Bhattacharya, Joseph A. Carlson, Vincenzo Cirigliano, Stefano Gandolfi, Rajan Gupta, Yong-Chull Jang, Huey-Wen Lin, Santanu Mondal, Sungwoo Park, Saori Pastore, Boram Yoon
- NF6/177 <u>Connecting QCD to Neutrino-nucleus Scattering</u> (POC = Rocco, Wagman); Joseph Carlson, Chia Cheng Chang (張家丞), William Detmold, Joshua Isaacson, William Jay, Gurtej Kanwar, Andreas Kronfeld, Huey-Wen Lin, Yin Lin (林胤), Keh-Fei Liu, Alessandro Lovato, Pedro Machado, Aaron S. Meyer, Saori Pastore, Noemi Rocco, Phiala Shanahan, and Michael Wagman
- NF6/193 Lattice-QCD Calculations Supporting Neutrino-Oscillation Experiments (Fermilab Lattice, MILC; POC = Kronfeld); A. Bazavov, C. DeTar, A.X. El-Khadra, E. Gámiz, Z. Gelzer, Steven Gottlieb, U.M. Heller, R.J. Hill, C. Hughes, W.I. Jay, A.S. Kronfeld, S. Lahert, J. Laiho, Yin Lin (林胤), P.B. Mackenzie, A.S. Meyer, E.T. Neil, J. Osborn, J.N. Simone, A. Strelchenko, R.L. Sugar, D. Toussaint, R.S. Van de Water, A. Vaquero Avilés-Casco

Rare & Precision Frontier

- RF1/047 Precision Lattice QCD in Support of BSM Searches (Fermilab Lattice, MILC; POC = DeTar);
 A. Bazavov, C. DeTar, A.X. El-Khadra, E. Gámiz, Z. Gelzer, Steven Gottlieb, Urs Heller, W.I. Jay, A.S. Kronfeld, J. Laiho, P.B. Mackenzie, E.T. Neil, R. Sugar, J.N. Simone, D. Toussaint, R.S. Van de Water, A. Vaquero
- RF1/054 <u>High Precision SM Predictions for Quark Flavor Observables</u> (POC = Lenz); Guido Bell, Oscar Cata, Thorsten Feldmann, Tobias Huber, Alexander Khodjamirian, Wolfgang Kilian, Thomas Mannel, Björn Lange, Alexander Lenz, Jan Piclum, Alexei Pivovarov and Oliver Witzel
- RF1/068 <u>Weak Decays of b and c Quarks</u> (RBC, UKQCD; POC = Flynn, Witzel); Peter A. Boyle, Mattia Bruno, Luigi Del Debbio, Felix Erben, Jonathan M. Flynn, Davide Giusti, Maxwell Hansen, Ryan C. Hill, Taku Izubuchi, Andreas Jüttner, Christoph Lehner, Michael Marshall, Antonin Portelli, Amarjit Soni, Masaaki Tomii, J. Tobias Tsang, and Oliver Witzel
- RF1/116 <u>High-precision Determinations of |Vxb| from a Close Theory-experiment Collaboration</u> (POC = Dey, Vaquero); Biplab Dey, Carleton DeTar, Andreas Kronfeld, and Alejandro Vaquero
- RF2/054 <u>High-precision Determination of Vus and Vud from Lattice QCD</u> (RB, UKQCD; POC = Gülpers);
 P. Boyle, N. Christ, F. Erben, X. Feng, D. Giusti, V. Gülpers, R. Hodgson, D. Hoying, T. Izubuchi, L. Jin,
 A. Jüttner, C. Lehner, S. Ohta, A. Portelli, J. Richings, C.T. Sachrajda, A Z.N. Yong
- RF2/055 <u>Rare Strange-to-down Processes from Lattice QCD</u> (POC = Portelli); P.A. Boyle, N.H. Christ, F. Erben, X. Feng, D. Giusti, V. Gülpers, R. Hodgson, D. Hoying, T. Izubuchi, A. Jüttner, F. Ó hÓgáin, A. Portelli, C.T. Sachrajda
- RF2/066 <u>Discovering New Physics in Rare Kaon Decays</u> (RBC, UKQCD; POC = Christ); Thomas Blum, Peter Boyle, Mattia Bruno, Norman Christ, Xu Feng, Danel Hoying, Taku Izubuchi, Yong-Chull Jang, Luchang Jin, Joe Karpie, Christopher Kelly, Christoph Lehner, Tuan Nyguen, Antonin Portelli, Christopher Sachrajda, Amarjit Soni, Masaaki Tomii, Bigeng Wang, Tianle Wang, Yidi Zhao

Rare & Precision Frontier

- RF3/038 <u>Hadronic Contributions to the Anomalous Magnetic Moment of the Muon</u> (RBC, UKQCD; POC = Lehner); Tom Blum, Peter Boyle, Mattia Bruno, Norman Christ, Davide Giusti, Vera Gülpers, Taku Izubuchi, Luchang Jin, Andreas Jüttner, Christoph Lehner, Aaron S. Meyer, J. Tobias Tsang
- RF3/077 <u>Calculations of Nucleon Electric Dipole Moments on a Lattice with Chiral Fermions</u> (POC = Syritsyn);
 M. Abramczyk, T. Blum, T. Izubuchi, Y.-C. Jang, H. Ohki, S. Syritsyn
- RF2/083 <u>The REDTOP Experiment: An n/n' Factory</u> (REDTOP; POC = Gatto); *alia et* J. Dey, V. Di Benedetto,
 B. Dobrescu, E. Gianfelice-Wendt, E. Hahn, D. Jensen, C. Johnstone, J. Johnstone, J. Kilmer, T. Kobilarcik, K. Krempetz, G. Krnjaic, A. Kronfeld, M. May, A. Mazzacane, N. Mokhov, W. Pellico, A. Pla-Dalmau, V. Pronskikh,
 E. Ramberg, J. Rauch, L. Ristori, E. Schmidt, G. Sellberg, G. Tassotto, Y.-D. Tsai, *et alia*
- RF2/092 <u>US Participation in Current & Future Rare Kaon Decay Experiments</u> (POC = Worcester); Wolfgang Altmannshofer, Leo Bellantoni, Gregory Bock, Norman Christ, David Christian, David E. Jaffe, Douglas Jensen, Christopher Kelly, Steve Kettell, Andreas Kronfeld, Jonathan Lewis, Matthew Moulson, Hogan Nguyen, Ronald Ray, Jack Ritchie, Phil Rubin, Robert Tschirhart, Yau Wah, Juliana Whitmore, Elizabeth Worcester, Eric Zimmerman
- RF2/094 Precise Lattice-QCD Calculations of Kaon- and Pion-decay Parameters and First-row CKM Unitarity Tests (Fermilab Lattice, MILC; POC = EI-Khadra); A. Bazavov, C. Bernard, C. DeTar, A.X. El-Khadra, E. Gámiz, Z. Gelzer, S. Gottlieb, U.M. Heller, W.I. Jay, A.S. Kronfeld, S. Lahert, J. Laiho, P.B. Mackenzie, E.T. Neil, R. Sugar, J.N. Simone, D. Toussaint, R.S. Van de Water, A. Vaquero
- RF3/103 <u>Using Lattice QCD for the Hadronic Contributions to the Muon g 2</u> (Fermilab Lattice, MILC; POC = EI-Khadra); A. Bazavov, C. DeTar, A.X. EI-Khadra, E. Gámiz, Z. Gelzer, Steven Gottlieb, U.M. Heller, W.I. Jay, A.S. Kronfeld, S. Lahert, J. Laiho, P.B. Mackenzie, E.T. Neil, R. Sugar, J.N. Simone, D. Toussaint, R.S. Van de Water, A. Vaquero

Theory Frontier

- TF3/060 Lattice Field Theory for Conformal Systems and Beyond (POC = Hasenfratz, Witzel); Andrea A. Carosso, Anna Hasenfratz, Ethan T. Neil, Claudio Rebbi, Enrico Rinaldi, David Schaich, Benjamin Svetitsky and Oliver Witzel
- TF5/010 Precision theory inputs for Vcb and LFUV observables; Andrew Lytle
- TF5/020 Lattice-QCD Studies of Inclusive B-meson Decays (POC = DeGrand, Jay);
 A. Bazavov, T. DeGrand, C. DeTar, A.X. El-Khadra, E. Gámiz Z. Gelzer, Steven Gottlieb,
 W.I. Jay, A.S. Kronfeld, J. Laiho, P.B. Mackenzie, E.T. Neil, R. Sugar, J.N. Simone,
 D. Toussaint, R.S. Van de Water, A. Vaquero
- TF5/021 Towards Global Fits of Three-dimensional Hadron Structure from Lattice QCD (POC = Monahan); C. Monahan, L. Del Debbio, H.-W. Lin, K. Orginos
- TF5/030 <u>Chiral Lattice Fermions and the Computational Frontier</u> (RBC, UKQCD; POC = Boyle); Tom Blum, Peter Boyle, Norman Christ, Felix Erben, Jonathan Flynn, Vera Gülpers, Taku Izubuchi, Yong-Chull Jang, Luchang Jin, Chulwoo Jung, Andreas Jüttner, Christopher Kelly, Christoph Lehner, Meifeng Lin, Michael Marshall, Masaaki Tomii, J. Tobias Tsang, Oliver Witzel
- TF5/032 <u>Algorithms and Software in Support of Computational HEP and NP at the Exascale and Beyond</u> (LatticeQCD ECP; POC = DeTar); R.C. Brower, N.H. Christ, C.E. DeTar, R.G. Edwards, and A.S. Kronfeld

Theory Frontier

- TF5/063 <u>Transverse-momentum-dependent Parton Distributions from Lattice QCD</u> (POC = Zhao); Markus Ebert, Jian Liang, Yizhuang Liu, Phiala Shanahan, Iain Stewart, Michael Wagman, Wei Wang, Yong Zhao
- TF5/064 <u>Nuclear Matrix Elements for BSM Searches from Lattice QCD</u> (NPLQCD; POC = Shanahan); Zohreh Davoudi, William Detmold, Marc Illa, Assumpta Parreño, Phiala E. Shanahan, Michael L. Wagman
- TF5/065 Lattice Quantum Chromodynamics on FPGA Hardware (POC = Detmold); W. Detmold and P. Shanahan
- TF5/088 <u>Lattice Supersymmetry: Successes and Opportunities</u> (POC = Catterall); S. Catterall and J. Giedt
- TF10/007 <u>The Need for Fast and Easy Access to Facilities for Quantum Computation &</u> <u>Simulations</u> (QuLAT; POC = Meurice); Yannick Meurice, Judah Unmuth-Yockey, Simon Catterall, David Berenstein, Michael McGuigan, Seth Lloyd, Richard Brower, Alexei Bazavov, Muhammad Asaduzzaman, Stephen Jordan
- TF10/072 Field Theories on a Quantum Computer (POC = Bhattacharya); Tanmoy Bhattacharya, Alex Buser, Shailesh Chandrasekharan, Hersh Singh, Rajan Gupta
- TF10/089 <u>Tensor Networks in High Energy Physics</u> (POC = Meurice); Y. Meurice, R. Somma, B. Şahinoğlu, G. Vidal