

USQCD and Snowmass

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Fermilab

USQCD All Hands' Meeting
virtually MIT | April 21–22, 2022



What is Snowmass?

- The Division of Particles and Fields (DBF) of the American Physical Society (APS) is conducting a community study on the future of particle physics: [homepage](#).
- Years ago, such studies lasted several weeks and were held in summer in Snowmass, CO. Hence, “Snowmass”.
- 2013: numerous satellite meetings, culminating in two weeks in Minneapolis (same time as Lattice 2013).
- This Snowmass was expected to take place in 2020–2021, but paused 9 months in 2021 because of covid. Hence, 2020–2022.
- Will culminate with a 10-day meeting in Seattle, [July 17–26](#).

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 50 LOIs w/ USQCD authors.](#)

Contributed Papers (aka whitepapers)

- Due March 15, 2022.
- I am writing/coordinating a whitepaper on behalf of USQCD, organized by Frontier, based on the seven 2019 USQCD whitepapers + updates.
- Authors nominally EC + 2019 WP authors. However, you will all have a chance to opt in as an author.
- For reasons that I don't want to go into here, I am way behind, but am in contact with Aida (Theory Frontier) and Ethan, Taku, Zohreh (LGT Topical Group).

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Contributions Mentioning Lattice Gauge Theory

- [1] P. A. Boyle *et al.*, A lattice QCD perspective on weak decays of b and c quarks, in *2022 Snowmass Summer Study* (2022) [arXiv:2204.xxxxx](#) [hep-lat].
- [2] B. Bhattacharya, T. Browder, Q. Campagna, A. Datta, S. Dubey, L. Mukherjee, and A. Sibidanov, A new tool to search for physics beyond the Standard Model in $\bar{B} \rightarrow D^{*+} \ell^- \bar{\nu}$, in *2022 Snowmass Summer Study* (2022) [arXiv:2203.07189](#) [hep-ph].
- [3] A. Sibidanov, T. E. Browder, S. Dubey, S. Kohani, R. Mandal, S. Sandilya, R. Sinha, and S. E. Vahsen, A new tool for detecting BSM physics in $B \rightarrow K^* \ell \ell$ decays, in *2022 Snowmass Summer Study* (2022) [arXiv:2203.06827](#) [hep-ph].
- [4] H.-Y. Cheng, X.-R. Lyu, and Z.-Z. Xing, Charm physics in the high-luminosity super τ -charm factory, in *2022 Snowmass Summer Study* (2022) [arXiv:2203.03211](#) [hep-ph].
- [5] T. Blum *et al.*, Discovering new physics in rare kaon decays, in *2022 Snowmass Summer Study* (2022) [arXiv:2203.10998](#) [hep-lat].
- [6] E. Worcester *et al.* (KOTO, LHCb, NA62/KLEVER, and the US Kaon Interest Group), Searches for new physics with high-intensity kaon beams, in *2022 Snowmass Summer Study* (2022).
- [7] J. Aebischer, A. J. Buras, and J. Kumar, On the importance of rare kaon decays, in *2022 Snowmass Summer Study* (2022) [arXiv:2203.09524](#) [hep-ph].
- [8] J. Elam *et al.* (REDTOP), The REDTOP experiment: Rare η/η' decays to probe new physics, in *2022 Snowmass Summer Study* (2022) [arXiv:2203.07651](#) [hep-ex].
- [9] G. Colangelo *et al.* (Muon $g - 2$ Theory Initiative), Prospects for precise predictions of a_μ in the Standard Model, in *2022 Snowmass Summer Study* (2022) [arXiv:2203.15810](#) [hep-ph].
- [10] R. Alarcon *et al.*, Electric dipole moments and the search for new physics, in *2022 Snowmass Summer Study* (2022) [arXiv:2203.08103](#) [hep-ph].

- [10] R. Alarcon *et al.*, Electric dipole moments and the search for new physics, in *2022 Snowmass Summer Study* (2022) [arXiv:2203.08103 \[hep-ph\]](#).
- [11] N. Blinov, N. Craig, M. J. Dolan, J. de Vries, P. Draper, I. Garcia Garcia, B. Lillard, and J. Shelton, Strong CP beyond axion direct detection, in *2022 Snowmass Summer Study* (2022) [arXiv:2203.07218 \[hep-ph\]](#).
- [12] P. S. B. Dev *et al.*, Searches for baryon number violation in neutrino experiments, (2022), [arXiv:2203.08771 \[hep-ex\]](#).
- [13] V. Cirigliano *et al.*, Neutrinoless double-beta decay: A roadmap for matching theory to experiment, in *2022 Snowmass Summer Study* (2022) [arXiv:2203.12169 \[hep-ph\]](#).
- [14] J. Bulava *et al.*, Hadron spectroscopy with lattice QCD, in *2022 Snowmass Summer Study* (2022) [arXiv:2203.03230 \[hep-lat\]](#).
- [15] L. Alvarez Ruso *et al.*, Theoretical tools for neutrino scattering: interplay between lattice QCD, EFTs, nuclear physics, phenomenology, and neutrino event generators, in *2022 Snowmass Summer Study* (2022) [arXiv:2203.09030 \[hep-ph\]](#).
- [16] J. M. Campbell *et al.*, Event generators for high-energy physics experiments, in *2022 Snowmass Summer Study* (2022) [arXiv:2203.11110 \[hep-ph\]](#).
- [17] D. d’Enterria *et al.*, The strong coupling constant: State of the art and the decade ahead, in *2022 Snowmass Summer Study* (2022) [arXiv:2203.08271 \[hep-ph\]](#).
- [18] M. Constantinou *et al.*, Lattice QCD calculations of parton physics, in *2022 Snowmass Summer Study* (2022) [arXiv:2202.07193 \[hep-lat\]](#).
- [19] P. Nadolsky, M. Ubiali, *et al.*, Proton structure at the precision frontier (2022).

- [20] R. A. Khalek *et al.*, Electron ion collider for high energy physics, in *2022 Snowmass Summer Study* (2022) [arXiv:2203.13199 \[hep-ph\]](#).
- [21] T. S. Humble *et al.*, Quantum computing systems and software for high-energy physics research, in *2022 Snowmass Summer Study* (2022) [arXiv:2203.07091 \[quant-ph\]](#).
- [22] T. Faulkner, T. Hartman, M. Headrick, M. Rangamani, and B. Swingle, Quantum information in quantum field theory and quantum gravity, in *2022 Snowmass Summer Study* (2022) [arXiv:2203.07117 \[hep-th\]](#).
- [23] Y. Meurice, J. C. Osborn, R. Sakai, J. Unmuth-Yockey, S. Catterall, and R. D. Somma, Tensor networks for high energy physics, in *2022 Snowmass Summer Study* (2022) [arXiv:2203.04902 \[hep-lat\]](#).
- [24] C. Bauer, Z. Davoudi, *et al.*, Quantum simulation for high-energy physics, in *2022 Snowmass Summer Study* (2022).
- [25] D. Boyda *et al.*, Applications of machine learning to lattice quantum field theory, in *2022 Snowmass Summer Study* (2022) [arXiv:2202.05838 \[hep-lat\]](#).
- [26] P. Boyle *et al.*, Lattice QCD and the computational frontier, in *2022 Snowmass Summer Study* (2022) [arXiv:2204.00039 \[hep-lat\]](#).

- Also a LGT topical group report by Ethan, Taku, and Zohreh.
- Missing whitepapers? Please send me an [email](#).
- Draft of “my” WP will be incomplete w.r.t. references: please help!! ([Email](#) me BibTeX; where to add; what to say.)

Backup: Snowmass LOIs

Computational Frontier

- CompF2/017 [Numerical Lattice Gauge Theory](#) (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](#) (χ QCD; POC = Liu); Keh-Fei Liu, Terrence Draper, Jian Liang, G. Wang, Yi-Bo Yang, Yong Zhao
- CompF3/061 [Machine Learning for Sampling in Lattice Quantum Field Theory](#) (POC = Hackett, Shanahan); M. S. Albergo, D. Boyda, K. Cranmer, D. C. Hackett, G. Kanwar, P. E. Shanahan, J. M. Urban
- CompF3/096 [Machine Learning for Lattice QCD Simulations on Classical and Quantum Computers](#) (POC = Yoon); Tanmoy Bhattacharya, Rajan Gupta, Huey-Wen Lin, and Boram Yoon
- CompF3/131 [Machine Learning and Neural Networks for Field Theory](#) (POC = Foreman); Sam Foreman, Xiao-Yong Jin, and James C. Osborn
- CompF3/131 [Machine Learning and Lattice QCD](#) (POC = Tomiya); Tom Blum, Peter Boyle, Taku Izubuchi, Luchang Jin, Chulwoo Jung, Christoph Lehner, Meifeng Lin, and Akio Tomiya

Cosmic Frontier

- CF1/166 [Composite Dark Matter from Strong Dynamics on the Lattice](#) (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 [Composite Higgs from Strong Dynamics on the Lattice](#) (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 [Unitarity of CKM Matrix, \$|V_{ud}|\$, Radiative Corrections and Semileptonic Form Factors](#) (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 \$\alpha_s\$](#) (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 [Gluon-helicity and Parton-orbital-angular-momentum Contribution to the Proton Spin](#) (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 [Hadronic Tomography at the EIC and the Energy Frontier](#) (POC = Hobbs); S. Fazio, T. J. Hobbs, A. Prokudin, A. Vicini (editors) *et al.*
- EF9/230 [Constraining Physics Beyond the Standard Model using Electric Dipole Moments](#) (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 [Neutrino-induced Shallow- and Deep-Inelastic Scattering](#) (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 [Nucleon Form Factors for Neutrino Physics](#) (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 [Theoretical Predictions of Neutrino-nucleus Interactions](#) (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 [Connecting QCD to Neutrino-nucleus Scattering](#) (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 [High Precision SM Predictions for Quark Flavor Observables](#) (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 [Weak Decays of b and c Quarks](#) (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 [High-precision Determinations of \$|V_{xb}|\$ from a Close Theory-experiment Collaboration](#) (POC = Dey, Vaquero); Biplab Dey, Carleton DeTar, Andreas Kronfeld, and Alejandro Vaquero
- RF2/054 [High-precision Determination of \$V_{us}\$ and \$V_{ud}\$ from Lattice QCD](#) (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 [Rare Strange-to-down Processes from Lattice QCD](#) (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 [Discovering New Physics in Rare Kaon Decays](#) (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 [Hadronic Contributions to the Anomalous Magnetic Moment of the Muon](#) (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 [Calculations of Nucleon Electric Dipole Moments on a Lattice with Chiral Fermions](#) (POC = Syritsyn); M. Abramczyk, T. Blum, T. Izubuchi, Y.-C. Jang, H. Ohki, S. Syritsyn
- RF2/083 [The REDTOP Experiment: An \$\eta/\eta'\$ Factory](#) (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 [US Participation in Current & Future Rare Kaon Decay Experiments](#) (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 = El-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 [Using Lattice QCD for the Hadronic Contributions to the Muon \$g - 2\$](#) (Fermilab Lattice, MILC; POC = El-Khadra); A. Bazavov, C. DeTar, A.X. El-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 \$|V_{cb}|\$ 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 [Chiral Lattice Fermions and the Computational Frontier](#) (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 [Algorithms and Software in Support of Computational HEP and NP at the Exascale and Beyond](#) (LatticeQCD ECP; POC = DeTar); R.C. Brower, N.H. Christ, C.E. DeTar, R.G. Edwards, and A.S. Kronfeld

Theory Frontier

- TF5/063 [Transverse-momentum-dependent Parton Distributions from Lattice QCD](#) (POC = Zhao); Markus Ebert, Jian Liang, Yizhuang Liu, Phiala Shanahan, Iain Stewart, Michael Wagman, Wei Wang, Yong Zhao
- TF5/064 [Nuclear Matrix Elements for BSM Searches from Lattice QCD](#) (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 [Lattice Supersymmetry: Successes and Opportunities](#) (POC = Catterall); S. Catterall and J. Giedt
- TF10/007 [The Need for Fast and Easy Access to Facilities for Quantum Computation & Simulations](#) (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 [Tensor Networks in High Energy Physics](#) (POC = Meurice); Y. Meurice, R. Somma, B. Şahinoğlu, G. Vidal