

# LQCD-ext II Project 2015 Annual Review

## Answers to science questions

LQCD-ext II Project 2015 Annual Review  
Brookhaven  
May 21-22, 2015





# Lattice for Beyond the Standard Model Physics

HIGH PERFORMANCE COMPUTING  
INNOVATION CENTER  
YOSEMITE CONFERENCE AUDITORIUM

APRIL 23-25, 2015

LAWRENCE LIVERMORE  
NATIONAL LABORATORY  
OPEN CAMPUS

LIVERMORE, CALIFORNIA



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3. The “Lattice for beyond the standard model physics”, Livermore, Apr 2015, had as many lattice talks and participants as non-lattice : the goal of the workshop was to facilitate discussion and collaboration.

Some non-lattice speakers: Tim Tait, Robert Lasenby, Kris Sigurdson, Graham Kribs, Michael Peskin, Markus Luty , Bogdan Dobrescu, Wick Haxton, Simona Murgia, Luca Vecchi, George Chaplin,.....

At least one collaboration was formed after the workshop between LSD and L. Vecchi and K. Agashe to study partial composite systems (first project is the study of the anomalous dimension of the 3-fermion operator at the 12-flavor IRFP)



The Kavli Institute for  
Theoretical Physics  
University of California, Santa Barbara

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## Lattice Gauge Theory for the LHC and Beyond

**Coordinators: Simon Catterall, Anna Hasenfratz, Andreas Kronfeld, Yannick Meurice**

**Scientific Advisors: Csaba Csaki, Adam Martin, Ann Nelson, Erich Poppitz, Robert Sugar**

This program will focus on the uses of lattice gauge theory to explore particle physics beyond the Standard Model. Within this broad theme, we aim to integrate three main subtopics: tests of the Standard Model in quark flavor physics, fundamental probes of new physics at the interface of nuclear and particle physics, and nonperturbative phenomena in electroweak symmetry breaking.

5. The scientific advisors for the upcoming KITP Santa Barbara workshop (Aug. 3-Oct 8 2015) “**Lattice Gauge Theory for the LHC and Beyond**” are Csaba Csaki, Adam Martin, Ann Nelson, Erich Poppitz, Robert Sugar and will have other non-lattice associates and participants.

We expect that this extended advisory board will ensure discussion and collaboration.

# Lattice BSM workshops

Sakata Memorial KMI Mini-Workshop on  
 "Strong Coupling Gauge Theories Beyond the Standard Model"  
 (SCGT14Mini)



March 5 (Wednesday) - March 7 (Friday), 2014

Science Symposia (ES 635), 6th Floor of ES Building  
 Kobayashi-Maskawa Institute for the Origin of Particles and the Universe (KMI)  
 Nagoya University, Nagoya, Japan

<http://www.SCGT14Mini/>

#### Topics

- LHC Phenomenology of the Walking Technicolor
- Lattice Studies of Conformal Strong Dynamics
- String and Holographic View of Strong Coupling Gauge Theories
- Composite Models for Higgs and others
- Dilaton and Conformal Symmetry in Strong Coupling Gauge Theories
- Other Related Topics

Sakata Memorial KMI Workshop on  
 "Origin of Mass and Strong Coupling Gauge Theories"  
 (SCGT15)



March 3 (Tuesday) - March 6 (Friday), 2015

Sakata-Hirata Hall, Nagoya University, Nagoya, Japan

<http://www.SCGT15/>

The purpose of this workshop is to discuss theoretical and phenomenological issues of strong coupling gauge theories as well as those in extreme conditions, particularly in view of the new phase of the LHC experiments and the conformal fixed point for the gauge/gravity. Synergy of the lattice, string and phenomenological studies at the meeting will be extremely important in this phase of the particle physics.

Shoichi Sakata at Nagoya University proposed in 1956 the Sakata model, a composite model for hadrons, which paved a

## Lattice Meets Experiment 2013: BEYOND THE STANDARD MODEL

RIKEN BNL Research Center Workshop  
 December 5-6, 2013 at Brookhaven National Laboratory

- Homepage
- Registration
- Agenda
- Contact Us
- Workshop Information

## Lattice Meets Experiment 2013: Beyond the Standard Model

Co-sponsored by [USQCD](#)

<http://www.bnl.gov/lme2013/>

### Motivation

Lattice gauge theory, which is an active field of research at RBRC and BNL, provides a rigorous, numerical approach to the study of particle physics models in strongly-coupled regimes. In addition to the study of the strong nuclear force as described by quantum chromodynamics (QCD), lattice studies can play an important role in many areas of research into possible new physics beyond the Standard Model (BSM), including:

- Intersections between new physics and QCD, such as proton decay and electric dipole

## PPCM

Field Theoretic Computer Simulations for Particle Physics and Condensed Matter

- PPCM
- SCHEDULE
- POSTER SIGNUP
- PARTICIPANTS
- TRAVEL & HOTEL

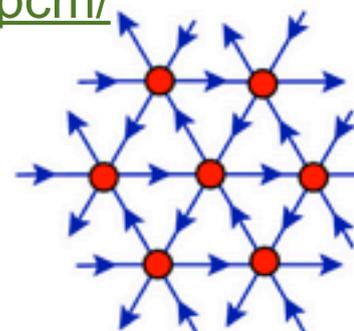
## PPCM

FIELD THEORETIC COMPUTER SIMULATIONS  
 FOR PARTICLE PHYSICS AND CONDENSED MATTER

8-10 MAY 2014  
 BOSTON UNIVERSITY CENTER FOR COMPUTATIONAL SCIENCE

This 2.5-day workshop is devoted to common problems in the theoretical and computational study of particle physics and condensed matter. It will take place from Thursday, 8 May, through Saturday morning, 10 May 2014, at the Boston

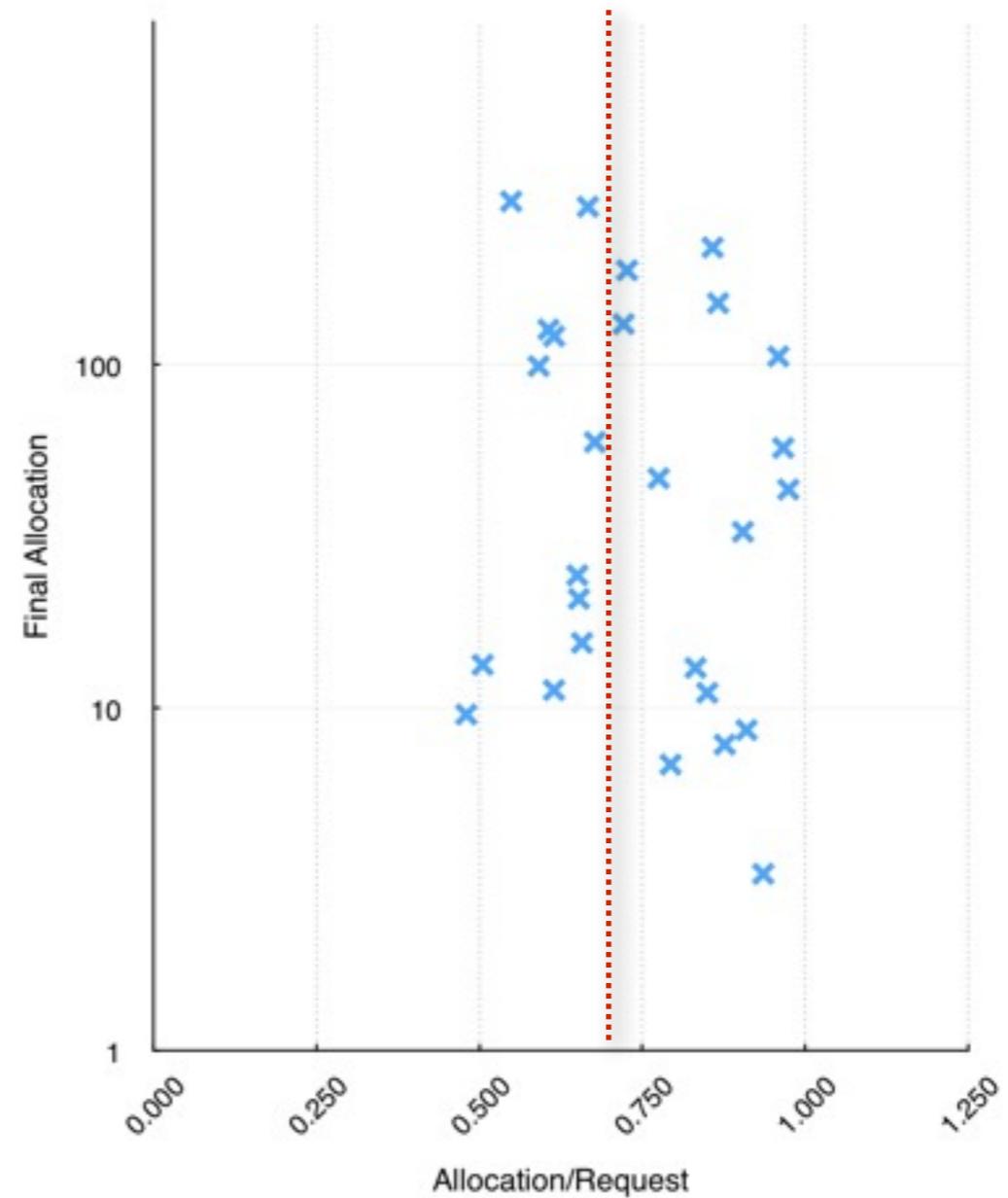
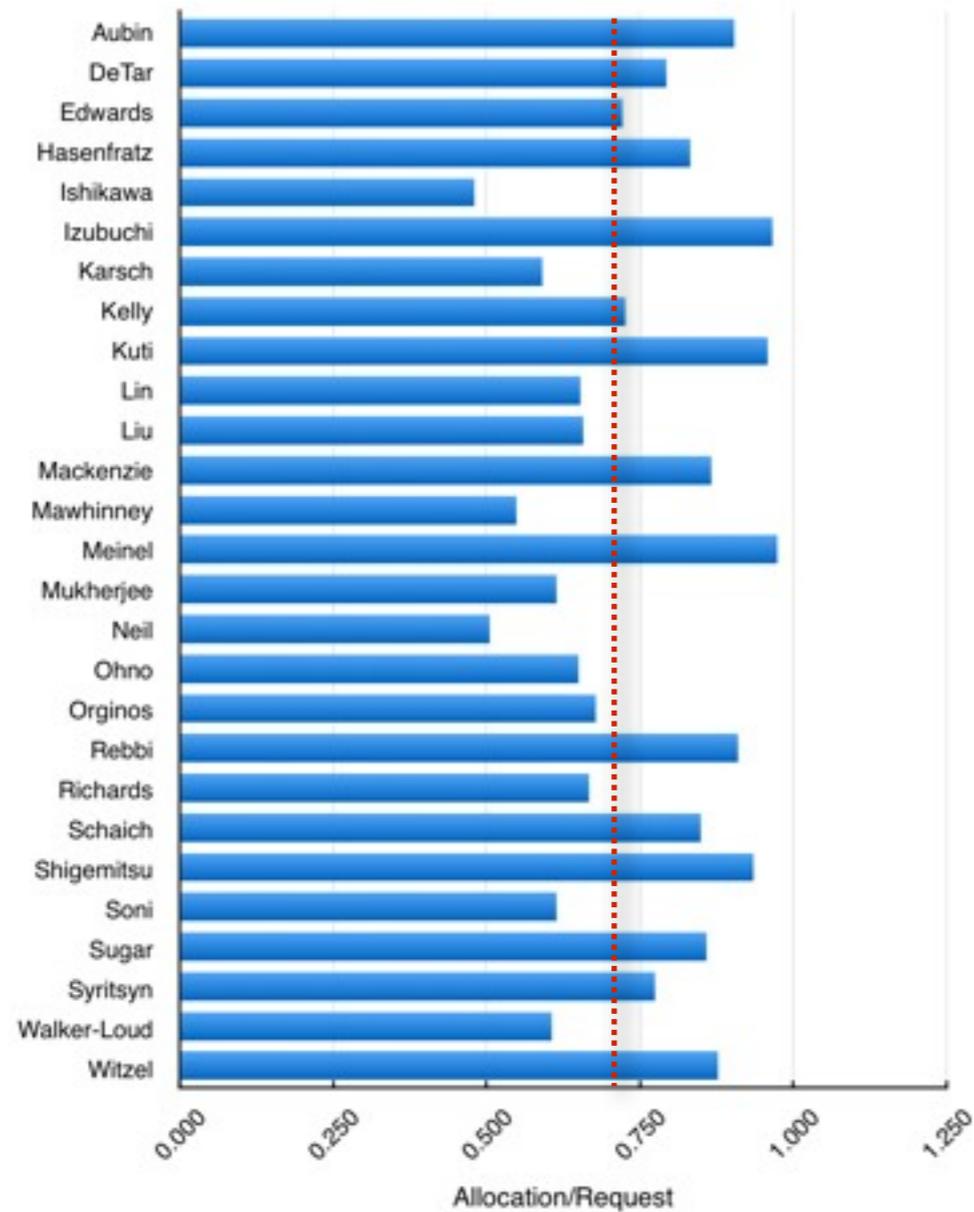
<http://blogs.bu.edu/ppcm/>





### 13) What is the success rate in the allocation process? What does success mean?

Type A >95% cycles; Type B & C usually full allocations



2014 oversubscription: 1.43



7) How are comments of the Scientific Advisory Board factored into your program?  
Is it listened to?  
What would you do with a recommendation that recommended a real change of course?

The comments of the SAB are as individuals, not as a committee. They are an advisory committee and not a decision making body. However, the whole purpose of having the Board is to look for ideas to improve our program, so when we get suggestions to move our program in one direction or another, we take them very seriously. However, we haven't set up the organization so that we are under a legal obligation to do so.

For the most part, their comments have been informative, but not surprising. We've explored with SAB members the possibility of being more directly involved in the allocation process. The answer so far has been no. Working through the proposals is very time-consuming, and they felt they had too little expertise in judging one proposal versus another.



## 8) How does USQCD decide what to work on next?

- Members refine their interests in many ways, attending workshops, conferences, talking to their colleagues at lunch...
- On the national level, USQCD members propose new ideas to the SPC, which evaluates how interesting they are and how well aligned they are with USQCD aims.
- The Executive Committee outlines the main themes in conversation with the HEP and NP Offices, and with processes like P5 and the NSAC LRP.
- Further information is gathered via workshops—Lattice Meets Experiment (in all 4 main themes), Project X Physics Study & similar interactions at BNL (e.g., on the BES) and JLab (e.g. on the 12-GeV upgrade).
- Sometimes the Executive Committee outlines main opportunities in proposals and white papers. Sometimes, new opportunities percolate from the bottom up, such as with the  $g-2$  calculations.

## 10) What is the succession plan for the Executive Committee? Is the process democratic enough?

- USQCD's hardware is operated as a national facility.
  - Open to all in US to submit proposals.
  - USQCD is like Fermilab fixed-target facilities, not like CMS or GlueX.
  - Overall physics goals are set by USQCD in our white papers and proposals for hardware and software, but specific projects are developed by component collaborations like MILC, RBC, NPLQCD, HOTQCD, ..., or by individuals and allocated by SPC. (Role of EC in this process is analogous to that of lab director.)

We have considered both making the rotation process of the Executive Committee more regular and possible role of elections in Executive Committee rotations. The Executive Committee has been constituted so that it represents a balance between high-energy physics and nuclear physics, between the main areas of physics interest, and between the most important of the constituent physics collaborations. Rotations on the committee have been made to carefully maintain the desired balance.

Our recent policy has been to rotate at the rate of about one rotation per year with a view toward making a rotation of most of the committee over a period of about ten years, while maintaining the balance just described. Last year, we decided to make the terms of Executive Committee members more regular and predictable by reconsidering the membership of all committee members at the rate of two per year starting with the most senior. We have defined seniority by years served on the committee, and by years from PhD in the case of ties. We expect to continue to make approximately one rotation per year, as we have done for the last few years.



This procedure brought to consideration this year two of the most senior members of the Executive Committee, Richard Brower and John Negele. The Executive committee considered the role that each are playing, possible replacement candidates and discussed the situation with John and Richard. As a result Richard was asked to continue on the committee and Kostas Orginos was asked to replace John Negele.

We have periodically considered the possibility of introducing democracy into the process of selecting the executive committee and looked at the management structure of other similar scientific organizations for guidance and found no useful example. The importance of having a small executive committee whose members take on substantial responsibility, must work effectively together, and represent the major physics areas and collaborations appears to be in tension with democratic elections. We believe that the successful functioning of this large collection of theorists is a highly non-trivial event and are reluctant to experiment with modifications to a structure which is working.



## 11) Have you considered making the user survey mandatory?

Yes.

In principle, it is mandatory now, but it is only enforced by peer pressure.

It is technically possible to do this in a draconian way by turning off the access to accounts of users who have not answered the survey.

The site managers have been reluctant to do this because it blocks scientific work for bureaucratic reasons.

However, if response seems to be a problem, we will consider trying it.

We'd be interested in the opinion of the review committee on this issue.



## 14) Can foreigners join USQCD?

- USQCD membership is open to everyone at a US institution, but not to those at non-US institutions.
- Several researchers at non-US institutions are involved in projects with USQCD collaborators, e.g. RBC/UKQCD, HPQCD (with a group in Glasgow), Hadron Spectrum (with collaborators in Dublin), BNL-Bielefeld, etc. Some individuals end up with accounts at LQCD sites, so they can submit jobs.
- USQCD members have obtained longer-term positions at non-US institutions; they continue to collaborate or, eventually, decouple.
- A special case was a grant of computing time (from USQCD and DOE) to Japanese researchers after the tsunami.

