Report from the Scientific Program Committee

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SPC Chair

Outline

- Committee membership
- Reallocation: `kaon` and `7n`
- Thoughts on collaboration & Collaboration
- Leadership-class computing & INCITE
- All Hands' Meeting: your role
- Roadmaps (?)

SPC Membership

2001–2003	2004–2006	2006–?
Peter Lepage	Andreas Kronfeld	Tom Blum
Bob Mawhinney	Bob Mawhinney	Andreas Kronfeld
Colin Morningstar	Colin Morningstar	Colin Morningstar
John Negele	John Negele	John Negele
Claudio Rebbi	Claudio Rebbi	Steve Sharpe
Steve Sharpe	Steve Sharpe	Junko Shigemitsu
Doug Toussaint	Doug Toussaint	Doug Toussaint
Frank Wilczek	Frank Wilczek	

chair in red

Reallocation

Reallocation

- Last year, the cluster `kaon` was not yet built and, hence, was allocated conservatively.
- Sometime between now and July 1, the cluster `7n` will be brought into service.
- Extra 1.7 + 1.0 M `4g`-equivalent node-hours, from now until June 30.
- 7% increase to our 2006–2007 resources.

- The Executive Committee asked the SPC to re-allocate the extra resource.

- The SPC recommended giving all projects a 7% increase in allocation.

- To boost *all* projects, two projects running on both QCDOC and clusters (MILC asqtad and LHPC anisotropic ⌘) will shift.

- For the other projects: just keep running.

Collaboration

Our collaboration

- National Computational Infrastructure for Lattice Gauge Theory:
  - SciDAC support for software;
  - Nat'l lab support for clusters;
  - talk of a nat'l DOE-funded QCDOC.
- Called "SciDAC collaboration".

Hardware Project(s)

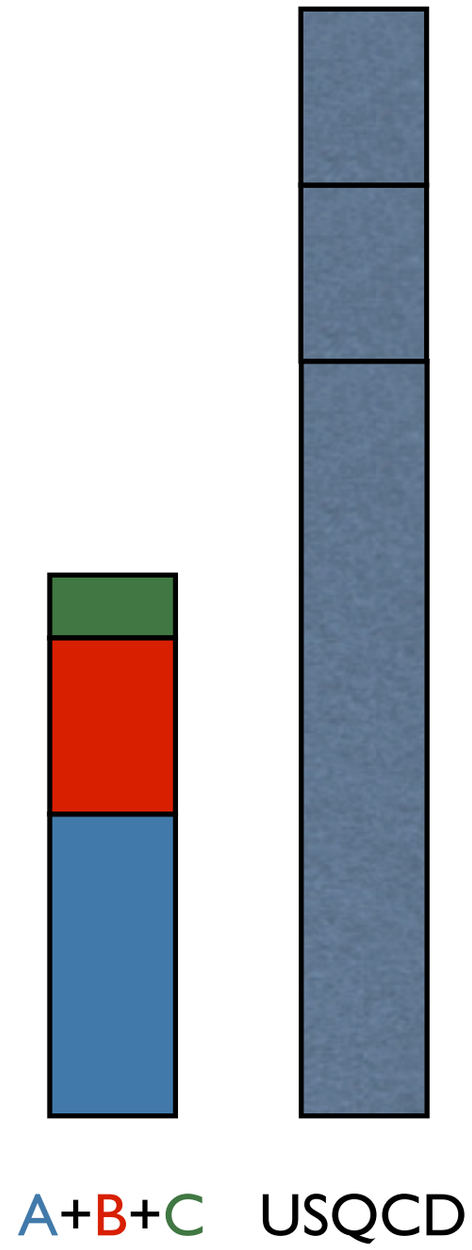
- QCDOC funded by HEP, NP, SciDAC, and ASCR (all part of DOE). Small clusters too.
- Clusters funded by HEP, NP.
- Software + cluster R&D funded by SciDAC.
- Need a better name: *USQCD Collaboration*.
- http://www.usqcd.org/

USQCD Collaboration

- Unified effort to acquire resources.
- Cooperative sharing of common resources.
- Autonomous scientific programs from constituent parts.
- Different character from
  - CDF, BaBar, Phenix, CLAS, ...
  - UKQCD

Why collaborate?

- Achieve more together than separately.
- Underscored through INCITE development.
- Strengthen USQCD identity, without losing identities of MILC, RBC, LHPC, NPLQCD, *etc*.
- Foster innovation.



INCITE

INCITE

- Last summer, the USQCD ExecCom was encouraged to submit proposals for time on "leadership class" machines:
  - BlueGene/P at ANL and XT4 at ORNL;
  - petaflop/s (eventually, peak).
- The ExecCom had to act quickly, submitting two early-use and one regular proposal.

- The ExecCom then engaged the SPC:
  - review (retroactively) the proposals submitted on USQCD's behalf;
  - devise a process amenable to future calls for proposals from INCITE.
- This year > 20% boost over our own hardware; in coming years perhaps ~100%.
  - Award of 10,000,000 XT3 core-hours.

- Type A, B, & C proposals (existed already)
- Type A: large, strategic
  - general purpose data
    - analyses fulfilling Collaboration Goals
- Type B: medium-sized, innovative
- Type C: small, tests of ideas, software, *etc.*

- A year has 8766 hours (on average).
- The Project guarantees 8000 hours.
- 400 hours given to host labs
- Target A:B:C = 80:15:5 of 7600
    - Reserve 400 hours for C
    - Aim for 7200 = 6060 + 1140

- Increase maximum award for Type B to 400,000 `6n`-equivalent node-hours.

- Be more careful to grant 15% of USQCD hardware to Type B projects.

- Demand no additional effort from Type B proponents in proposing and carrying out their work.

- Provide ExecCom with Type A projects suitable for leadership class machines.
    - data generation (gauge fields, multi-purpose quark propagators)
- When leadership-class time becomes available, combine (pre-approved) science proposal with introduction, etc., into an INCITE proposal.

- Move (part of) the running of these projects to the leadership-class machine.

- Increase in total award implied, *but* some of the INCITE award spread to other Type A projects, e.g., relevant physics analyses.

- Top up Type B projects where appropriate.

- Scientifically sound; bureaucratically nimble.

- We need more information from Type A proponents:
  - How do you benefit USQCD?
  - What would you do with (rather more) computing resources?
  - What is your multi-year plan (roadmap)?
  - Technical feasibility.

Toy example

- A generates gauge fields with 4,500,000
- B solves all mysteries with 4,500,000
- C is clever with 300,000
- USQCD receives 8,000,000 from INCITE based on A's gauge fields.
- SPC moves A to INCITE, gives B some of A's USQCD allocation; may give C 100,000.

Overall Response

- We [the SPC] approve of the Executive Committee taking initiative to submit these proposals, even though there was no time for scientific review within the Collaboration. The proposed work is consistent with large projects already approved by USQCD. The DOE gave you unreasonably short deadlines, so you made the best of the situation.

- The proposed work is to generate lattice gauge fields with dynamical fermions. We will sort comments by fermion action. The next three paragraphs are suitable for transmitting to, respectively, the LHPC, MILC, and RBC collaborations.

Anisotropic Clover

- The proposed work with Wilson sea quarks on anisotropic lattices is essentially an extension of ensembles that have already been approved for running on USQCD resources. Consequently, additional time from INCITE will allow [JLab] to reach milestones more quickly. Nevertheless, anisotropic Wilson simulations are a relatively new undertaking. We therefore ask the proponents to present evidence that simulations with these sea quarks are successful. If it is too early to demonstrate success for some of the important observables, then we would like an explanation of how USQCD should be expected to judge success in the future. → 10,000,000 XT4 = 7,000,000 6n.

"Asqtad" Staggered

- The proposed work with improved ("asqtad") staggered sea quarks continues MILC's ongoing program, but moves to smaller quark mass, smaller lattice spacing, and larger lattices. Because of the fourth-root procedure, these simulations have been controversial. The recent year has witnessed a significant improvement in the theoretical understanding of rooted staggered quarks, and also led to some proposed tests (for example on the scaling of the taste-breaking defect in the blocked fermion operator, proposed by Shamir). We would like to hear of plans to carry out such tests. We would also like a discussion of the pros and cons of reducing the lattice spacing, on the one hand, and a more improved action, on the other. Finally, we would like to be assured that the new lattices are not so large that they cannot be analyzed on USQCD computers.

Domain-Wall Sea

- The proposed work with domain-wall sea quarks continues RBC's ongoing program, moving to smaller quark mass, smaller lattice spacing, and larger lattices. There is not yet much experience at high statistics with this method. (We do not know of any public results with sub-percent statistical errors.) We see some value in attaining statistical error bars similar to MILC, and presenting these results, before embarking on smaller lattice spacing. We would like to know whether m_{res} is small enough so that uncertainties from explicit chiral symmetry breaking are under control, for selected, important observables.

All Hands' Meeting

Proposals

- 13 proposals of Type A; 15+1 of Type B.
- Type A requests 10,400 hours-(all nodes); budgeted 6060 hours.
- Type B requests negligibly more than budgeted 1140 hours.
- Written reports sent to all PIs on March 8.

- PIs' response orally at this meeting or (for some Type B) by e-mail.

- Revised proposals (if desired) by March 29.

- Revision necessary when changes to data-sharing arrangements are made.

- Preliminary numerical allocations (of 90%) have been made, but will not be announced.

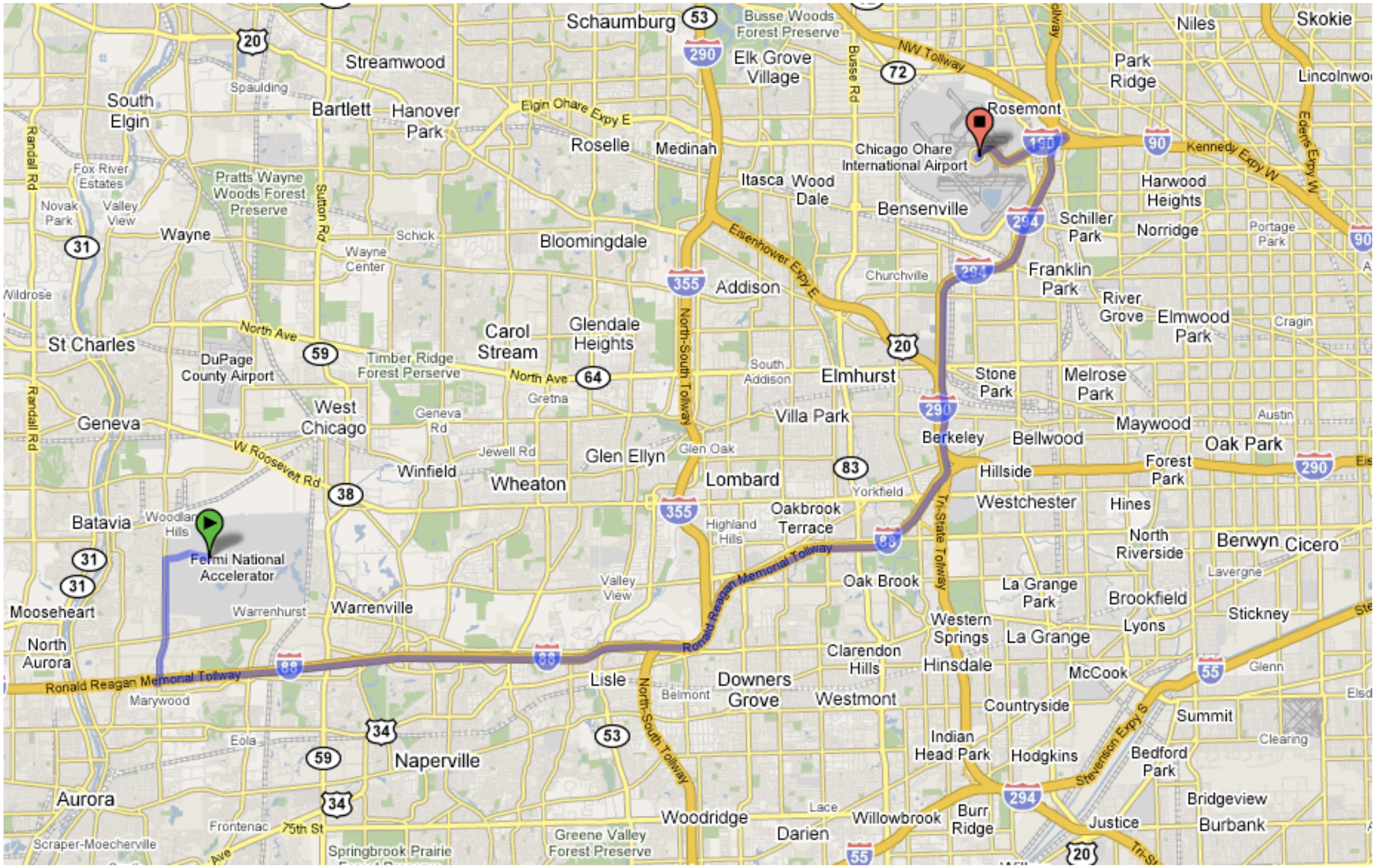
Round Tables

- Your chance to tell us what you think the USQCD Collaboration should do:
  - Allocations—in wise proportions?
  - Directions—ramps up and down?
  - Strategy—will there be another Project?
- Aim for advice that strengthens USQCD.

Roadmap

- We would like to close with some remarks for the Executive Committee. We believe the scientific case for generating these ensembles should be sharpened. A specific question that arises here is the future of staggered sea quarks. Some collaborators seem to assume they will be phased out, but that does not seem to be explicit policy. The notion seems to be founded on qualitative considerations, perhaps most kindly summarized as "staggered fermions are ugly" [hep-lat/0610094]. Does USQCD believe that they are indeed only ugly, namely that the continuum limit is correct, and accessible with feasible numerical data and the suitable ChPT? Furthermore, quantitative considerations seem not yet to have been worked out. For example, what set of simulations gives the most accurate value of f_K, and some other strategically important observables? On these matters we believe the Collaboration could profit from having a long-term roadmap. We have framed these questions around staggered quarks, but the central issue—how best to deploy our computer resources—affects any approach to lattice gauge theory.

A Roadmap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Kennedy Expy W
Edens Expy W
Randall Rd
Fox River Estates
Novak Park
Valley View
Pratts Wayne Woods Forest Preserve
Sutton Rd
Itasca
Wood Dale
Bensenville
Harwood Heights
Schiller Park
Norridge
Portage Park
Wayne
Schick
Wayne Center
Bloomingdale
Eisenhower Expy E
Churchville
Franklin Park
River Grove
Elmwood Park
Cragin
Wildrose
St Charles
North Ave
DuPage County Airport
Timber Ridge Forest Preserve
Carol Stream
Glendale Heights
Addison
Elmhurst
Stone Park
Melrose Park
Geneva
West Chicago
Gretna
Geneva Rd
Villa Park
Berkeley
Bellwood
Maywood
Austin
Oak Park
Jewell Rd
Glen Ellyn
Glen Oak
Winfield
Wheaton
Lombard
Hillside
Forest Park
W Roosevelt Rd
Yorkfield
Westchester
Hines
Batavia
Woodlawn Hills
Fermi National Accelerator
Highland Hills
Oakbrook Terrace
Tri-State Tollway
North Riverside
Berwyn
Cicero
Lavergne
Valley View
Oak Brook
La Grange Park
Brookfield
Stickney
Mooseheart
Warrenhurst
Warrenville
Ronald Reagan Memorial Tollway
Western Springs
La Grange
Lyons
North Aurora
Clarendon Hills
Hinsdale
McCook
Glenn
Lisle
Belmont
Downers Grove
Westmont
Countryside
Summit
Marywood
Eola
Naperville
Indian Head Park
Hodgkins
Stevenson Expy S
Bedford Park
Aurora
Lace
Woodridge
Willowbrook
Burr Ridge
Darien
Justice
Bridgeview
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Scraper-Moecherville
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Greene Valley Forest Preserve
North-South Tollway