

LHC Theory Initiative Update

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- What is the LHC Theory Initiative?
 - ☞ There is a mismatch between the need for theorists doing work that connects directly with experiment in the US, and the number of theorists doing such work
 - ☞ Funding agencies have invested large sums in the LHC; a modest additional investment in relevant theory can have a large physics payoff
 - ☞ Stronger connections between model building, speculative theory, and traditional phenomenology are needed
 - ☞ **LHC Theory Initiative**: Community-wide effort to strengthen LHC related theory work in the US

☞ specifically:

- stimulate research on projects which enable ATLAS and CMS to fully utilize the physics potential of the LHC
- organize activities such as working groups, workshops, etc.
- there appears consensus that this is best done by supporting postdocs and students (not necessarily by creating more positions, but by stimulating them to work on LHC physics)
- **therefore:** obtain additional funding from NSF and DoE for LHC related theory work
- in detail: submit NSF proposal this fall; **prioritized list of projects (which calculations are needed by 2008, 2010,...)** to illustrate and guide the kind of work the LHC-TI intends to support; propose fellowships at the **graduate student** and **postdoc** level (more later)

- **History:**

☞ Initial message sent in January 2005. Positive feedback.

- ☞ February 2005: Brainstorming session at BNL TeV4LHC meeting
- ☞ Organizational meeting May 4, 2005 in Madison; NSF and DoE participate
- ☞ May - June 2005: formation of steering committee based on feedback received at or after Madison meeting
- ☞ May 2005: Fermilab theory group expresses interest in participating
- ☞ May 2005: Barnett - Hinchliffe proposal for fellowships
- ☞ June - July 2005: “Aspen Consensus”
 - ➔ student and postdoc funding of highest priority
 - ➔ modified fellowship structure proposed
- ☞ August 2005: beginning of draft of proposal/whitepaper; fellowship structure meets overhead reality (more later)
- ☞ August 2005: Argonne (Harry Weerts) and BNL (Sally Dawson) express interest in participating

☞ August 2005: explicit encouragement from NSF program officers (Fred Cooper, Randy Ruchti, Jim Whitmore) to submit whitepaper and proposal

- current members of steering committee:

Jonathan Bagger (Johns Hopkins)

Ulrich Baur (Buffalo)

Sekhar Chivukula (MSU)

Sarah Eno (Maryland, CMS)

Walter Giele (FNAL Theory)

JoAnne Hewett (SLAC)

Ian Hinchliffe (LBNL)

Paul Langacker (Penn)

Steve Mrenna (FNAL Computing)

Fred Olness (SMU)

Lynne Orr (Rochester)

John Parsons (Columbia, ATLAS)

Martin Schmaltz (BU)
Carlos Wagner (Argonne)
Edward Witten (IAS)

- **plan for this afternoon:**

- ☞ present proposed fellowship rules

- ☞ present possible implementations of fellowships; these need to be discussed with NSF

- ☞ get feedback from community

- **global structure:**

- ☞ postdoc fellowships (5/year) and

- ☞ graduate student fellowships (6/year) (need those for obvious reasons)

- ☞ want named fellowships (Feynman?, Bethe?,)

- ➡ want to provide extra research funds so that fellowships are prestigious
- ➡ administered by one institution (host institution), similar to Quarknet (adm. by Notre Dame)
- ➡ since students are not students of the host institution (there may be exceptions to that) need to treat graduate student fellowships as subcontracts
- ➡ postdocs can either be handled as employees of host institution, or via subcontracts
- ➡ possible host candidates so far: MSU and UB
- ➡ numbers presented below are for illustration only and assume MSU for definiteness (26% off campus), and 50% on-campus overhead for recipient institution

Fellowship rules: a specific proposal

- fellowships are awarded in an open nation-wide competition in response to nominations
- nominee does not have to reside in US at time of nomination
- selection committee:
 - ➡ 5 members, cannot be members of LHC-TI steering committee
 - ➡ members of the selection committee cannot nominate
 - ➡ members of the selection committee serve for one year
 - ➡ the selection committee should be representative of the US HEPT community in LHC-related physics
 - ➡ the administrator (member of host institution) is ex officio member of the selection committee and cannot nominate
 - ➡ NSF?, DPF?, who else? decides who serves

☞ selection criteria:

1. quality of candidate
2. quality of proposal (more later)
3. relevance of proposed work for LHC, using the projects of the proposal as guidelines
4. support committed by recipient institution:
 - one additional year of salary
 - synergy of proposed work with theoretical and experimental groups at institution
 - quality of students, postdocs, and faculty available to collaborate

● postdoc fellowships:

- ☞ \$110k total in employee model, \$150k in subcontract model (latter may be conservative); more details on employee model and subcontract model later

- ➡ money can be spent over a period of up to 3 years, \geq 1 year of salary support
- ➡ for subcontract model: a minimum of \$15k has to be set aside for research money (ie. not all money can be spent on salary)
- ➡ need to be nominated by a faculty adviser (sponsor)
- ➡ time line for awards such to allow for coherence with usual postdoc hiring process (awards by November 15?)
- ➡ sponsor guarantees availability of office space, computer access, and all other resources necessary for the project to proceed
- ➡ sponsor guarantees a minimum of one year of salary from other sources
- ➡ nomination letter plus 3 letters of recommendation

- ➡ the nominee has to submit a proposal (no more than 4 pages + budget)
- ➡ proposal has to address which fraction of the money is spent on salary+benefits and on research and in what year
- ➡ yearly progress reports and final report within 60 days of end date
- ➡ recipient should visit CERN for minimum of one month in first year of fellowship (need to check with CERN theory group for office space etc.): CERN is the best place to get excited about the LHC!
- ➡ balance of money stays with person if she/he gets hired on a faculty position
- ➡ lifetime limit of one award
- ➡ recipient cannot be more than 6 years after obtaining Ph.D. at time of nomination

- graduate student fellowships:

- ☞ \$57k total for one year (details on numbers later...)
- ☞ require that a total of \$25k are available for salary and research combined (this is effectively a cap on what is available for combined tuition and health care, but depends on overhead charged)
- ☞ need to be nominated by faculty adviser
- ☞ the nominee has to submit a proposal (no more than 2 pages + budget)
- ☞ final report within 60 days of end date
- ☞ proposal has to address which fraction of the money is spent on salary+benefits and on research
- ☞ the student has to have declared candidacy at time of nomination
- ☞ recipient should visit CERN for a minimum of one month (**does this make sense?**)

- ☞ recipient cannot have been a graduate student in the US for more than 6 years at time of nomination
- ☞ balance of money stays with person if she/he gets hired on a post-doc position
- ☞ lifetime limit of two awards
- total cost per year:
 $5 * (\$110k - \$150k) + 6 * \$57k = \$890k - \$1090k$
- should there be meetings of the fellows where they discuss their work?
How many? Where? (BNL, ANL, FNAL, SLAC, Aspen, KITP,....)
- implementation: overhead (OH)
 - ☞ the “Aspen Consensus” calls for no overhead on the fellowships
 - ☞ this may be difficult, unless NSF agrees to a fellowship similar to the Hubble fellowships at JHU (but these are NASA)
 - ☞ possibilities under discussion for postdoc fellowships:

- employee model: fellow is employee of host institution
- subcontract model: the fellowship is given to the recipient institution (or the individual) as a subcontract

☞ employee model:

- fixed off-campus overhead (26%)
- everyone gets benefits of host institution if more than 50% of salary comes from fellowship

☞ subcontract model:

- subcontracts are usually charged at 26% (off-campus rate) for the first \$25k of the subcontract by host institution
- but may be subject to additional overhead at recipients institution (double overhead on first \$25k)

- the overhead for postdocs varies significantly between institutions
- is it possible to give subcontracts to individuals so that there is no overhead? (desirable? wishful thinking?)
- flexible
- need feedback from NSF which one to choose
- sample numbers for student fellowships:
 - ☞ aim at \$25k stipends (salary + research expenditures) = direct costs
 - ☞ \$25k (stipend) + \$6k (tuition) + \$2k (health care) + 50% OH = \$50.25k
 - ☞ host fee (26% of first \$25k) = \$6.5k
 - ☞ total: **\$57k**
 - ☞ total for case that **no** overhead is charged by recipients institution: **\$40k**

- sample numbers for postdoc fellowships:

- ☞ assume \$45k for salary

- ☞ aim at salary support for **one** year

- ☞ and research funds for up to **three** years

- ☞ employee model:

- a one-year postdoc with off-campus OH costs:

- \$45k (salary) + \$9.2k (health care) + \$4.4k (FICA)

- + 26% OH = **\$74k**

- add research funds: \$36k

- total: **\$110k**

- ☞ subcontracts: since overhead is unclear, assume a fixed sum of \$156.5k total for fellowship

- what does that buy you?

- fee of host institution: 26% of first \$25k: \$6.5k

- transferred to recipients institution: \$150k

- assume MSU numbers: \$45k (salary) + \$9.2k (health care) + \$4.4k (FICA) = \$58.6k
- \$150k is equivalent to:
 - one year of salary and \$41k of research funds for 50% OH
 - one year of salary and \$35k of research funds for 60% OH
 - two years of salary and \$2k of research funds for 26% OH
 - two years of salary and \$33k of research funds for 0% OH
- please provide feedback (baur@buffalo.edu, orr@pas.rochester.edu, sekhar@pa.msu.edu) on
 - ☞ Is MSU acceptable as a host institution? If not tell us who you prefer
 - ☞ Do you think the suggested number and size of fellowships is appropriate? What do you think the name should be? Feynman Fellowships seems to be the most popular suggestion; others are possible (Bethe?).

- ☞ What in your view is the appropriate cap on overhead? (We might not have much choice here, though ...)
- ☞ we welcome contributions to the physics case of the proposal and whitepaper from anyone who wishes to contribute.
- time line:
 - ☞ circulate draft of whitepaper/proposal in early September
 - ☞ deadline for proposal: September 28
- for more details consult
<http://www.rochester.edu/~orr/LHC-TI.html>
where a copy of these slides can also be found