Report from NSF

Covering Activities in the Divisions of Physics and Astronomical Sciences

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National Science Foundation

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High Energy Physics at NSF – Budget Considerations

- NSF budgets are set by Director at the highest level
  OMB/Congress → NSF OD → Directorates → Divisions → Programs
- Currently (FY 2013), there are 6 lines in the NSF Budget:
  Research & Related Activities (R&RA, $5,544M) Research Awards in all Research Directorates (MPS, GEO, BIO, ENG, CISE, SBE); Facilities Operations here
  Education & Human Resources (EHR, $833M)
  Agency Operations & Award Management (AOAM, $294M)
  Major Research Equipment & Facilities Construction (MREFC, $196M); Includes no funds for operations; funds disappear when construction is complete
  Office of Inspector General (OIG, $13M)
  National Science Board (NSB, $4M)
- The Director has flexibility in making program and Directorate allocations; however
  President's budget has detailed "bottoms-up" justifications – administration priorities
  Appropriations language can highlight Congressional priorities
  Budget cuts can impact "core" research programs (9.6% PHY budget cut in FY 2013)
- The NSF mission is broad ("fund the best science"); all disciplines compete every year for non-core funding (Presidential priorities, Congressional priorities, MREFC projects); planning for long-term projects is difficult, although essential for high energy physics

Consequences of Current Budget Constraints

There is a lot of very good science that will not be funded.

Whatever is funded should reflect:

- the strongest case for scientific progress at the frontier of knowledge, irrespective of field
- potential to transform society either directly or indirectly
- reasonable expectation of affordability over long term

PHY Perspectives:

- Maximize impact of NSF funds, e.g. invest in a few high-impact mid-scale projects as opposed to contributions to large efforts with incremental impact
- Optimize utilization of resources otherwise funded, e.g. OSG, XSEDE, PFC
- Focus on science questions, not disciplinary programs per se; utilize cross-cutting programs where feasible, e.g. MRI, CDS&E
- Encourage connections across PHY sub-areas

High Energy Physics has been and should remain highly competitive at NSF.

PHY Particle Physics (PP) Funding - Details

Experimental EPP

Experimental Particle Astro

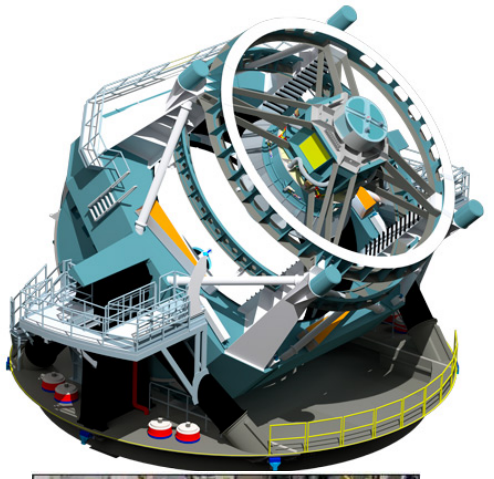
Theory

(in M$)	FY 2008 Actuals	FY 2009 Omnibus	FY 2009 ARRA	FY 2010 Actual	FY 2011 Actual	FY 2012 Actual	FY 2013 Estimate
EPP Research	20.5	18.8	14.0	25.8	25.0	24.7	21.7
LHC Ops	18.0	18.0		18.0	18.0	18.0	18.0
CESR	13.7	8.5	1.3				
Accel/Instrumentation	4.0	2.2		3.0	4.1	11.9	4.5
Particle Astrophysics	15.8	15.9	15.3	17.9	9.7	11.5	10.4
IceCube Ops	1.5	2.2		2.2	3.5	3.5	3.5
DUSEL Planning	2.0	22.0		28.9	10.2		3.2
Underground R&D	5.0	4.0	5.6	4.6	6.0	11.0	3.4
Underground Physics					8.4	6.3	5.5
THY (EPP/Astro/Cosmo	11.7	12.0	6.8	13.2	14.1	13.6	12.1
Physics Frontier Centers	6.3	5.9		5.9	6.0	6.0	6.0
TOTAL Particle Physics	98.4	109.5	43.0	119.4	104.9	106.4	88.4
TOTAL Physics Divisior	285.0	275.5	102.1	307.8	280.3	277.4	250.7
% of Physics Division	34.5%	39.7%	42.1%	38.8%	37.4%	38.4%	35.2%
Allied Funding	7.2	4.9	0.5	12.7	12.3	24.7	20.8
Effective Total	105.5	114.4	43.5	132.1	117.2	131.1	109.2

Allied Funding

Large Synoptic Survey Telescope (LSST)

- Stage IV Dark Energy experiment, with many other astrophysical goals
  - NSF: Telescope, site, data management
  - DOE: Large-format camera (SLAC leads)
- In President's MREFC budget request for NSF for FY 2014
  - Total NSF construction budget of $466M
  - Goal: start NSF construction in July 2014
- DOE camera could not start in FY 2013 due to Continuing Resolution; in FY14 Budget Request
  - Total cost range up to $175M
- NSF Final Design Review occurring this week
  - Aiming for May 2014 construction approval by NSB



Artist's rendering of site and telescope; primary mirror in final polishing stage

MPS/AST Dark Energy Efforts

- Contributed to funding of Sloan Digital Sky Survey (SDSS) over the years
  - Presently funding BOSS (Baryon Oscillation Spectroscopic Survey), a Stage III DE experiment, as part of SDSS-III
- Together with university and private sources, funding Hobby Eberley Telescope Dark Energy Experiment (HETDEX), another Stage III spectroscopic experiment at higher redshift
- Supporting Dark Energy Survey (DES), a Stage III imaging experiment on the Blanco 4m telescope in Chile
  - NSF telescope and data management, DOE (FNAL) camera
  - 5-yr survey began in August 2013
- DOE/HEP has selected NSF Mayall 4m telescope in Arizona as host for Dark Energy Spectroscopic Instrument (DESI), with LBNL as lead institution
  - Further advance of DESI depends strongly on report and recommendations of P5 committee

NSF Considers P5 Process as Critical

Key Points of Interest to NSF

NSF Funds are Limited; Particle Physics must Compete with All of Science

P5 Charge: Focus on the Science in defining priorities:

"To better understand this picture, we request an assessment of the current and future scientific opportunities over the next 20 year period."

Look for Maximum Impact; Science Payoff Must Justify Level of Investment

P5 Charge: Describe the scientific return on investments:

"Examine current, planned and proposed research capabilities and assess their role and potential for scientific advancement; assess their uniqueness and relative scientific impact in the international context and estimate the time and resources... needed to achieve their goals."

Capitalize on NSF Agility; Mid-scale Awards in Key Areas Rather than Incremental Contributions to Big Efforts

P5 Charge: Consider a balance of experiments. NSF/PHY will support small and mid-scale experiments, and well-defined university-led contributions to large projects:

"We also request that HEPAP consider the appropriate balance of small, mid-scale, and large experiments and identify, where possible, multiple or complementary pathways to address the important scientific questions..."

Capitalize on the NSF Focus on the University Community and Students

P5 Charge: Consider a range of projects that engage laboratory and university personnel:

"... maintaining a healthy balance that preserves essential roles and contributions for national laboratories and universities and enables opportunities for global coordination of large initiatives."

Utilize Access to NSF- and Division-Wide Funding Opportunities

These are **NOT** Particle Physics programs;

Proposal Must be Competitive with Science in Other Areas
Project Must Enable a Major Advance in the Science
Costs Must Mesh Well with Other Support for Project, e.g. Operations Costs

Major Research Infrastructure (MRI): Deadline January 23, 2014

http://www.nsf.gov/publications/pub_summ.jsp?WT.z_pims_id=5260&ods_key=nsf13517

Two awards in FY 2013: g-2, LHCb

PHY Mid-Scale Instrumentation Fund

http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf13118

Accelerator Science

http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504937&org=PHY&from=home