

Nuclear Physics Program

Nuclear Science Advisory Committee

Gene Henry

Acting Associate Director of the Office of Science

for Nuclear Physics

July 27, 2009



Outline of Presentation

- Program News
- FY 2009 Appropriation
- 2009 Recovery Act Funding
- FY 2010 Budget Request
- Office of Nuclear Physics



Early Career Awards for NP Researchers

Outstanding Junior Investigators

Prof. William Detmold -- College of William & Mary
“Multi-Meson Systems in Lattice QCD”

Prof. Katherine L. Grzywacz-Jones -- University of Tennessee
“Spectroscopic Studies Close to ^{100}Sn and ^{132}Sn Using Direct Reactions and Gamma-Ray Measurements”

Prof. Anna Stasto -- Pennsylvania State University
“QCD Description of Hadronic Interactions at High Energies”

Presidential Early Career Awards for Scientists and Engineers

Dr. Gianluigi Ciovati -- Thomas Jefferson National Accelerator Facility
for work on the dependence of cavity Q-value on accelerating gradient and the causes of degradation of Q-value at higher gradients

Dr. Paul Sorensen -- Brookhaven National Laboratory
for original research demonstrating quark number scaling in the elliptic flow of hadrons in nucleus-nucleus collisions

Dr. Ivan Vitev -- Los Alamos National Laboratory
for seminal theoretical research on energy loss in the quark-gluon plasma

Great Beginnings

**Groundbreaking for the
12 GeV CEBAF Upgrade Project**
(April 2009)



**Signing of the Cooperative Agreement
Between DOE and MSU for FRIB**
(June 2009)





Nuclear Theory

Topical Collaborations, Laboratory Theory Review

Topical Collaborations are fixed-term, multi-institution collaborations established to investigate a specific topic in nuclear physics of special interest to the community, which is well aligned with programmatic NP goals.

Notice DE-PS02-09ER09-24

Closes September 1, 2009

Program Manager: Dr. George Fai

See the Office of Science Grants and Contracts Web Site:

<http://www.er.doe.gov/grants/>

National Laboratories Theory Group Review - September 16-18, 2009



Office of Science FY 2010 Budget Request

Office of Science Overview Appropriation Summary by Program

(dollars in thousands)

	FY 2008 Current Appropriation	FY 2009 Original Appropriation	FY 2009 Additional Appropriation ^a	FY 2010 Request	FY 2010 Request to Congress vs. FY 2009 Appropriation	
Office of Science						
Basic Energy Sciences	1,252,756	1,571,972	+555,406	1,685,500	+113,528	+7.2%
Advanced Scientific Computing Research	341,774	368,820	+157,110	409,000	+40,180	+10.9%
Biological and Environmental Research	531,063	601,540	+165,653	604,182	+2,642	+0.4%
High Energy Physics	702,845	795,726	+232,390	819,000	+23,274	+2.9%
Nuclear Physics	423,671	512,080	+154,800 ^b	552,000	+39,920	+7.8%
Fusion Energy Sciences	294,933	402,550	+91,023	421,000	+18,450	+4.6%
Science Laboratories Infrastructure	66,861	145,380	+198,114	133,600	-11,780	-8.1%
Science Program Direction	177,779	186,695	+1,600	213,722	+27,027	+14.5%
Workforce Development for Teachers and Scientists	8,044	13,583	+12,500	20,678	+7,095	+52.2%
Safeguards and Security	75,946	80,603	0	83,000	+2,397	+3.0%
SBIR/STTR (SC funding)	92,997	0	+19,004 ^b	0	0	0.0%
Subtotal, Office of Science	3,968,669	4,678,949	+1,587,600	4,941,682	+262,733	+5.6%

^aAmerican Recovery and Reinvestment Act

^b Excludes \$1,100 for SBIR/STTR shown below



FY 2009 Appropriations

	FY 2006 Approp.	FY 2007 Approp.	FY2008 Approp.	FY 2009 Approp.	FY 2009 vs FY 2008	FY 2009 ARRA
Nuclear Physics						
Medium Energy Nuclear Physics	107,605	113,754	111,990	122,336	9.2%	20,166
Heavy Ion Nuclear Physics	160,230	184,290	186,663	200,473	7.4%	16,923
Low Energy Nuclear Physics	68,367	79,397	83,623	94,895	13.5%	24,044
Nuclear Theory	28,352	33,205	34,411	38,415	11.6%	14,405
Isotope Program	0	0	0	24,900	100.0%	15,362
Subtotal, Nuclear Physics	364,554	410,646	416,687	481,019	15.4%	90,900
Construction	2,480	12,120	17,539	31,061	77.1%	65,000
Total, Nuclear Physics	367,034	422,766	434,226	512,080	17.9%	155,900

* Includes SBIR/STTR in FY 2006-2009 for comparability

FY 2009 Appropriation has allowed for effective utilization of the program's scientific facilities and makes important investments for the future.

- University and Laboratory research efforts have been strengthened to effectively support and implement the nuclear physics program.
- User Facilities (RHIC, CEBAF, ATLAS and HRIBF) operations have been increased.
 - RHIC operated for 22 weeks
 - CEBAF operated for 35 weeks
 - HRIBF and ATLAS transitioning toward 7-day operations
- Important instrumentation projects are continuing.
- Construction was initiated on the 12 GeV CEBAF Upgrade Project.
- A Cooperative Agreement was signed in June with Michigan State University to initiate conceptual design and R&D for the Facility for Rare Isotope Beams.
- Support requested for advanced fuel cycle initiatives transitioned into a broader Applications for Nuclear Science and Technology effort.
- Support is provided for theoretical topical collaborations (distributed in FY2010).
- Isotope Program is transferred to Office of Nuclear Physics, and funding is provided for research isotopes.
- The nearly 6-month Continuing Resolution impacted the timing for all of the above.

FY 2009 Recovery Act provided additional funds to: accelerate funding for several projects (12 GeV, FNPB, PHENIX Silicon Vertex and Forward Vertex MIEs); enhance AIP at NP facilities; invest in infrastructure at TJNAF; support LQCD computing.; enhance the Nuclear Data program; enhance isotope production and capabilities; fund R&D on alternative isotope production techniques; and expand support for Applications of Nuclear Science and Technology.



American Recovery and Reinvestment Act

Nuclear Physics Projects

<u>Recovery Act Project</u>	<u>Funding (\$M)</u>
• Advance Funding of 12 GeV CEBAF Upgrade <ul style="list-style-type: none">– Advances procurements to create jobs– Reduces cost and schedule risk	65.000
• Fundamental Neutron Physics Beam-line MIE at the Spallation Neutron Source <ul style="list-style-type: none">– Two tasks to complete FNBP Project	0.600
• PHENIX Silicon Vertex MIE <ul style="list-style-type: none">– Completes the VTX project	0.250
• PHENIX Forward Vertex MIE <ul style="list-style-type: none">– Completes the FVTX project	2.000
• Enhanced AIP Funding at NP National User Facilities <ul style="list-style-type: none">– Projects at five nuclear physics facilities	25.000
• Enhanced Utilization of Isotope Facilities <ul style="list-style-type: none">– Projects and enhanced production at isotope facilities at four laboratories	10.000
• TJNAF Infrastructure Investments <ul style="list-style-type: none">– Five backlogged GPP projects supported	10.000
• Nuclear Data Program Initiative <ul style="list-style-type: none">– Workforce succession	1.944
• Lattice Quantum ChromoDynamics Computing <ul style="list-style-type: none">– Augment LQCD project with 16 tflops of computing	4.965



American Recovery and Reinvestment Act Nuclear Physics Projects (FOAs)

<u>Recovery Act Project</u>	<u>Funding (\$M)</u>
• Nuclear Science Workforce (Applications of Nuclear Science and Technology)	19.440
– FOA posted March 19 and closed May 6, 2009	
– Invited applications from universities and laboratories	
– Approximately 200 applications received	
– Applications passing initial review were reviewed by experts	
– Decisions are being finalized	
• R&D on Alternative Isotope Production Techniques	4.617
– FOA posted March 19 and closed May 13, 2009	
– Approximately 55 applications received	
– Applications passing initial review were reviewed by experts	
– Decisions are being finalized	
TOTAL NP	143.816 ^a

^aSBIR/STTR and Early Career are not included.



American Recovery and Reinvestment Act Science Early Career Research Program

The purpose of this program is to support the development of individual research programs of outstanding scientists early in their careers and to stimulate research careers in the areas supported by the DOE Office of Science.

- Involves all programs of the Office of Science with uniform criteria and rules
- Solicitation open to both university faculty and laboratory researchers (See SC Grants and Contracts Site)
 - University notice: DE-PS02-09ER09-26
 - Lab notice: Lab 09-26
- Posted June 2, 2009, and closes September 1, 2009; LOI not required, but is encouraged
- Eligibility
 - Universities: assistant professor in tenure track, no more than 10 years past PhD
 - Labs: permanent, non-postdoctoral, national laboratory employee, no more than 10 years past PhD
- Funding--Recovery Act funding in FY 2010; programmatic funding thereafter
 - Universities: minimum of \$150k/yr for 5 years
 - Labs: minimum of \$500k/yr for 5 years

For Nuclear Physics

- Research areas: Medium Energy, Heavy Ion, Low Energy, Theory, Isotopes Program, Accelerator R&D
- Anticipate approximately 5 university awards and 2 to 3 laboratory awards, dependent on funding

Frequently Asked Questions posted on http://www.science.doe.gov/SC-2/early_career.htm



Nuclear Physics Program in Proposed FY 2010

	FY 2006 Approp.	FY 2007 Approp.	FY 2008 Approp.	FY 2009 Approp.	FY2009 ARRA	FY 2010 Request	FY 2010 vs FY 2009
Nuclear Physics							
Medium Energy Nuclear Physics	107,605	113,754	111,990	122,336	20,166	131,009	7.1%
Heavy Ion Nuclear Physics	160,230	184,290	186,663	200,473	16,923	219,556	9.5%
Low Energy Nuclear Physics	68,367	79,397	83,623	94,895	24,044	116,816	23.1%
Nuclear Theory	28,352	33,205	34,411	38,415	14,405	43,419	13.0%
Isotope Program	0	0	0	24,900	15,362	19,200	-22.9%
Subtotal, Nuclear Physics	364,554	410,646	416,687	481,019	90,900	530,000	10.2%
Construction	2,480	12,120	17,539	31,061	65,000	22,000	-29.2%
Total, Nuclear Physics	367,034	422,766	434,226	512,080	155,900	552,000	7.8%

FY 2010 Budget Request is designed to optimize scientific productivity of the program by balancing research workforce, facility operations, and investments in advanced technology and capabilities.

- Research increased, including Nuclear Science Applications and Technology that is inherently relevant to a broad suite of applications.
- All facilities supported at near optimal levels of operation. Investments made in programmatic infrastructure, facility equipment, and accelerator improvement projects that will increase reliability, cost-effectiveness, and productivity, and provide new capabilities to pursue discovery science.
 - RHIC operates 30 weeks
 - CEBAF operates 35 weeks
- Funding for instrumentation increases according to planned profiles, and 2 new MIEs are initiated (STAR HFT RIB Science)
- Continued construction of 12 GeV per planned profile, adjusted for Recovery Act funding
- Continued R&D and conceptual design of FRIB per Cooperative Agreement



Office of Nuclear Physics

FY 2010 Congressional Budget Request

	(millions)			Request	vs FY09
	<u>FY07</u>	<u>FY08</u>	<u>FY09</u>	<u>FY10</u>	
Research Operating	138.7	142.6	156.1	169.8	+ 9%
Research Cap. Equip.	<u>13.1</u>	<u>14.1</u>	<u>16.6</u>	<u>32.2</u>	+ 94%
<Research>	151.8	156.7	172.7	202.0	+ 17%
RHIC	135.5	137.0	148.1	160.2	+ 8%
CEBAF	70.4	70.8	80.3	83.9	+ 4%
HRIBF	12.9	13.1	15.9	16.6	+ 4%
ATLAS	11.7	12.4	15.2	16.6	+ 9%
88-Inch Cyclotron	3.1	3.2	3.7	4.1	+ 11%
MIT/Bates	<u>2.0</u>	<u>2.0</u>	<u>0</u>	<u>0</u>	
<Facility Operations>	235.6	238.5	263.2	281.4	+ 7%
12 GeV Upgrade R&D/PED	9.5	14.4	28.6	22.0	
EBIS (RHIC)	5.1	4.1	2.7	0	
FRIB R&D/CDR	<u>0</u>	<u>0</u>	<u>7.0</u>	<u>9.0</u>	
<Construction (TPE)>	14.6	18.5	38.3	31.0	- 19%
Other (GPP/SBIR/etc)	<u>21.0*</u>	<u>20.5*</u>	<u>37.9**</u>	<u>37.6**</u>	
<Stewardship>	21.0	20.5	37.9	37.6	- 1%
Nuclear Physics Total	422.8	434.2	512.1	552.0	+ 8%

* Includes SBIR/STTR **Includes Isotope Program



FY 2010 Budget Request Research

	(millions)				
				Request	
<u>Research</u>	<u>FY07</u>	<u>FY08</u>	<u>FY09</u>	<u>FY10</u>	<u>vs FY09</u>
Universities	62.3	63.2	70.5	73.3	+ 4%
Laboratories	69.9	72.9	82.4	93.3	+ 13%
SciDAC & LQCD	2.7	2.8	3.2	3.2	
Rare Isotope R&D	<u>3.8</u>	<u>3.8</u>	<u>0</u>	<u>0</u>	
Operating Subtotal	138.7	142.6	156.1	169.8	+ 9%
 <u>Research Capital Equipment (TEC)</u>					
GRETINA	3.9	4.2	2.0	0.4	
FNPB	1.5	1.5	1.5	0	
STAR TOF	2.4	0	0	0	
PHENIX Silicon VTX	1.6	2.0	0.9	0	
PHENIX Forward Vertex Detector	0	0.7	2.2	0	
PHENIX Nose Cone Calorimeter	0	0.2	0	0	
HI LHC	1.0	2.0	4.0	5.0	
nEDM	0.8	2.2	1.1	4.5	
CUORE	-	0.4	2.0	4.5	
Rare Isotope Beam Science Initiative	-	-	-	4.2	
RHIC Detector Upgrade	-	-	-	1.4	
University CE	0.9	0.5	1.0	4.3	
Laboratory CE	<u>1.0</u>	<u>0.5</u>	<u>1.9</u>	<u>7.9</u>	
Capital Equip Subtotal	13.1	14.1	16.6	32.2	+ 94%
Research Subtotal	151.8	156.7	172.7	202.0	+ 17%



House and Senate Appropriations Committees Reports

FY 2010 Budget Request for Nuclear Physics:	\$552,000,000
House Appropriations Committee Report:	\$536,455,000
Senate Appropriations Committee Report:	\$540,000,000

House Committee:

- “...recommends \$111,816,000 for Low Energy Nuclear Physics, \$5,000,000 below the request.”
- “...within these funds, the Committee recommends \$12,000,000, \$3,000,000 above the request for the Facility for Rare Isotope Beams.”
- “...recommends \$12,000,000 for the 12GeV continuous electron beam facility upgrade at the Thomas Jefferson Laboratory, \$10,000,000 below the request in light of reduced requirements for the project.”
- “...recommends \$29,200,000, \$10,000,000 above the request for Isotope Development and Production for Research and Applications, University Operations”
- “...directs the Department to work with the academic community to most cost-effectively increase the availability of medical isotopes”

Senate Committee:

- “Within the funds provided, \$17,500,000 is for nuclear medicine medical application research.”
- “All of the added funds must be awarded competitively in one or more solicitation that includes all sources-- universities, the private sector, and Government laboratories.”

Compared to the FY 2010 Budget Request – the House Mark reduces the NP core program by \$28.5M and the Senate Mark reduces it by \$29.5M.

The House and Senate Marks would lead to significant reductions in force at universities and laboratories; either will necessitate a redirection of the program.

Office of Nuclear Physics

