



---

# HIGH ENERGY PHYSICS PROGRAM FY 2003 BUDGET DISCUSSION

## High Energy Physics Advisory Panel



Dr. John R. O'Fallon  
Director, Division of High Energy Physics  
U.S. Department of Energy  
April 26, 2002 - corrected

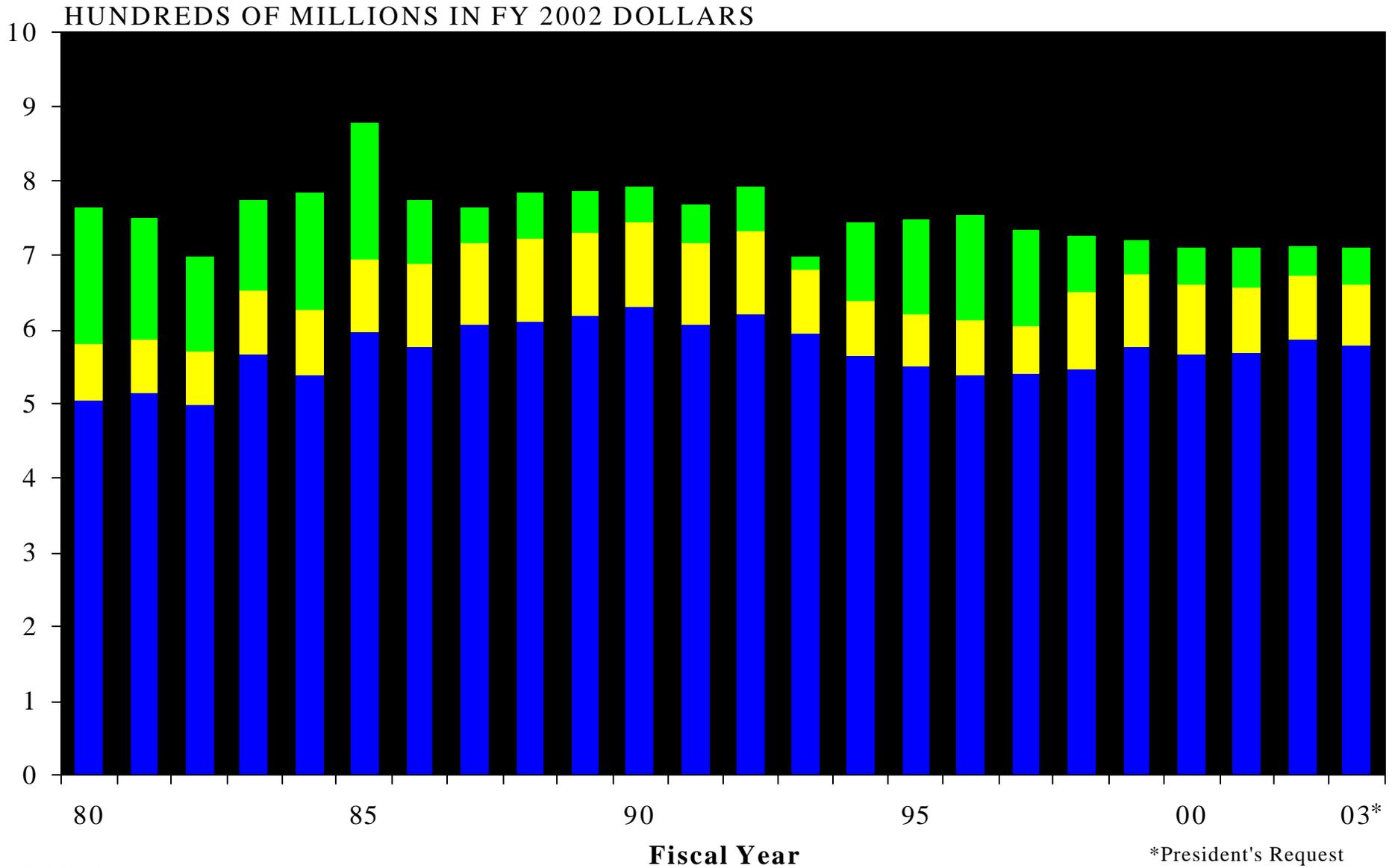


## Recent Appropriations History (B/A in Millions)

	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u>
Congressional Budget Request	\$ 714.7	\$ 716.1	\$ 725.0
House Appropriations Bill	714.7	716.1	
General Reduction (HEP share)	<u>- 3.5</u>	<u>- 0.5</u>	
Net	\$ 711.2	\$ 715.6	
Senate Appropriations Bill	677.0	725.1	
General Reduction (HEP Share)	<u>-12.3</u>	<u>--</u>	
Net	\$ 664.7	\$ 725.1	
Conference Committee	726.1	716.1	
General Reduction (HEP Share)	-8.7	-2.9	
Safeguards and Security Transfer	<u>-6.2</u>	<u>--</u>	
	\$ 711.2	\$ 713.2	
Appropriation after reductions	711.2	713.2	
Comparability Adjustment	--	--	
SBIR & STTR	<u>-15.3</u>	<u>-15.3</u>	
Net Funding Available	\$ 696.9	\$ 697.9	



# High Energy Physics Funding





## Key Elements of the FY 2003 Program

---

- ✍ U.S. HEP Program has opportunities for major discoveries over the next several years at each of its accelerator laboratories
  - Tevatron with the Main Injector and newly upgraded CDF and D-Zero detectors at Fermilab to search for the Higgs particle, supersymmetry, neutrino mass and mixing
  - B-factory at SLAC to study CP violation
  
- ✍ These opportunities are too important to let pass by and each window of opportunity must be exploited.
  
- ✍ Such exploitation requires strong running of the accelerators/colliders and appropriate upgrades of the machines and detectors. Therefore, FY 2003 budget provides for:
  - Near optimal levels of running at Fermilab and SLAC (39 weeks for Fermilab and 39 weeks at SLAC)
  - Increased support for upgrades to the machines and detectors at both Fermilab and SLAC, as well as the supporting computing facilities



## Key Elements of FY 2003 Program (Cont'd)

---

- ✍ Provides for continuation of U.S. LHC activities at agreed upon levels
- ✍ Provides for continuation of construction projects on agreed upon profiles
- ✍ We recognize that placing emphasis on one part of the program when the budget is flat-flat necessarily means that other parts of the program must be reduced or terminated, and we recognize the severe hardship it places on those reduced programs.
  - Funding for university research groups will be reduced.
  - Funding for the smaller HEP laboratories--Lawrence Berkeley National Laboratory, Argonne National Laboratory, and Brookhaven National Laboratory--will be reduced.
  - Funding for operation of the AGS for high energy physics research will be terminated



# FY 2003 Budget

(B/A in Millions)

	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003 Request</u>	<u>% Change</u>
<b>Research &amp; Technology</b>				
Physics Research	\$ 163.8	\$ 159.3	\$ 166.1	
Technology R&D	<u>76.9</u>	<u>84.9</u>	<u>92.4</u>	
Subtotal	\$ 240.7	\$ 244.2	\$ 258.5	5.8
<b>Facility Operations</b>				
Operating	\$ 317.4	\$ 328.6	\$ 307.2	
Capital Equipment (not including LHC)	40.8	50.3	47.8	
AIP	11.1	17.7	18.8	
GPP	10.0	12.0	12.5	
LHC	<u>58.9</u>	<u>49.0</u>	<u>60.0</u>	
Subtotal	\$ 438.2	\$ 457.6	\$ 446.4	-2.4
<b>Construction</b>				
Neutrinos at the Main Injector - NuMI (TEC \$ 109.2)	\$ 22.9	\$ 11.4	\$ 20.1	
Wilson Hall (TEC \$15.6)	4.2	--	--	
SLAC Research Office Bldg. (TEC \$7.2)	<u>5.2</u>	<u>--</u>	<u>--</u>	
Total Construction	\$ 32.3	\$ 11.4	\$ 20.1	
<b>Total HEP Budget</b>	\$ 711.2	\$ 713.2	\$ 725.0	1.7
<b>SBIR &amp; STTR</b>	<u>-15.3</u>	<u>-15.3</u>	<u>-15.6</u>	
	\$ 696.9	\$ 697.9	\$ 709.4	1.7



## FY 2003 Budget - Major Components

(B/A in Thousands)

	<u>FY 2002</u>	<u>Change Amount</u>	<u>FY 2003</u>	<u>Change (%)</u>
University Base Program	115,470	3,480	118,950	3.0%
Physics Research	102,911	3,525	106,436	3.4%
HEP Technology	12,559	-45	12,514	-0.4%
Fermilab Total	283,051	5,789	288,840	2.0%
Base Program	271,651	-2,904	268,747	-1.1%
Construction	11,400	8,693	20,093	
SLAC Total	160,938	1,727	162,665	1.1%
Base Program	160,938	1,727	162,665	1.1%
AGS	5,830	-5,830	0	-100.0%
BNL <sup>1</sup>	15,392	-115	15,277	-0.7%
LBNL <sup>1</sup>	23,633	-15	23,618	-0.1%
Landlord at LBNL	5,239	211	5,450	
ANL <sup>1</sup>	8,123	-168	7,955	-2.1%
LHC	49,000	11,000	60,000	
LHC Support	3,990	2,740	6,730	
Muon Collider R&D	5,329	-1,766	3,563	-33.1%
SciDAC	4,920	-510	4,410	
Auger	1,140	0	1,140	0.0%
SBIR/STTR	15,261	368	15,629	2.4%
Other	15,854	-5,091	10,763	-32.1%
<b>Total</b>	<b>713,170</b>		<b>724,990</b>	

Notes: 1) LHC not included; muon collider incremental funding not included



## Washington Administered Programs--Physics Research and Technology R&D (Universities and Small Labs) (B/A in Millions)

---

	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003 Request</u>	<u>% Change</u>
<b>Physics Research -- base</b>	\$ 109.6	\$ 102.9	\$ 106.4	3.4
<b>Technology R&amp;D*</b>	\$ 13.3	\$ 12.6	\$ 12.5	-0.8

\* Washington administered only. Does not include funds provided directly to the principal HEP Laboratories (ANL, BNL, Fermilab, LBNL, SLAC) for general Technology R&D or R&D in support of operating accelerators.

Does not include LHC project funding.



# Fermilab

(B/A in Millions)

	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u> <u>Request</u>	<u>% Change</u>
<b>Research &amp; Technology</b>				
Physics Research	\$ 5.8	\$ 6.4	\$ 6.4	
Technology R&D	<u>19.2</u>	<u>24.4</u>	<u>23.7</u>	
Subtotal	\$ 24.0	\$ 30.8	\$ 30.1	-2.3
<b>Facility Operations</b>				
Operating	\$ 188.5	\$ 194.6	\$ 194.4	
Capital Equipment	22.6	31.7	30.9	
AIP	4.9	9.7	8.5	
GPP	<u>2.7</u>	<u>4.8</u>	<u>4.8</u>	
Subtotal	\$ 218.7	\$ 240.8	\$ 238.6	-0.9
<b>Construction</b>				
NuMI (TEC \$109.2)	\$ 22.9	\$ 11.4	20.1	
Wilson Hall (TEC \$15.6)	<u>4.2</u>	<u>--</u>	<u>--</u>	
Total Construction	\$ 27.1	\$ 11.4	\$ 20.1	
<b>Total Fermilab</b>	\$ 269.8	\$ 283.0	\$ 288.8	2.0

Does not include LHC project funding, LHC support, SciDAC, and incremental muon collider funding.



# Stanford Linear Accelerator Center

(B/A in Millions)

	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u> <u>Request</u>	<u>% Change</u>
<b>Research &amp; Technology</b>				
Physics Research	\$ 11.8	\$ 12.5	\$ 12.5	
Technology R&D	<u>21.7</u>	<u>22.4</u>	<u>24.2</u>	
Subtotal	\$ 33.5	\$ 34.9	36.7	5.2
<b>Facility Operations</b>				
Operating	\$ 95.0	\$ 97.5	\$ 97.3	
Capital Equipment	13.9	15.6	14.2	
AIP	6.2	8.0	10.3	
GPP	<u>4.2</u>	<u>5.0</u>	<u>4.2</u>	
Subtotal	\$ 119.3	\$ 126.1	\$ 126.0	-0.1
<b>Construction</b>				
Research Office Bldg. (TEC \$7.2M)	<u>\$ 5.2</u>	<u>\$ --</u>	<u>\$ --</u>	
<b>Total SLAC</b>	\$ 158.0	\$ 161.0	\$ 162.7	1.1



# Brookhaven National Laboratory

(B/A in Millions)

	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u> <u>Request</u>	<u>% Change</u>
<b>Research &amp; Technology</b>				
Physics Research	\$ 10.8	\$ 10.7	\$ 10.2	
Technology R&D	<u>5.2</u>	<u>4.7</u>	<u>5.1</u>	
Subtotal	\$ 16.0	\$ 15.4	15.3	-0.6
<b>Facility Operations</b>				
Operating	\$ 5.6	\$ 5.7	\$ --	
Capital Equipment	0.4	.1	--	
AIP	<u>--</u>	<u>--</u>	<u>--</u>	
Subtotal	\$ 6.0	\$ 5.8	\$ --	
<b>Total BNL</b>	\$ 22.0	\$ 21.2	\$ 15.3	-27.8

Does not include LHC project funding, LHC support, SciDAC, and incremental muon collider funding.



# Lawrence Berkeley National Laboratory

(B/A in Millions)

	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u> <u>Request</u>	<u>% Change</u>
<b>Physics Division</b>				
Physics Research	\$ 14.0	\$ 13.7	\$ 14.1	
Detector R&D	<u>2.7</u>	<u>2.0</u>	<u>2.0</u>	
Total	\$ 16.7	\$ 15.7	\$ 16.1	2.5
<b>AFR Division</b>	\$ 9.0	\$ 8.0	\$ 7.6	- 5.0
<b>Landlord</b>				
GPE	\$ 2.1	\$ 1.9	\$ 1.9	
GPP	3.0	3.5	3.5	
WM	<u>5.5</u>	<u>5.5</u>	<u>--</u>	
Subtotal	\$ 10.6	\$ 10.9	5.4	
<b>Total LBNL</b>	\$ 36.3	\$ 34.6	\$ 29.1	-15.9

Does not include LHC project funding, LHC support, SciDAC, SNAP, and incremental muon collider funding.



# Argonne National Laboratory

(B/A in Millions)

---

	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003</u> <u>Request</u>	<u>% Change</u>
<b>Physics Division</b>				
Physics Research	\$ 6.2	\$ 6.1	\$ 6.0	
Detector R&D	0.9	0.8	0.8	
Accelerator R&D	<u>1.5</u>	<u>1.1</u>	<u>1.1</u>	
<b>Total ANL</b>	\$ 8.6	\$ 8.0	\$ 7.9	-1.3

Does not include LHC project funding, and incremental muon collider funding.



# Large Hadron Collider

(B/A in Millions)

---

	<u>FY 2001</u>	<u>FY 2002</u>	<u>FY 2003 Request</u>
<b>Accelerator</b>			
Lab Program	\$ 19.2	\$ 10.1	\$ 8.7
Procurement from Industry	<u>8.0</u>	<u>11.2</u>	<u>13.4</u>
<b>Subtotal</b>	<b>\$ 27.2</b>	<b>\$ 21.3</b>	<b>\$ 22.1</b>
<b>Detectors</b>			
Atlas	\$ 14.5	\$ 10.5	\$ 17.4
CMS	<u>17.2</u>	<u>17.2</u>	<u>20.5</u>
<b>Subtotal</b>	<b>\$ 31.7</b>	<b>\$ 27.7</b>	<b>\$ 37.9</b>
<b>TOTAL</b>	<b>\$ 58.9</b>	<b>\$ 49.0</b>	<b>\$ 60.0</b>



# NOTES FOR BUDGET TABLES

---

1. The numbers shown do not reflect:
  - A. Transfers of capital equipment from labs to universities for large detector (e.g., CDF, D-Zero, BaBar, ZEUS, etc.) fabrication.
  - B. Incremental funding for conferences, detailees to DOE Headquarters, etc.
  - C. Special help provided during the year.
  - D. Funding for lab service accounts at BNL, Fermilab, and SLAC.
  - E. Allocation of LHC funding except as noted.
2. The Physics Research University Program includes funding for universities and certain DOE labs (LANL, LLNL, ORNL, PNNL).
3. The Advanced Technology R&D Program includes funding for universities and specific programs at certain DOE labs (ANL, BNL, LANL, LBNL, LLNL, PPPL).
4. A portion of the Advanced Technology R&D Program is included in the HEP Technology R&D entries for ANL, BNL, and LBNL.