
FY2007 Presidential Budget Request for Office of Science High Energy Physics

Presentation before HEPAP

**Robin Staffin
Associate Director, DOE Office of
High Energy Physics**

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The DOE HEP program in FY 2007

- Overall HEP budget and priorities in FY 2007:
 - Tevatron and B-factory supported for full scheduled operations
 - LHC Support (Operations and Computing) up 8% as construction completes
 - Core research program at the universities (6%) and laboratories (2%) increased
 - Initiatives for the future of HEP:
 - ILC R&D doubled (\$30M→\$60M)
 - Start of new neutrino initiatives
 - Electron Neutrino Appearance Experiment (EvA)
 - Reactor Neutrino Detector
 - Investment in long-term accelerator R&D increased \$28M→\$33M
 - Dark Energy R&D increased \$3M→\$13M

High Energy Physics FY 2007 Budget

(\$M)

		FY05 Actual	FY06 Approp.	FY07 Request	FY07 - FY06
Facility ops	Tevatron	234	215	215	0
	B-factory	108	93	93	0
	LHC (construction+ops)	62	60	60	0
	LBNL and BNL infrastructure	6	6	6	0
Other Projects	Construction and non-LHC MIEs	17	2	13	11
Subtotal ops & projects		427	376	387	11
core research	University physics research	104	104	110	6
	Laboratory physics research	85	83	85	2
	Accelerator Science (univ + lab)	28	28	33	5
	SciDAC & Lattice QCD	7	7	7	0
Subtotal core research		224	222	235	13
	Accelerator Development	24	28	28	0
	Detector R&D	14	20	14	-6
	ILC R&D	24	30	60	30
	Dark Energy R&D	3	3	13	10
	Neutrino R&D	0	9	4	-5
Subtotal R&D and new initiatives		65	90	119	29
Others (incl. SBIR/STTR in 06 and 07)		7	29	34	5
Total as shown in FY07 budget		723	717	775	58
SBIR/STTR in FY 2005		17			
Grand Total incl SBIR/STTR		740	717	775	58

ILC R&D

- To support a U.S. leadership role in this coordinated international R&D effort, DOE is doubling the ILC R&D budget in FY2007 Presidents Request (\$30M→\$60M)
 - Enables progress on major subsystems
 - Begins industrialization of key components so that U.S. industry can get “up to speed” and successfully compete for contracts if ILC is built
 - Includes detector R&D funding (a change from previous years)
 - Also includes U.S. contributions to GDE management & support
- This is an important step forward for the ILC effort, although it is NOT yet
 - Approval of construction, or engineering design
- The goal of the R&D program at this stage is to provide solid technical, cost and schedule information to governments to support a future decision on ILC construction.

Core Research

- We are supporting core experimental and theoretical research at labs and universities to maintain approximately the FY 2006 level-of-effort, or slightly above:
 - **University-based physics research up ~6% overall**
 - **Lab-based physics research up ~2% overall**
- **Goals:**
 - To maintain strong participation in the **Tevatron, B-factory** and **LHC** physics programs
 - To help support **research** activities associated with new initiatives such as ILC R&D, neutrinos, dark energy, and dark matter (though most R&D funding for these activities comes from other sources).
 - Also includes ongoing (unchanged from FY06) HEP contributions to the cross-cutting **SciDAC** program and the **Lattice QCD** IT investment, joint with Nuclear Physics.

New Neutrino Experiments

- APS Study *The Neutrino Matrix* recommended several new experiments in neutrino physics, including:
 - Reactor experiment to measure θ_{13} via ν_e disappearance
 - Accelerator-based experiment with comparable sensitivity to θ_{13} as above AND sensitivity to mass hierarchy thru matter effects
- Charge to Neutrino Scientific Assessment Group (NuSAG) in 2005 explicitly asked for further recommendations on which of the possible technical options to pursue in these two areas.
- We are proceeding in the FY2007 request with these two experiments:
 - **Reactor Neutrino Detector.** Site to be determined. Awaiting NuSAG assessment of experiments.
 - **Electron Neutrino Appearance (EvA) Experiment.** Very large scintillator detector to observe ν_e appearance.
- R&D for other items in the list of APS recommendations is proceeding (see later slide), in coordination with DOE Nuclear Physics and/or NSF

Accelerator R&D

- In addition to increases in ILC R&D, there is in the FY2007 request an **additional significant increase (+\$5M, or ~18%) in the long-range R&D program that supports fundamental research into the physics of beams and accelerator technologies (“accelerator science”)**
- The goal is to enable the restoration of the accelerator science research program to the level needed to support long-term R&D on new particle acceleration techniques and technologies, such as:
 - **Novel particle acceleration concepts**
 - **New superconductors and their application**
 - **Very high gradient accelerating structures**
 - **Advanced beam instrumentation**
 - **Theory and simulation of beams**
 - **User facilities to test these concepts**
- This research has, in the past, benefited all of the accelerator-based Office of Science research and will likely continue to do so in the future
- Advice from the community (e.g., J. Marx AARD panel) provide needed input for developing this program

Other New Initiatives

- Progress on other experimental initiatives (not an exhaustive list)
 - A high intensity neutrino beam for neutrino CP-violation experiments
 - R&D continues; technical evaluation
 - A neutrinoless double-beta decay experiment to probe the Majorana nature of neutrinos
 - 200kg Xenon experiment in operations by 2007
 - R&D underway for large-scale (~1000kg) experiments with various isotopes (with DOE Nuclear Physics, and possibly NSF)
 - An underground experiment to search for direct evidence of dark matter
 - R&D for next-generation experiments, joint with NSF
 - Dark Matter Scientific Advisory Group (SAG) to be discussed here
 - Ground-based dark energy experiment(s)
 - R&D for new cameras on existing telescopes and/or new telescopes
 - In cooperation with NSF, based in part on DETF input
 - Space-based dark energy experiment(s)
 - SNAP R&D continues as conceptual design for Joint Dark Energy Mission with NASA
 - R&D on other approaches will be considered