

R&D Budget and Overview

FY05 Request, allocation, complaints

FY06, FY07 outlook

Forward Funding Schemes

FY05 R&D

- In August, a bottom up list of tasks led to \$1680 K total.
- In September we requested \$ 513 K for FY05
 - The Executive Council was part of the process on what to request.
 - I expected only \$300K was possible based on earlier PPD plans.
- In December we were allocated \$ 90 K
 - Found out later that \$200K went to DES, so my original PPD plan of \$ 300 K held, it just didn't come to us.
- On December 15, Gary and I met with Jim Strait and Montgomery to complain
 - We took an updated spreadsheet showing the minimum we thought we could live with was \$ 101 K, directed totally towards work before the Aspen decision
- On January 4 our budget was increased to \$ 101 K
 - I think this shows the actual amount will depend on our articulated needs?
 - “Needs” will be redefined if we get approval?
 - Perhaps \$ 25-50 K could be available later this year?

Scenarios are now being done for FY06 and FY07

- This is for a lab budget presentation at DOE in mid-February
 - DOE guidance is to talk to -2%, flat-flat, +2%
 - The lab is responding with scenarios for flat-flat, +2%, +7%
 - I don't think the +7% is for NOvA
- So, we've again been asked what we need
 - Strangely enough that is about \$1475 K
\$1680 K (original request) less ~\$101 K (allocation) less ~\$84 K for the defunct Cosmic Ray Background test
 - and we need it all in FY06 assuming the project starts in FY07
- So they ask how we would spread the R&D over TWO more years assuming a project start in FY08.
 - Answer is about a 50/50 split
- All this is just planning, nothing solid
 - But the DOE rumors are consistently that FY06 will be a bad year

FY05 total	FY06 total	FY07 total				FY05 details
101.0	790.0	685.0				
						A. Verifying the signal size for Liquid Scintillator / fiber / APD chain
			Total			
			Need K\$	Item		
						Extrusion Prototypes
7.5	-		38	a.	Second pass with another vendor on the baseline cells, 3 cells by 48' long	
0.5	-				(our first "low bid" vendor using FY04 \$ is having some trouble producing a usable product, hope 4th iteration is OK)	
					(this first pass gets us 3180 ft)	
5.0	-				150 pound samples to figure out the reflectivity problem	
					(each might yield 150 ft?)	
10.0	-				Assuming we figure out the reflectivity, make another 1000 ft of the right stuff? With some long cells?	
10.0	35.0		45	b.	Another pass with another (?) vendor on the Totally Active cells, 3 cells by 48' long	
					have a quote for \$3650 die + \$3.10/ft if >1000 ft.	
-	250.0		250	c.	32-cell wide version for final technology choice (\$ 65 K die + cost / ft of prototype parts)	
-	-		5		Liquid Scintillator purchase 3x 55 gal from ELJEN, have some additional at Minnesota and CalTech	
					if we need some, use the NuTeV stuff?	
10.0	-		10		Liquid Scintillator R&D , check light output of various concentrations of psuedocumene and waveshifters	
					Indiana(5) and CalTech(5) work, these components are cost drivers for the liquid	
3.0	-		3		Fiber purchase , have some on hand but will order more. This is 2 km of 0.8 mm diameter S-type.	
-	15.0		15		Bubble effects / Fiber position studies , tech and eng time at universities / labs	
						Machining and assembly for light output tests
					two manifold types, bottom seal, top opening + fiber routing box	
20.0	-		20		need hand-crafted prototypes for light output work, tech time	
						Light output: reflectivity and some lifetime studies
5.0	15.0		20		understand TiO2 level, study effects of temperature, oxygen, ... machining and tech assembly at universities	
						APD work with Hamamatsu
25.0	75.0		100	a.	NRE design, low cost bare die. Product is a design report. This is the first step in a better understanding of the APD costs.	
					They design a pixel size to match our fibers, develop a method to mount APDs using flip-chip techniques	
-	150.0		150	b.	This second step creates a new APD mask set, qualifies the flip-chip scheme, engineers the cooler	
					on the back side of the APD and produces about 5 prototype parts for our evaluation	
-	54.0		54		ASIC for flip-chip assembly with APD , Yarema group design, then \$ for submission	
					\$ 54 K would get 300 chips, \$ 33 K gets only 40 chips, in design now, submission is Jan 05, testing in April 05	
						Board level items (initial work done in FY04, this would be a 2nd pass)
-	20.0		20		Eng & tech support at universities	
-	8.0		10		prototype boards	
2.0	-				prototype RMCC boards for HV	
						APD Housing - design prototype , initial test will be done with FY04 purchase kludge items
-	20.0		20		Eng and tech support at universities	
-	5.0		5		Materials	

FY05, 06, 07

FY05 total	FY06 total	FY07 total	Total Need K\$		
101.0	790.0	685.0	1,680.0		
				A. Verifying the signal size for Liquid Scintillator / fiber / APD chain	
98.0	647		765		Subtotal A
				B. Cosmic Ray Background Test	
-	-		84		Subtotal B
				C. Structural Analysis of the Totally Active Detector	
3.0	111.0	-	114		Subtotal C
				D. Site & Building Work	
-	32.0	-	32		Subtotal D
				E. Design & Prototyping of final technology choice	
-	-	685.0	685		Subtotal E

Switch topics

- How do we start a project with likely marginal early funding?
- The last few projects at Fermilab have used the scheme of “forward funding”
 - Once the DOE approves the project,
 - Get Universities to advance funds immediately but agree to pay them back one year later
 - Sometimes the University actually pays a bill, more often they are giving “obligation authority” for a long lead time procurement and the delivery occurs in a later year when the project has funds and is able to automatically transfer the obligation to project task codes. So no money actually leaves the university in this case.
- DZero did this quite successfully
 - Even used real cash to pay for real objects
 - Rolled over the authority from year to year in one case.
- BTeV is working on it, I think MiniBooNE did some, did MINOS?
- The amounts have been quite substantial, ranging from \$0.250M to several at \$0.5 - 1.0M to one at \$7.5M.
- Can we do this?
 - Montgomery has supplied a sample Fermilab promise letter:

Professor F. Neutrino
University of Off-Axis
Tower

I've seen actual signed letters addressed to
Dean, Vice-Chancellor Provost,
Dept. Chair, Vice Pres for Research,
Vice Provost for Research



Dear Professor Neutrino,

The NOvA Collaboration is in the process of putting together its funding model for the project.

The experiment, to be sited to see a neutrino beam from the Fermilab Main Injector, is intended to become the preeminent particle physics experiment at a United States accelerator investigating neutrino identity at the turn of the decade. This approach received high praise and a strong recommendation from the APS Neutrino Study. The use of Neutrino Superbeams was included in the DOE Facilities Plan put together for Ray Orbach, Director of the DOE Office of Science.

Funding is being put in place from the US Department of Energy, possibly from the US National Science Foundation, and possibly other international funding agencies. As a result of the machinery, and of prior commitments, none of these organizations will be able to ramp up the funding at the rate which is optimally desirable. The Spokespersons of NOvA, Dr. John Cooper of Fermilab and Professor Gary Feldman of Harvard University, are initiating contacts with their university collaborators to solicit prefunding arrangements. These can help the NOvA project develop the momentum to make it competitive on the stage of worldwide particle physics.

They propose to request direct obligation authority for use of equipment purchases at Fermilab if the project is approved. In the succeeding Federal fiscal year, as new additional obligation authority becomes available to Fermilab, Fermilab will recapture the obligations to the university to cover these prefunded commitments. I understand that Gary Feldman has discussed with you the possibility that the Harvard University would be able to prefund NOvA at the level of \$9,000,000.

Mont
having
fun

I write to assure you of my full support for prefunding the project. This mechanism has been used for other projects and full recovery was made in all cases.

The experiment, when complete, will execute forefront research on issues which touch on the imbalance of matter and antimatter in the universe. In turn, this impacts our understanding of our very existence. Harvard University with its faculty has been the lead institution, beyond Fermilab, in the NOvA project enjoying the status it now has. While no firm guarantee can be given concerning funds in future Federal budgets, we have discussed this plan with the Department of Energy and have their encouragement to use this mechanism to to achieve our collective goals. I can assure you that Fermilab will give the highest priority to repayment of these forward funding commitments. This would happen as soon as practical in the following fiscal year.

If you have further questions, I would be happy to speak with you, as would Dr. Cooper or Professor Feldman.

Sincerely,

Pier J. Oddone
Director, Fermilab

Can we use this mechanism?

- If we had a “possible” prefunding total in our hands at the time of the Aspen PAC meeting, it might be a deciding factor
 - Well, it would have to be a substantial total.
 - **Are people willing to pursue their Deans, Provosts,.... for quantitatively “possible” amounts?**
 - This wouldn’t have to be an official public document.
 - From the NOvA side, the information could perhaps be restricted to an executive session of the PAC?
 - » But real institutional names and possible amounts would be required to have any real influence
 - After all, none of these agreements or letters can be sent until the DOE acts with CD-2 (even CD-3?)