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# **FY17 Budget Retreat: My perspective**

Paul Derwent

03 May 2016

# Budget history & development

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- FY14, FY15, FY16 numbers
  - Get these from the historical data
- FY17 discussions
  - Go back to FY14 stuff submitted to Procario, FWP's through time also
  - Profile presented to HEP, profile in the MNS
  - Story from Mike P about OMB/new start
  
  - 15.22M\$ (PBR) + 3M\$ (OHEP carryover)
- Some really bad results
  - SSR1 CM: July 2015 & FY16 budget moved from Q3FY17 to Q3FY18. April 2016 & FY17 budget moved from Q3FY18 to Q2FY19
    - Slipped 21 months in 10 months for no technical reason
  - HWR CM: July 2015 & FY16 budget moved from Q3FY17 to Q3FY18. Sent additional funding to move up again to Q4FY17. April 2016 & FY17 budget moved back to Q3FY18
    - Slipped 1 year in 10 months for no technical reason
  - PXIE delay chopper testing FY18, 6 months operation

# PIP-II funding

	Funding	Budget	Obligations	Carryover
FY14*		\$20.0M		\$0.8M
FY15	\$19.8M	\$20.6M	\$18.8M	\$1.8M
FY16	\$19.5M	\$21.3M		\$0.8M (target)
FY17	\$18.2M			
FY18	\$22-25M			

\*this is combination of PIP-II and Project 18

- Profile based on FY20-25 construction period
  - As presented at DOE June Review, w/ modification to reflect upper cost range

	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	TOTAL
OPC	\$19.5	\$31.5	\$25.0	\$25.0	\$22.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$123.0
TEC			\$26.0	\$45.0	\$68.0	\$90.0	\$90.0	\$90.0	\$90.0	\$28.0	\$527.0
TPC	\$19.5	\$31.5	\$51.0	\$70.0	\$90.0	\$90.0	\$90.0	\$90.0	\$90.0	\$28.0	\$650.0

# FY17

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- November Mission Needs Statement included a profile
  - \$19.5M
  - which had impacts on FY17 possibilities
- The President's Budget Request (February 2016): \$15.22M
  - In an IPT meeting, Mike Procaro told us that Office of Management & Budget, seeing PIP-II as a new start, set it way down. OHEP argued it up to this level as it had been supported R&D at a high level
  - \$3M in OHEP FY16 carryover directed to PIP-II
    - \$18.22M

## **From HEP Intensity Frontier's Activities and Explanation of Changes (pg 192)**

Funding (\$15,220,000) supports the Other Project Costs for the PIP-II project including the conceptual design for a new superconducting proton linac to replace the more than 40 year-old existing linac. The goal of this development is to increase the beam power of the entire complex and improve its reliability. This improvement to make the Fermilab neutrino and muon programs sustainable through the next decade was recommended in the P5 report.

# Goals for the Retreat

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- Establish a set of self-consistent goals and resource requirements, consistent with our FY17 budget guidance.
  - Preliminary goals established at level 3 of WBS
  - Initial resource target allocations established at level 3 of WBS
  - Unlikely we will achieve this goal today, but we will have all info required to develop a rational plan
- FY17 Guidance = \$18.2M
  - Compare to FY16 budget of \$21.3M
  - This will be augmented by whatever we carry over/forward fund from FY16
- Level 3 Managers to present:
  - Resources required to meet target goals
  - Goals that can be met at the initial target resource allocation
- Come up with a plan that gets us within \$1.0M of budget guidance

# FY17 PIP-II High Level Goals

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- In FY2017 we have significant goals in three areas:
  - R&D
    - Complete MEBT and maintain momentum for testing of CMs at PXIE in 2018
    - Complete resonance control testing of SSR1 at STC
  - India Institutions and Fermilab Collaboration (IIFC)
    - Keep R&D joint document deliverables on schedule
  - CD-1
    - Achieve CD-1
    - Start with CD-2 requirements
- It is likely we will have to prioritize both among and within these areas

# FY17 High Level Priorities

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- R&D
  - Complete PXIE MEBT installation and initiate beam commissioning
  - Deliver HWR CM in early FY18
  - Complete PXIE cryogenic distribution system in early FY18
  - Complete SSR1 resonance control testing
  - Provide RF and infrastructure support systems for above
  - Complete SSR1 cold-mass assembly in FY17, CM in FY18
  - Dress at least one  $\beta=0.9$  HB650 cavity
- IIFC
  - Test 325 MHz/7 kW rf amplifier
  - Test 650 MHz/40 kW rf amplifier (@RRCAT)
  - Fabricate one  $\beta=0.92$  5-cell (bare) cavity (RRCAT)
  - Complete preliminary HB650 CM design
- CD-1
  - Complete Conceptual Design Report/Alternatives Analysis
  - Complete Resource Loaded Schedule
  - Initiate Environmental Assessment
  - Complete other CD-1 documentation
  - Achieve CD-1

# Integrated Request vs. Initial Allocation

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- Integrated request corresponding to L3 Goals:

	FTE	M&S	Loaded
Initial Target	53.4	\$3.6M	\$18.2M
Request	72.6	\$6.4M*	\$26.7M*
Difference	19.2	\$2.8M*	\$8.5M*

- The difference is beyond the realm of “tweaking”

⇒ **We are going to have to slow down multiple activities**

\*Note: Includes \$500K (loaded) of M&O funds that we will ask from AD.

# Budget Strategy

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- Goal remains to get to CD-3 asap (2019?)
- Develop an internally consistent plan that bring things together synchronously, even if later than we would like
  - Appropriate balance between R&D, IIFC, and CD-1 activities
- Strategy
  - Carry over \$750K from FY16  $\Rightarrow$  average 60 FTE over balance of year
  - Support FY17 M&O costs off-project
  - Complete MEBT installation/commissioning in FY17
    - Delay chopper testing to FY18
  - Delay beam through HWR and SSR1 to FY19
    - Keep HWR pCM and PXIE cryo distribution proceeding in parallel: early/mid FY18 delivery
    - Attempt to keep SSR1 pCM delivery in FY18
  - Keep HTS-2/STC modifications and HB650 dressed cavities proceeding in parallel: early/mid FY18 delivery
  - Complete successful CD-1 DOE Review in FY17
  - Delay CD-2 to FY19
- An initial application of the above yields a budget shortfall of  $\sim$ \$3.0M

# Agenda

## FY17 Budget Retreat Agenda/Presentation Schedule Tuesday, April 26, 2016 - IARC Building

Time Start	Duration	Time End	Area	Presenter
8:30	20	8:50	Goals & Project Management	S. Holmes
8:50	10	9:00	LEBT	L. Prost
9:00	10	9:10	RFQ	J. Steimel
9:10	15	9:25	MEBT	S. Shemyakin
9:25	15	9:40	HWR	P. Ostromouv
9:40	15	9:55	325 MHz	L. Ristori
9:55	15	10:10	650 MHz	A. Rowe
10:10	15	10:25	Break	
10:25	15	10:40	CMTF	J. Leibfritz
10:40	15	10:55	HTS-2	J. Ozelis
10:55	15	11:10	Cryogenics	A. Klebaner
11:10	15	11:25	Controls	J. Patrick
11:25	15	11:40	Power	R. Pasquinelli
11:40	20	12:00	All Others	P. Derwent
12:00	15	12:15	Conventional Facilities	S. Dixon
12:15	25	12:40	Discussion	All
12:40	60	13:40	Lunch	
13:40	80	15:00	Wrap up	S. Holmes, P. Derwent, V. Lebedev, D. Mitchell, S. Mishra, C. Jacobsen

As of 3/31/2016

# Requests

FY17 PIP-II Updated Budget Submission Compared to Initial Targets (\$000)

Primary Work Effort	Work Effort	L3M	Target	Initial FTE	(Over)/Under	Target	Target	Total Target	M&S for	M&S for	Total Rqst'd	(Over)/Under	(Over)/Under
			FTE	Rst'd	Target	M&S	M&S Thru		Direct	R&D		M&O	Direct M&S
			\$000	\$000	\$000	\$000	\$000	Direct M&S	\$000	\$000	\$000	\$000	\$000
Proj. Mgmt	Accelerator Design Mgmt.	Lebedev, Valeri	-	-	-	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Business Office	Holmes, Stephen	2.05	2.05	-	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	ES&H	Holmes, Stephen	0.25	0.40	(0.15)	\$ -	\$ -	\$ -	\$ 300.0	\$ -	\$ 300.0	\$ (300.0)	\$ (300.0)
	International Collaboration	Mishra, Shekhar	1.80	1.80	-	\$ 109.0	\$ -	\$ 109.0	\$ 221.1	\$ -	\$ 221.1	\$ (112.1)	\$ (112.1)
	Project Management	Holmes, Stephen	1.45	1.45	-	\$ 40.0	\$ -	\$ 40.0	\$ 55.0	\$ -	\$ 55.0	\$ (15.0)	\$ (15.0)
	Sys. Engineering & Integration	Mitchell, Don	1.05	1.05	-	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Management Reserve	Holmes, Stephen	-	-	-	\$ 150.0	\$ -	\$ 150.0	\$ -	\$ -	\$ -	\$ 150.0	\$ 150.0
<b>Proj. Mgmt Total</b>			<b>6.60</b>	<b>6.75</b>	<b>(0.15)</b>	<b>\$ 299.0</b>	<b>\$ -</b>	<b>\$ 299.0</b>	<b>\$ 576.1</b>	<b>\$ -</b>	<b>\$ 576.1</b>	<b>\$ (277.1)</b>	<b>\$ (277.1)</b>
Linac	325 MHz	Ristori, Leonardo	13.50	15.30	(1.80)	\$ 400.0	\$ -	\$ 400.0	\$ 580.0	\$ -	\$ 580.0	\$ (180.0)	\$ (180.0)
	650 MHz	Rowe, Allan	5.50	7.40	(1.90)	\$ 100.0	\$ -	\$ 100.0	\$ 100.0	\$ -	\$ 100.0	\$ -	\$ -
	Installation/Alignment	Bocean, Virgil	0.40	1.53	(1.13)	\$ -	\$ -	\$ -	\$ 7.4	\$ -	\$ 7.4	\$ (7.4)	\$ (7.4)
	Accelerator Physics	Lebedev, Valeri	4.20	4.80	(0.60)	\$ 40.0	\$ -	\$ 40.0	\$ 14.0	\$ -	\$ 14.0	\$ 26.0	\$ 26.0
	CMTF	Leibfritz, Jerry	3.00	3.30	(0.30)	\$ 200.0	\$ -	\$ 200.0	\$ 630.0	\$ -	\$ 630.0	\$ (430.0)	\$ (430.0)
	Control	Patrick, James	1.20	2.95	(1.75)	\$ -	\$ -	\$ -	\$ 187.7	\$ -	\$ 187.7	\$ (187.7)	\$ (187.7)
	Cryogenics	Klebaner, Arkadiy	2.50	2.50	-	\$ 600.0	\$ -	\$ 600.0	\$ 600.0	\$ -	\$ 600.0	\$ -	\$ -
	HTS-2 (MDB)	Ozeliz, Joe	1.00	2.21	(1.21)	\$ 130.0	\$ -	\$ 130.0	\$ 341.0	\$ 61.3	\$ 402.3	\$ (211.0)	\$ (272.3)
	HWR	Mitchell, Don	0.10	0.60	(0.50)	\$ -	\$ 1,200.0	\$ 1,200.0	\$ 1,400.0	\$ -	\$ 1,400.0	\$ (200.0)	\$ (200.0)
	Instrumentation	Scarpine, Vic	1.50	2.85	(1.35)	\$ 50.0	\$ -	\$ 50.0	\$ 217.0	\$ -	\$ 217.0	\$ (167.0)	\$ (167.0)
	LEBT	Prost, Lionel	1.00	1.00	-	\$ -	\$ -	\$ -	\$ -	\$ 21.7	\$ 21.7	\$ -	\$ (21.7)
	Linac Project Management	Derwent, Paul	0.40	0.85	(0.45)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	LLRF	Chase, Brian	2.25	3.25	(1.00)	\$ 10.0	\$ -	\$ 10.0	\$ 23.7	\$ -	\$ 23.7	\$ (13.7)	\$ (13.7)
	MEBT	Shemyakin, Alexander	6.75	10.30	(3.55)	\$ 200.0	\$ -	\$ 200.0	\$ 251.5	\$ 5.0	\$ 256.5	\$ (51.5)	\$ (56.5)
	Mechanical Support Systems	Baffes, Curtis	0.20	0.20	-	\$ -	\$ -	\$ -	\$ 6.0	\$ -	\$ 6.0	\$ (6.0)	\$ (6.0)
	Power	Pasquinelli, Ralph	1.15	2.50	(1.35)	\$ 115.0	\$ -	\$ 115.0	\$ 589.5	\$ 10.0	\$ 599.5	\$ (474.5)	\$ (484.5)
	Power Supplies	Hanna, Bruce	0.10	2.10	(2.00)	\$ -	\$ -	\$ -	\$ 232.5	\$ -	\$ 232.5	\$ (232.5)	\$ (232.5)
	RFQ	Steimel, Jim	1.00	0.60	0.40	\$ -	\$ -	\$ -	\$ -	\$ 5.0	\$ 5.0	\$ -	\$ (5.0)
	Vacuum	Chen, Alex	0.10	0.70	(0.60)	\$ -	\$ -	\$ -	\$ 210.0	\$ 34.8	\$ 244.8	\$ (210.0)	\$ (244.8)
<b>Linac Total</b>			<b>45.85</b>	<b>64.94</b>	<b>(19.09)</b>	<b>\$ 1,845.0</b>	<b>\$ 1,200.0</b>	<b>\$ 3,045.0</b>	<b>\$ 5,390.3</b>	<b>\$ 137.7</b>	<b>\$ 5,528.0</b>	<b>\$ (2,345.3)</b>	<b>\$ (2,483.0)</b>
Convntl. Fac.	Conventional Facilities	Dixon, Steve	1.00	0.95	0.05	\$ 300.0	\$ -	\$ 300.0	\$ 300.2	\$ -	\$ 300.2	\$ (0.1)	\$ (0.1)
<b>Convntl. Fac. Total</b>			<b>1.00</b>	<b>0.95</b>	<b>0.05</b>	<b>\$ 300.0</b>	<b>\$ -</b>	<b>\$ 300.0</b>	<b>\$ 300.2</b>	<b>\$ -</b>	<b>\$ 300.2</b>	<b>\$ (0.1)</b>	<b>\$ (0.1)</b>
<b>Grand Total</b>			<b>53.45</b>	<b>72.64</b>	<b>(19.19)</b>	<b>\$ 2,444.0</b>	<b>\$ 1,200.0</b>	<b>\$ 3,644.0</b>	<b>\$ 6,266.5</b>	<b>\$ 137.7</b>	<b>\$ 6,404.3</b>	<b>\$ (2,622.5)</b>	<b>\$ (2,760.3)</b>
<b>Increase/(Decrease) Needed to Attain Target</b>					<b>(19.19)</b>							<b>\$ (2,760.3)</b>	

2016 Budget retreat



## Summary of Total Request

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- FY2017 M&S Guidance (Direct) \$3.6M
- FY2017 M&S Request (Direct) \$6.4M
- FY2017 FTE Guidance 53.4
- FY2017 FTE Request 72.6
  
- In fully loaded dollars:
  - FY2017 Guidance \$18.2M
  - FY2017 Request \$26.7M
  - Over-subscription: \$8.5M**

2016 Budget retreat

# Carryover

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- We are assuming \$0.75M of carryover into FY17
  - Requires regulating FTE to 58 (average over the year) = 60 FTE year balance
- If we have additional underruns as we approach the end of FY16 we will engage in forward funding
  - Easiest things to forward fund are items like HWR/ANL and T&M contracts
  - We do not currently project major underruns beyond the SWF associated with above FTE

2016 Budget retreat

# Strategy for Further Adjustments

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- We do not have sufficient resources to meet our schedule goals
- Develop an internally consistent plan that bring things together synchronously, with appropriate balance between R&D, IIFC, and CD-1 activities
- Strategy
  - Support FY17 M&O costs off-project
  - Complete MEBT installation/commissioning in FY17
    - Delay chopper testing to FY18
    - Delay HEBT design to FY18
    - Limit PXIE operations to 6 months in FY17
  - Delay cryo operations in PXIE to Q3FY18
    - Keep HWR pCM and PXIE cryo distribution proceeding in parallel: Q2FY18 delivery
      - Note: MUST install cryo distribution before HWR
  - Delay beam through HWR/SSR1 to FY19/20
    - Attempt to keep SSR1 pCM delivery in Q2-4FY19
    - Do we need beam through SSR1 at this point?
  - Keep STC modifications and HB650 dressed cavities proceeding in parallel: early/mid FY18
    - Delay HTS-2 prep into FY18
  - Delay HB650 pCM to FY20
  - Complete successful CD-1 DOE Review in FY17
  - Delay CD-2 to FY19

2016 Budget retreat

# After the retreat: closer but not quite there

## FTE and M&S Direct Cost Adjustments Made at PIP-II Budget Retreat on 4/26/2016

Major Work Area	Work Effort	Orig FTE	Adj. FTE	FTE Change	Orig SWF	Adj SWF	SWF Change	Orig M&S Direct Cost	New M&S Direct Cost	M&S Change	% Change in M&S	
Proj. Mgmt.	Proj. Mgmt.	1.45	1.45	-	\$ 355,282	\$ 355,282	\$ -	\$ 55,000	\$ 40,000	\$ (15,000)	0.00%	
	Bus. Ofc.	2.05	2.05	-	\$ 348,612	\$ 348,612	\$ -	\$ -	\$ -	\$ -	0.00%	
	ES&H	0.40	0.20	(0.20)	\$ 85,076	\$ 44,946	\$ (40,130)	\$ 300,000	\$ -	\$ (300,000)	-47.17%	
	Intl. Collab.	1.80	1.80	-	\$ 336,531	\$ 336,531	\$ -	\$ 221,100	\$ 127,100	\$ (94,000)	0.00%	
	Sys. Engrng. & Intgrtn	1.05	1.05	-	\$ 198,272	\$ 198,272	\$ -	\$ -	\$ -	\$ -	0.00%	
<b>Proj. Mgmt. Total</b>		<b>6.75</b>	<b>6.55</b>	<b>(0.20)</b>	<b>\$ 1,323,772</b>	<b>\$ 1,283,642</b>	<b>\$ (40,130)</b>	<b>\$ 576,100</b>	<b>\$ 167,100</b>	<b>\$ (409,000)</b>	<b>-3.03%</b>	
Linac	LEBT	1.00	0.25	(0.75)	\$ 133,409	\$ 34,781	\$ (98,628)	\$ 21,680	\$ -	\$ (21,680)	-73.93%	
	RFQ	0.60	0.55	(0.05)	\$ 112,028	\$ 102,579	\$ (9,449)	\$ 5,000	\$ -	\$ (5,000)	-8.43%	
	MEBT	10.30	7.40	(2.90)	\$ 1,437,544	\$ 1,059,883	\$ (377,661)	\$ 256,480	\$ 231,480	\$ (25,000)	-26.27%	
	HWR	0.60	0.15	(0.45)	\$ 89,734	\$ 25,984	\$ (63,749)	\$ 1,400,000	\$ 1,200,000	\$ (200,000)	-71.04%	
	325 MHz	15.30	11.00	(4.30)	\$ 1,796,555	\$ 1,291,860	\$ (504,695)	\$ 580,000	\$ 430,000	\$ (150,000)	-28.09%	
	650 MHz	7.40	5.90	(1.50)	\$ 1,006,530	\$ 803,123	\$ (203,407)	\$ 100,000	\$ 100,000	\$ -	-20.21%	
	CMTF	3.30	3.20	(0.10)	\$ 435,304	\$ 418,715	\$ (16,588)	\$ 630,000	\$ 487,000	\$ (143,000)	-3.81%	
	Power	2.50	2.20	(0.30)	\$ 400,837	\$ 344,914	\$ (55,923)	\$ 599,500	\$ 199,500	\$ (400,000)	-13.95%	
	HTS-2 (MDB)	2.21	0.97	(1.24)	\$ 269,358	\$ 148,161	\$ (121,198)	\$ 402,250	\$ 141,000	\$ (261,250)	-44.99%	
	Control	2.95	2.95	-	\$ 424,823	\$ 424,823	\$ -	\$ 187,700	\$ 135,100	\$ (52,600)	0.00%	
	Cryogenics	2.50	2.50	-	\$ 258,358	\$ 258,358	\$ -	\$ 600,000	\$ 600,000	\$ -	0.00%	
	Accel. Physics	4.80	4.80	-	\$ 737,854	\$ 737,854	\$ -	\$ 14,000	\$ 14,000	\$ -	0.00%	
	Installation	1.53	1.53	-	\$ 223,486	\$ 223,486	\$ -	\$ 7,418	\$ 7,418	\$ -	0.00%	
	Instrumentation	2.85	2.85	-	\$ 373,851	\$ 373,851	\$ -	\$ 217,001	\$ 217,001	\$ -	0.00%	
	Linac Proj. Mgmt.	0.85	0.65	(0.20)	\$ 134,764	\$ 110,267	\$ (24,497)	\$ -	\$ -	\$ -	\$ -	-18.18%
	LLRF	3.25	3.10	(0.15)	\$ 396,596	\$ 375,934	\$ (20,662)	\$ 23,680	\$ 23,680	\$ -	\$ -	-5.21%
Mech. Suprt. Sys.	0.20	0.20	-	\$ 33,177	\$ 33,177	\$ -	\$ 6,000	\$ 6,000	\$ -	\$ -	0.00%	
Power Supplies	2.10	0.60	(1.50)	\$ 242,647	\$ 108,770	\$ (133,877)	\$ 232,520	\$ -	\$ (232,520)	\$ -	-55.17%	
Vacuum	0.70	0.70	-	\$ 110,648	\$ 110,648	\$ -	\$ 244,800	\$ 210,000	\$ (34,800)	\$ (34,800)	0.00%	
<b>Linac Total</b>		<b>64.94</b>	<b>51.51</b>	<b>(13.43)</b>	<b>\$ 8,617,502</b>	<b>\$ 6,987,167</b>	<b>\$ (1,630,335)</b>	<b>\$ 5,528,029</b>	<b>\$ 4,002,179</b>	<b>\$ (1,525,850)</b>	<b>-18.92%</b>	
Conv. Fac.	Convntl. Fac.	0.95	0.95	-	\$ 179,374	\$ 179,374	\$ -	\$ 300,150	\$ 200,150	\$ (100,000)	0.00%	
<b>Conv. Fac. Total</b>		<b>0.95</b>	<b>0.95</b>	<b>-</b>	<b>\$ 179,374</b>	<b>\$ 179,374</b>	<b>\$ -</b>	<b>\$ 300,150</b>	<b>\$ 200,150</b>	<b>\$ (100,000)</b>	<b>0.00%</b>	
<b>Grand Total</b>		<b>72.64</b>	<b>59.01</b>	<b>(13.63)</b>	<b>\$ 10,120,648</b>	<b>\$ 8,450,183</b>	<b>\$ (1,670,465)</b>	<b>\$ 6,404,279</b>	<b>\$ 4,369,429</b>	<b>\$ (2,034,850)</b>	<b>-16.51%</b>	
	Target		53.45		\$ 139,326	\$ 143,209	\$ 3,883	\$ -	\$ 3,644,000	\$ -		
	(Over)/Under Target		(5.56)						\$ (725,429)			

# Strategy for Further Adjustments/Revised Milestones

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- Priorities/Target Dates 2016 Budget retreat
  - PXIE warm: beam out of MEBT-1 Q3FY16
  - SSR1: Resonance control testing definite results Q2FY17
  - PXIE warm: beam to end of MEBT QFY17
  - PXIE cold: HWR CM and associated infrastructure (cryo, rf, power, etc.) Q3FY18
  - SSR1 CM and associated infrastructure (rf, power, etc) Q2FY19
  - HB 650 dressed cavities and associated infrastructure (HTS-2, rf) Q4FY18
  - HB650 CM to CMTS Q2FY20
  - CD-1 activities: CDR, Site Characterization, civil construction drawings Q3FY17
  - Note: India is not a stand-alone priority; it is integrated into the work above

# Strategy for Further Adjustments

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- Priorities/Target Dates 2015 Budget retreat
  - PXIE warm: beam out of MEBT-1 Q4FY16
  - SSR1: Resonance control testing definite results Q4FY16
  - PXIE warm: beam to end of MEBT-2 Q4FY17
  - PXIE warm: beam to end of final MEBT (confirm delta) Q2FY18
  - PXIE cold: HWR CM and associated infrastructure (cryo, rf, power, etc.) Q3FY18
  - SSR1 CM and associated infrastructure (rf, power, etc) Q3FY18
  - HB 650 dressed cavities and associated infrastructure (HTS-2, rf) Q4FY18
  - HB650 CM to CMTS Q1FY20
  - CD-1 activities: CDR, Site Characterization, civil construction drawings Q3FY17
  - Note: India is not a stand-alone priority; it is integrated into the work above

# Summary

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- Three competing priorities:
  - PXIE: MEBT & Chopper & Beam operation
  - SRF: HWR, SSR1, HB650
  - Critical Decisions and Project Progress
- Nota Bene: not supporting any work in Booster/RR/MI in this budget
  - \$550k coming from RR RF AIP to support RR/MI RF work (June)
- Balancing progress in all 3 has been management goal
  - maybe change in the balance going forward
  - discussion underway as to how to meet goal of 1.2 MW at start of LBNF operations