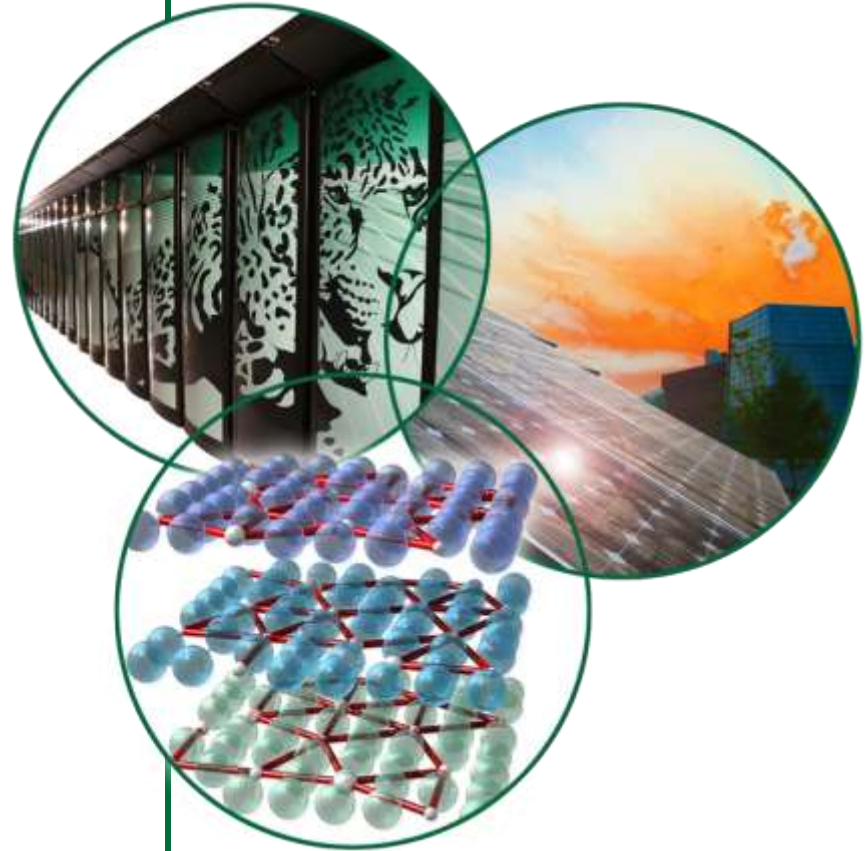


Status of the SNS Power Upgrade Project

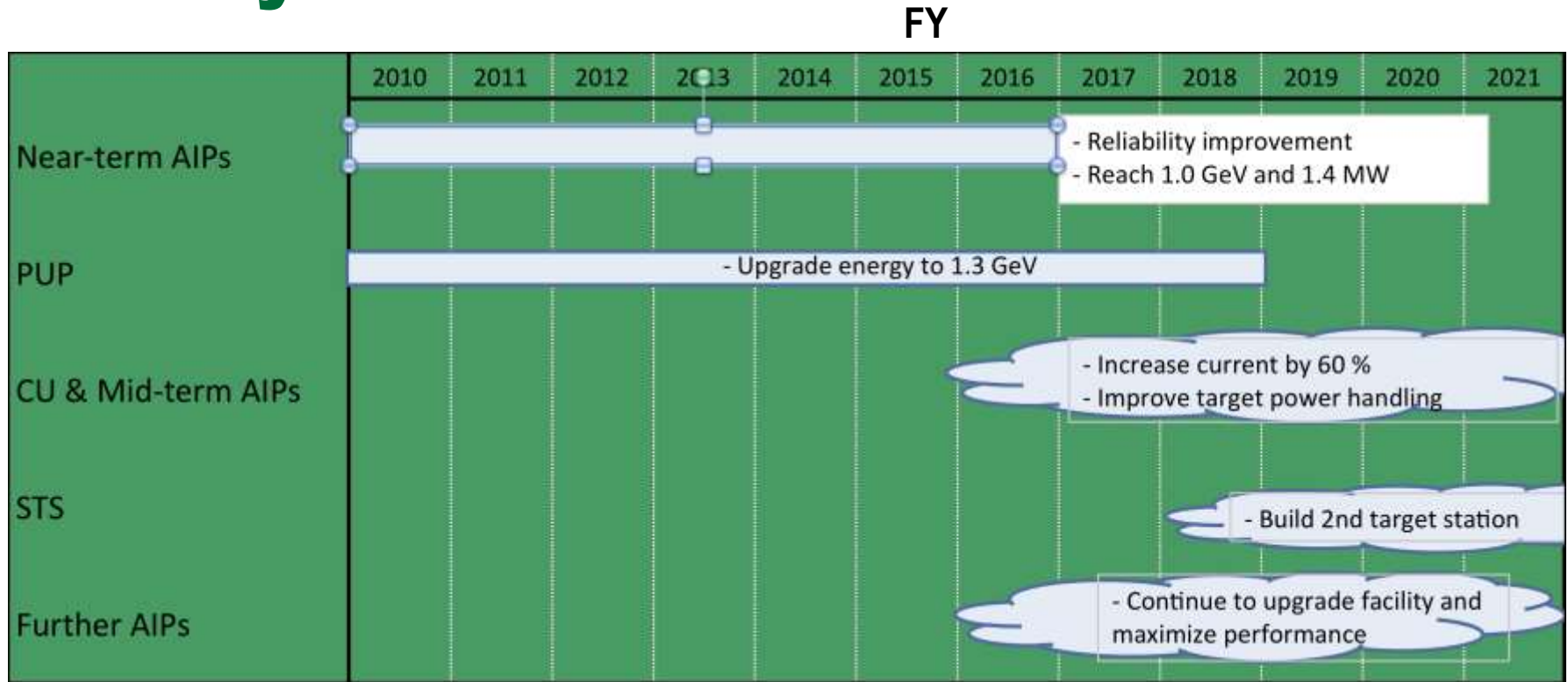
J.Galambos

Accelerator Advisory Committee

Jan. 10-12, 2012

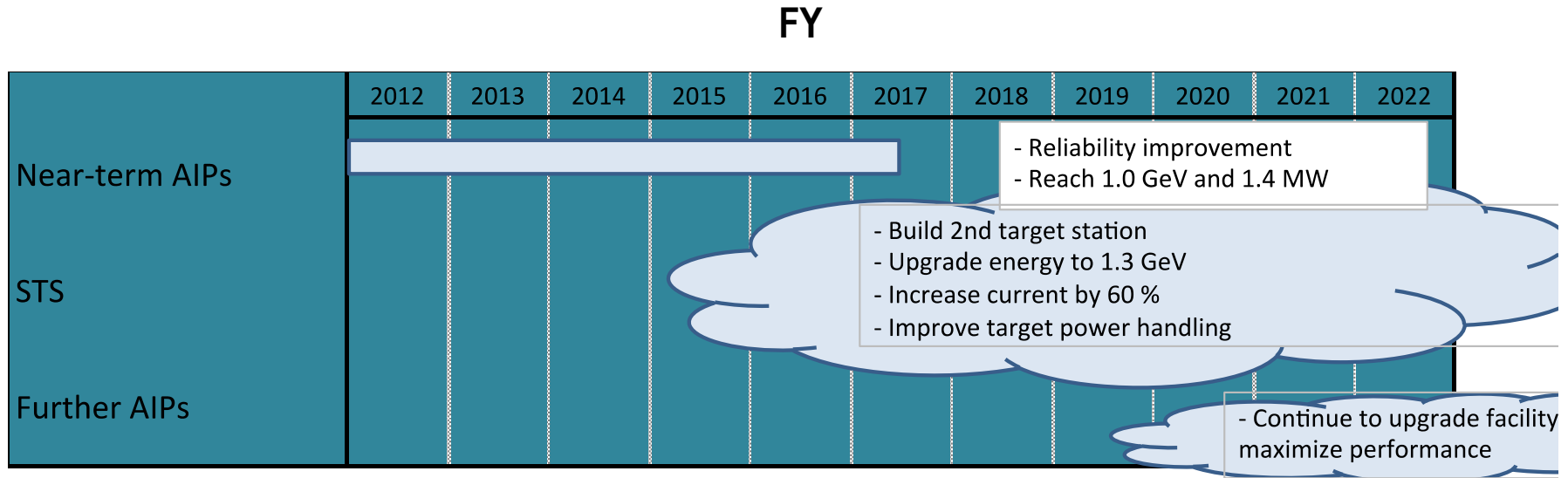


PUP and the SNS Upgrade Path Plan January 2011



- Power Upgrade Project (PUP) was only an energy upgrade:
- Summer 2011 project was canceled
 - Words were that energy and current upgrades would be combined with second target station project

PUP and the SNS Upgrade Path, January 2012



STS = Second Target Station

- **STS does have CD-0**
 - “Revival date is unknown
 - **Power upgrades bundled into the STS**

PUP Activity Highlights

- **Chases are full – plan to correct cable pulls**
 - Complication we did not fully appreciate 2 years ago
 - Significant impact on schedule
- **SCL Cryomodule Fabrication plan**
 - Primary option was to not reuse old cavities
 - Cryomodule construction based on spare cryomodule experience
- **Ring Design**
 - Ring injection area requires some redesign (M Plum's talk)



PUP CD-2 Preparation

- **Reviews**
 - 5 system reviews + 4 component reviews
 - Preliminary Design Review (Don Rej et. al.) Jan. 2011
 - DOE SC (K. Fisher et. al.), Dec. 2010
- **Integrated cost-schedule prepared**
- **Never had a CD-2 review**
- **July the project cancelation announced**
- **Closeout report submitted in Sept.**

Cost Increase from CD-1 to CD-2

WBS	Major Drivers in Change	CD-1 (circa 2006) (\$k)	CD-2 (2011) (\$k)	Δ@L2 (\$k)
3.01 PM	8 years vs. 5 years	5,170	6,807	1,637
3.02 SCL	Exchange rate, 36 vs. 24 cavities, cryomodule cost increases	22,256	36,391	14,135
3.03 Ring	Deleted HEBT RF, added water cooling, lower design and installation estimates	10,415	8,063	-2,352
3.04 RF	Additional HVCM, vendor quotes, water cooling, vendor increases	29,979	41,116	11,141
3.05 ACS	More realistic estimate	4,782	6,555	1,773
3.06 Facilities	Different scope, added pump building, HVAC for KG	1,485	2,639	1,154
Total PUP		74,088	101,571	27,488

?

- CD-2 cost based largely on vendor quotes

Long Term Power Upgrade Strategy

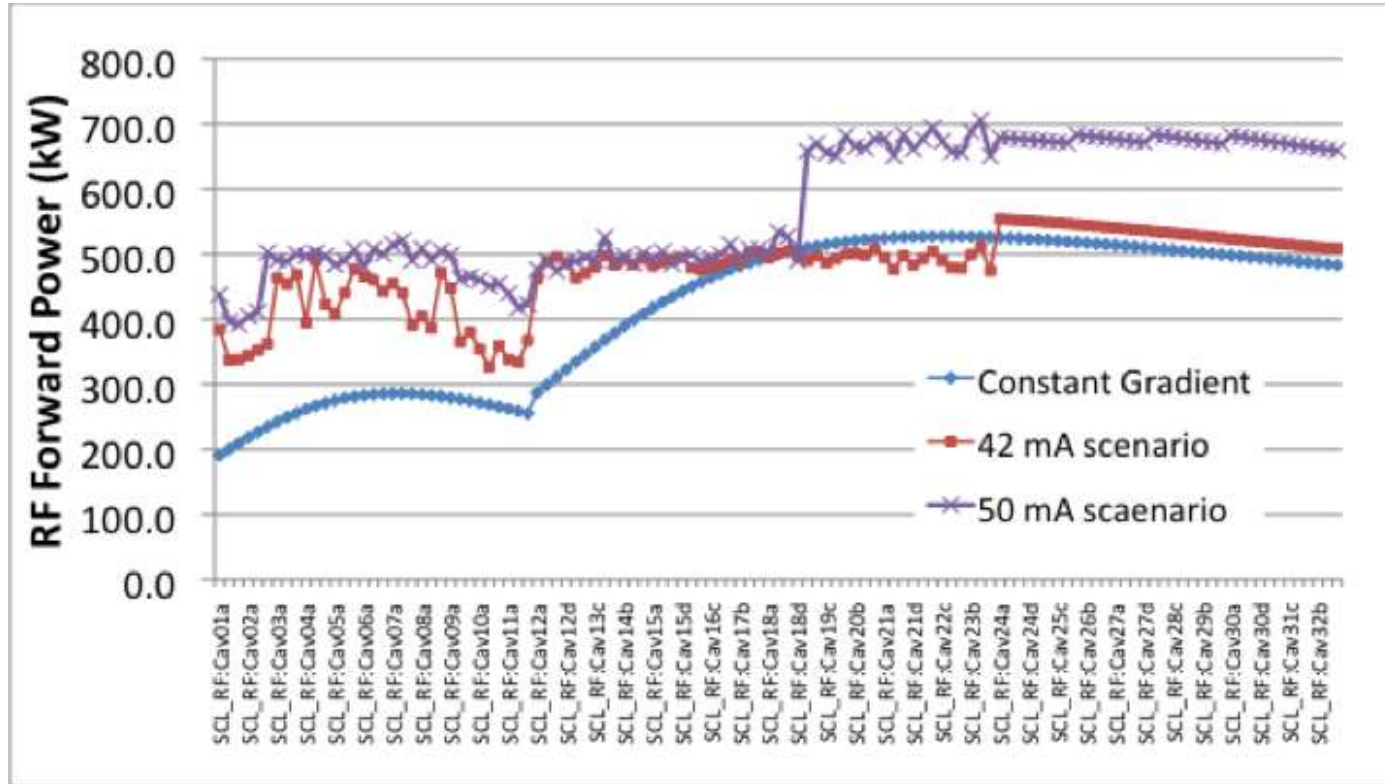
- **Long term power upgrade scenario to produce a 3 MW beam**
 - Estimate the ultimate beam loading supportable by the warm linac
 - Evaluate implications on the SCL
 - Power Upgrade Path for SNS (STS02-21-TR0001 - R00), Dec. 3, 2010
- **Simplified version for PUP**
 - PUP Superconducting RF Requirements (PUP0-300-TR0001 - R02), March 2011

Long Term Upgrade Scenarios for SNS

	$\langle I \rangle$ (mA)	I_{peak} (mA)	E (MeV)	Rep Rate (Hz)	Target Power (MW)	Total Power on Targets
1) Baseline	26	38	1000	60	1.44	1.44
2) PUP- Energy Upgrade only	26	38	1300	60	1.87	1.87
3) PUP-42 mA (Current + Energy upgrades)	42	59	1300	60	3.00	3.00
4) STS - Whitepaper						
1st Target	29	42	1300	40	1.40	2.40
2nd Target (no chopping)	42	42	1300	20	1.00	
5) STS - 50 mA						
1st Target	42	59	1300	40	2.00	3.22
2nd Target	50	59	1300	20	1.22	

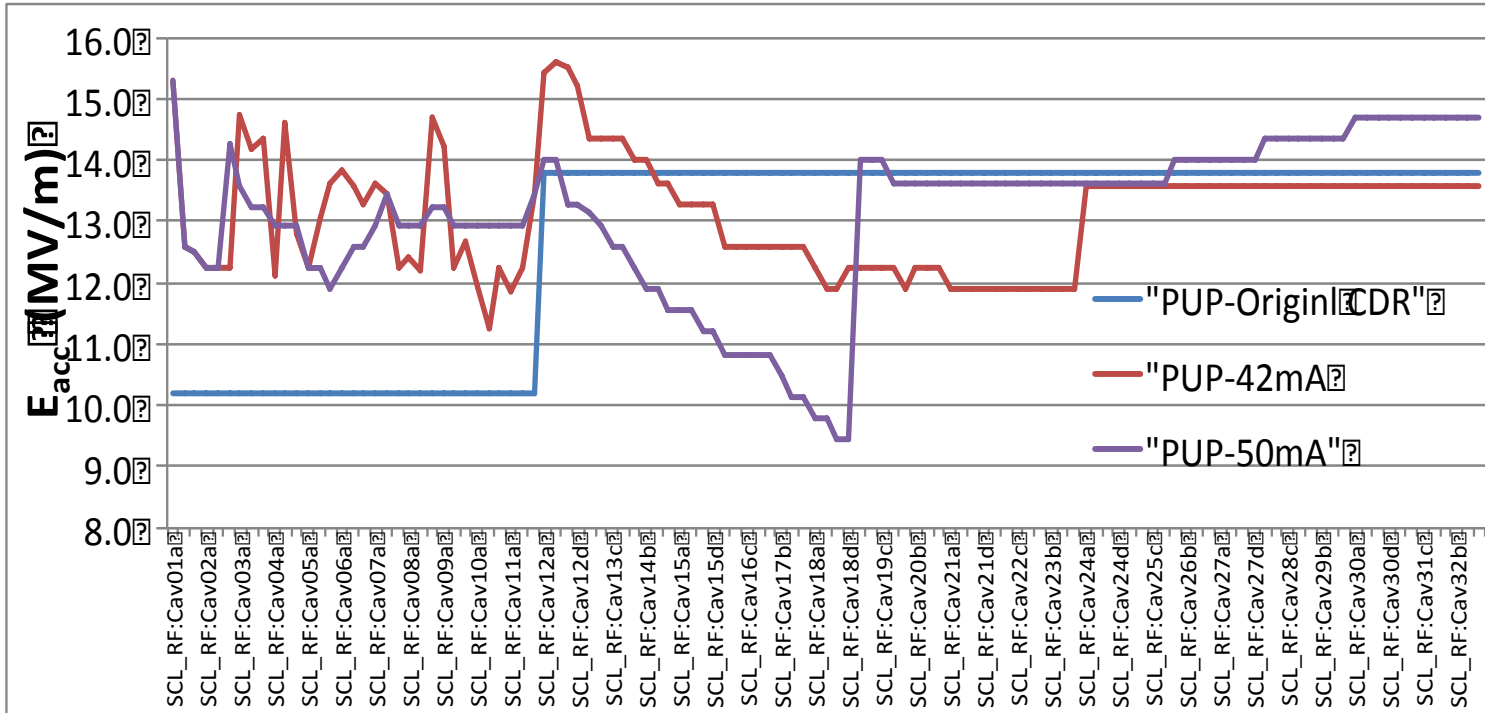
- **Aggressive cases – to identify the ultimate performance capability**

Long Term Strategy for Power Increase



- With current upgrades – RF power (beam loading) becomes a serious issue
 - Ensure all new cryomodules have couplers that can handle the ultimate power upgrade

Long Term Power Upgrade Strategy



- To accommodate the “constant power” profile
 - Gradient profile requires increasing some poor performing existing cavities
 - Also some high performance cavity gradients are reduced

Summary

- **Short term plan is to reach 1.4 MW in ~ 5 years**
- **Longer term strategy to approach a 3 MW beam capable of powering 2 neutron source targets is identified**