
SLAC PPA Budget Discussion: FY09 Allocations Among BNR Codes

S. Kahn, D. MacFarlane, R. Blandford, T.
Raubenheimer, C. Chang

Particle Physics and Astrophysics Directorate

Purpose of This Meeting

- * In February, we presented our budget plans for FY09 and beyond, guided by the future scientific program that we laid out for the PPA part of the laboratory.
- * There were a number of differences between the BNR code allocations that had come with your budget guidance in FY09, and the allocations that we were recommending based on the plan that we presented. To our knowledge, these differences are still unresolved.
- * In this meeting, we would like to discuss those differences on a case by case basis with the relevant program officers, so that we can present our rationale.
- * There are also several lingering issues regarding our mapping to the new organizational structure at OHEP that still require clarification in our view.

Additional Comments

- * We recognize that the President's Budget for FY09 is unlikely to be realized, given the inevitability of another Continuing Resolution.
- * Clearly then, the budget allocations will undergo significant further evolution.
- * Nevertheless, we believe it is important for us to get on the same page with you as to how we see SLAC distributing the HEP funding that does become available. This is crucial for our current planning, and for some near-term decisions we are making regarding the deployment of specific personnel.
- * For lack of an alternative, the existing President's Budget for FY09 is probably adequate for working these specific issues. The SLAC FY09 President's Budget total from OHEP is \$91.5M.

Outline of Presentation

- * Explicit discussion of each of the BNR code differences, including our rationale for the changes we are proposing.
 - * Discussion of residual uncertainties on our end of where particular research efforts should appear in the budget.
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- * Meetings with individual program officers for further clarification how we should proceed.

Proton Accelerator-Based Research: Budget Breakout

Br_Code	Budget and Reporting (BnR Titles)	FY08 Lab Budget			FY09 Scen. (A) - Pres. Bgt			Programs
		M&S	SWF	total w Ind-Lab Req	M&S	SWF	total w Ind-Lab Req	
KA110102	Proton Accelerator-based experimental program							
	ATLAS Research	203	784	3,249	176	2,351	3,524	ATLAS
	ATLAS - Ops				345	1,494	2,550	ATLAS
	ATLAS - Upgrade R&D				100	276	497	ATLAS
	ATLAS - EQ				337	123	530	ATLAS
	ATLAS - Computing							ATLAS
	PPA Program Support	37	128	221	79	239	422	ATLAS
KA1102051	LHC Computing - ATLAS EQ	380		400	400		400	
	LHC Computing - ATLAS OPE		141	200		148	210	
KA1102052	LHC M&O		34	48		35	50	
KA1102053	LARP	203	784	1,360	468	850	1,700	LARP
	Proton Accelerator-Based Subtotal KA11	823	1,870	5,478	1,904	5,516	9,884	

Proton-based particle physics: FY09

- * Major growth in ATLAS and ATLAS upgrade efforts.
 - Continuing planned growth of effort in ATLAS operations and physics research.
 - Working to define major role in upgrades to pixel (phase I and phase II) and/or silicon tracking systems: mechanical, cooling, power, data pathway, and potentially pixel sensor development.
 - Desire for development of a remote monitoring center for LHC and ATLAS.
 - Building-up required infrastructure, e.g., clean test areas, and personnel in key engineering areas.

Electron Accelerator-Based Research & B-Factory Operations (includes Research, NLCTA, PEP II MMS, and BaBar D&D)

➤ FY09 President's Budget, **\$22.4M OPE & \$3.4 EQU**

➤ Lab Plan **\$16.1M**

➤ OPE: 12.1M EQU: 4.0M

➤ B-Factory FTEs	41
▪ Permanent PhD	18
▪ Temporary PhD	1
▪ Professional/Engineer	14
▪ Tech/Administrative	5
▪ Graduate Students	0
▪ Other (specify)	1

Electron Accelerator-Based Research: Budget Breakout

Br_Code	Budget and Reporting (BnR Titles)	FY08 Lab Budget			FY09 Scen. (A) - Pres. Bgt			Programs
		M&S	SWF	total w Ind-Lab Req	M&S	SWF	total w Ind-Lab Req	
KA12	Electron Accelerator-based experimental program							
KA120102	Research							
	BaBar	66	2,570	3,743	77	2,604	3,799	BaBar Physics
	LCD	4	1,247	1,772	7	1,031	1,472	LCD
	General Support	266	1,181	2,023	261	1,256	2,125	General/Legacy
	PPA Program Support	93	319	551	94	285	504	BaBar Physics
KA120103	University Service Accounts	103		103	180		180	
	Subtotal KA1201	532	5,317	8,193	619	5,176	8,080	
	B-factory/Linac Complx Ops							
KA1202011	Accelerator Ops	-	94	133				B Factory
	Accelerator Ops-PEP II MMS & DnD	-	1,400	1,988	518	1,402	2,536	B Factory
	Accelerator Ops-NLCTA	82	449	724	439	673	1,419	NLCTA
	PPA Program Support	37	126	163	40	121	214	B Factory
	Accelerator Ops-Power	10,407		10,407	539		539	B Factory
KA1202012	Detector Ops	1,519	5,369	9,299	1,223	1,256	3,109	BaBar
	Detector DnD				700	2,207	3,871	BaBar
	PPA Program Support	98	335	579	66	202	357	BaBar
	Detector Ops-Power	155		155				BaBar
KA1202021	Accelerator support EQU	380	-	400			100	
	AIP	889	592	2,000	313	120	500	AIP
KA1202022	Computing EQU	1,603	50	1,750	2,199	75	2,300	BaBar
KA1202023	GPP	1,163	200	1,500	712	176	1,000	GPP
	Other Complex support EQU	569	-	600				Equ
	Other Complex support	2,750	950	4,200	114		120	Equ
KA1202031	PEP-II Accelerator R&D	3	1,149	1,635				PEP II R&D
	Subtotal KA1202 B Factory Operations	25,860	10,713	35,534	6,863	6,232	16,065	
	Electron Accelerator-Based Subtotal KA12	26,392	16,030	43,727	7,482	11,408	24,145	

Electron-based particle physics: FY09

- * BABAR intense analysis period.
 - Maintain FY08 levels of computing hardware, continue upgrade mass storage systems, and retain support from core computing professionals.
 - Gradual decline of electron accelerator-based research effort with migration to ATLAS and ATLAS upgrade efforts.
- * BABAR detector D&D planning and start of phase I execution.
 - Develop mature plan, including budgets, safety, inventory, disposal, and salvage options.
 - Assemble and catalog tooling for individual systems.
 - Remove and dispose electronics hut; transfer utilities where needed; remove shield walls, support tube, components in forward and rear end doors.
- * Continuing development of SiD concept
 - Letter of Intent for spring 2009, ongoing R&D efforts for electronics, software, and overall design

Non-Accelerator Based Research (includes EXO, GLAST, LSST, KIPAC)

➤ FY09 President's Budget, **\$14.7M OPE**

➤ Lab Plan **\$15.7M OPE**

➤ Non Accelerator FTEs	69
▪ Permanent PhD	24
▪ Temporary PhD	9
▪ Professional/Engineer	16
▪ Tech/Administrative	8
▪ Graduate Students	6
▪ Other (Contract Labor for SNAP)	5

Non-Accelerator Based Research: Budget Breakout

Br_Code	Budget and Reporting (BnR Titles)	FY08 Lab Budget			FY09 Scen. (A) - Pres. Bgt			Programs
		M&S	SWF	total w Ind-Lab Req	M&S	SWF	total w Ind-Lab Req	
KA13	Non accelerator-based Physics Research							
KA1301020	EXO	61	595	909	82	678	1,050	EXO
	General Support	10	350	508	10	783	1,123	KIPAC
	GLAST Research	182	3,739	5,546	177	3,980	5,883	GLAST
	GLAST Ops	713	2,209	3,905	713	1,630	3,454	GLAST
	KIPAC Admin	43	439	676	60	649	992	KIPAC
	LSST	-	435	617	4	381	545	LSST
	SNAP	177	674	1,152	22	284	434	SNAP
	GLAST Computing EQU							
	PPA Program Support	160	548	946	165	503	888	KIPAC
KA1301030	EQU SNAP				155	842	1,358	SNAP
	Add'l SNAP							
	NonAccel Based Subtotal KA13	1,345	8,989	14,259	1,388	9,729	15,727	

Non-Accelerator Research

- * Primary Activities Include:
 - GLAST Operations Support and Analysis
 - LSST Design Studies and Science Preparation
 - SNAP Design Studies and Science Preparation;
 - SNAP EQU funding is assumed
 - Data analysis from existing facilities, which is of relevance to particle astrophysics and cosmology

- * Budgetary difference is reflecting movements of labor and M&S into SNAP.

Theoretical Research (includes KIPAC theory, KIPAC Computing, EPP Theory)

➤ FY09 President's Budget, **\$8.8M OPE**

➤ Lab Plan **\$9.7M OPE** **EQU: 0.45M**

➤ Theory FTEs	43
▪ Permanent PhD	13
▪ Temporary PhD	13
▪ Professional/Engineer	4
▪ Tech/Administrative	3
▪ Graduate Students	11
▪ Other (Specify)	

Theoretical Research: Budget Breakout

Br_Code	Budget and Reporting (BnR Titles)	FY08 Lab Budget			FY09 Scen. (A) - Pres. Bgt			Programs
		M&S	SWF	total w Ind-Lab Req	M&S	SWF	total w Ind-Lab Req	
KA14	Theoretical Physics							
KA1401020	KIPAC Physics	529	2,371	4,035	492	2,484	4,090	KIPAC Phy & Comp EPP Theory
	Theoretical Physics Research	269	2,365	3,904	249	3,344	5,051	
	General Support							
	KIPAC Computing EQU	71		75	427		450	
KA1401030	Advanced Computing (SciDac)							
KA1401040	Theory Other (incl. education/outreach)	6	34	54	6	25	44	
	PPA Program Support	94	321	554	112	340	601	Theoretical Res
	Theory Subtotal KA14	968	5,091	8,622	1,286	6,193	10,236	

Theoretical Research

- * Primary Activities Include
 - Elementary Particle Theory
 - Particle Astrophysics and Cosmology Theory & Computational Physics

- * Budget difference is slight reflecting the return of one faculty member from sabbatical leave, and the recent hiring one new elementary particle theorist assistant professor (Jay Wacker).

- * This budget line will decline in future years due to impending faculty retirements.

Accelerator Science

(includes AARD, High Gradient, rf Power Research, Beam Theory, etc.)

➤ FY09 President's Budget, **\$5.1M**

➤ Lab Plan, **\$8.6M OPE**

➤ Accelerator Science FTEs	38
▪ Permanent PhD	17
▪ Temporary PhD	3
▪ Professional/Engineer	8
▪ Tech/Administrative	7
▪ Graduate Students	2
▪ Other (Specify)	2

Accelerator Science: Budget Breakout

Br_Code	Budget and Reporting (BnR Titles)	FY08 Lab Budget			FY09 Scen. (A) - Pres. Bgt			Programs
		M&S	SWF	total w Ind-Lab Req	M&S	SWF	total w Ind-Lab Req	
KA15	Advanced Technology R&D							
KA1501020	Accelerator Science							
	Program Management	279	421	949	128	581	962	Accel Sci
	Accel Physics	290	922	1,615	217	989	1,638	Accel Sci
	Adv Computation	22	608	887	119	543	900	Accel Sci
	High Gradient	320	1,521	2,497	336	1,530	2,533	Accel Sci
	Laser Acceleration	133	962	1,506	203	923	1,528	Accel Sci
	Plasma Wakefield Accel	41	354	546	74	335	554	Accel Sci
	PPA Program Support	90	310	535	94	286	506	Accel Sci
KA1501020 -EQU	Accel Sci	218		230				Accel Sci
	Accel Sci Subtotal KA1501	1,394	5,098	8,765	1,171	5,188	8,621	

Accelerator Science

- * Long-term accelerator science research
 - Laser acceleration
 - Plasma-wakefield acceleration
 - US high gradient collaboration
 - RF source research
 - Accelerator physics and computing

Accelerator Development (includes R&D aimed at demonstration of new technology and concepts)

➤ FY09 President's Budget, **\$6.2M**

➤ Lab Plan, **\$2.9M OPE**

➤ General Accelerator R&D FTEs 12

- Permanent PhD 5
- Temporary PhD 1
- Professional/Engineer 4
- Tech/Administrative 2
- Graduate Students 1

Accelerator Development: Budget Breakout

Br_Code	Budget and Reporting (BnR Titles)	FY08 Lab Budget			FY09 Scen. (A) - Pres. Bgt			Programs
		M&S	SWF	total w Ind-Lab Req	M&S	SWF	total w Ind-Lab Req	
KA1502011	Accelerator Development							
	Program Management	343	797	1,556	156	259	437	Accel Dev
	Accel Research	2	191	274	2	199	285	Accel Dev
	Accelerator Design	90	1,183	1,774	140	284	709	Accel Dev
	Feedback & Instrumentation	47	817	1,210	47	852	1,258	Accel Dev
	LBand\XBand RF	205	2,101	3,199	115	532	898	Accel Dev
	Test Facility Development	100	1,031	1,569				Accel Dev
	PPA Program Support	169	578	1,000	31	93	164	Accel Dev
	Add'l Accel Development							
	Accel Dev Subtotal KA1502	955	6,698	10,581	375	1,687	2,853	

Accelerator Development

- * Mid-term accelerator development
 - L-band rf development (2008 only)
 - X-band rf source development
 - CLIC rf development
 - Accelerator design (CLIC, LHC, Project-X)
 - Beam feedback and instrumentation development

Detector Development (includes work on EXO, LSST, SiD)

➤ FY09 President's Budget, **\$4.5M**

➤ Lab Plan, **\$8.7M OPE**

➤ Detector R&D FTEs	30
▪ Permanent PhD	2
▪ Temporary PhD	0
▪ Professional/Engineer	19
▪ Tech/Administrative	2
▪ Graduate Students	1
▪ Other (Incl. FixTerm Contr)	7

Detector Development: Budget Breakout

Br_Code	Budget and Reporting (BnR Titles)	FY08 Lab Budget			FY09 Scen. (A) - Pres. Bgt			Programs
		M&S	SWF	total w Ind-Lab Req	M&S	SWF	total w Ind-Lab Req	
KA1503020	Detector Development							
	Neutrino R&D - EXO	350	870	1,622	368	951	1,762	EXO
	LC Detector R&D	334	729	1,387	189	722	1,225	LCD
	particle-astro R&D - LSST	1,156	1,058	2,720	1,531	2,527	5,225	LSST
	Addtl LSST							
	PPA Program Support	50	172	298	97	294	520	PPADO
	EQU							
	Det R&D KA150302	1,890	2,830	6,028	2,185	4,494	8,733	

Detector Development

- * Primary Activities Include:
 - EXO-200 R&D and design studies for Full EXO.
 - Camera R&D for LSST.
 - SiD design studies.

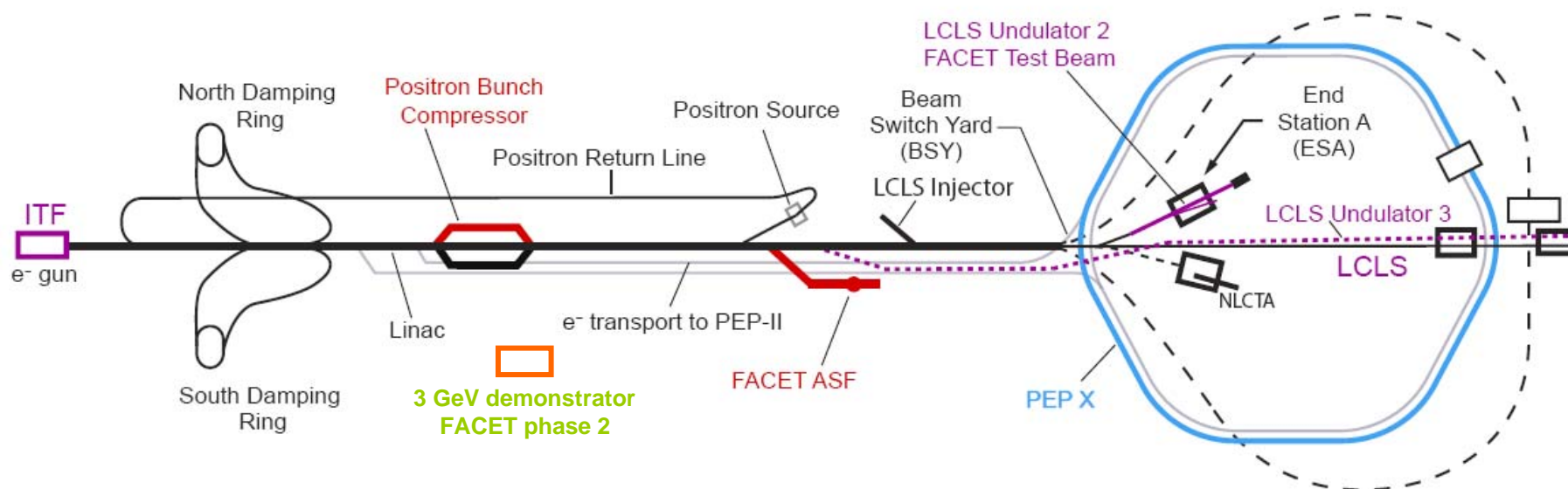
- * All of these pre-project R&D programs are facing critical milestones in FY09.

- * Our proposed funding total in this line is not significantly different from what it has been in previous years.

Unresolved Issues

- * Data analysis in particle astrophysics and cosmology - Does it sit in Theoretical Research or Non-Accelerator Research?
- * Large-scale numerical astrophysics, accelerator computation, and GEANT4 support - Can this fit in Computational HEP?
- * Definition of Detector Development - We have traditionally used this line to fund pre-project R&D funding to new concepts (e.g. LSST, SiD). Do you intend this funding to be more for generic detector issues? If so, how would we fund new concepts in the pre-CD1 phase?
- * Distinction between Accelerator Science and Accelerator Development R&D.
- * Support for accelerator facilities at SLAC (NLCTA, FACET operations, Electron test beam facility) - Does that fit under Research Technology or Facility Operations?
- * Support for community service functions like SPIRES upgrade?

Future evolution of the accelerator complex



- FACET Accelerator Science Facility (ASF): development of plasma wakefield acceleration techniques
- Injector Test Facility (ITF): development facility for state-of-the-art electron gun sources
- LCLS Undulator 2 in ESA: coherent uv x-ray FEL source
- FACET ESA Test Beam Facility: instrumentation and detector development for HEP & BES
- LCLS Undulator 3 in LCLS tunnel: coherent short wavelength x-ray FEL source
- 3 GeV High-Gradient Demonstration Accelerator: based on 100 MV/m warm technology
- FACET Phase 2: 2-stage PWFA Test Facility: next step in development of multi-TeV PWFA technique
- PEPX Light Source: cw high brightness x-ray source

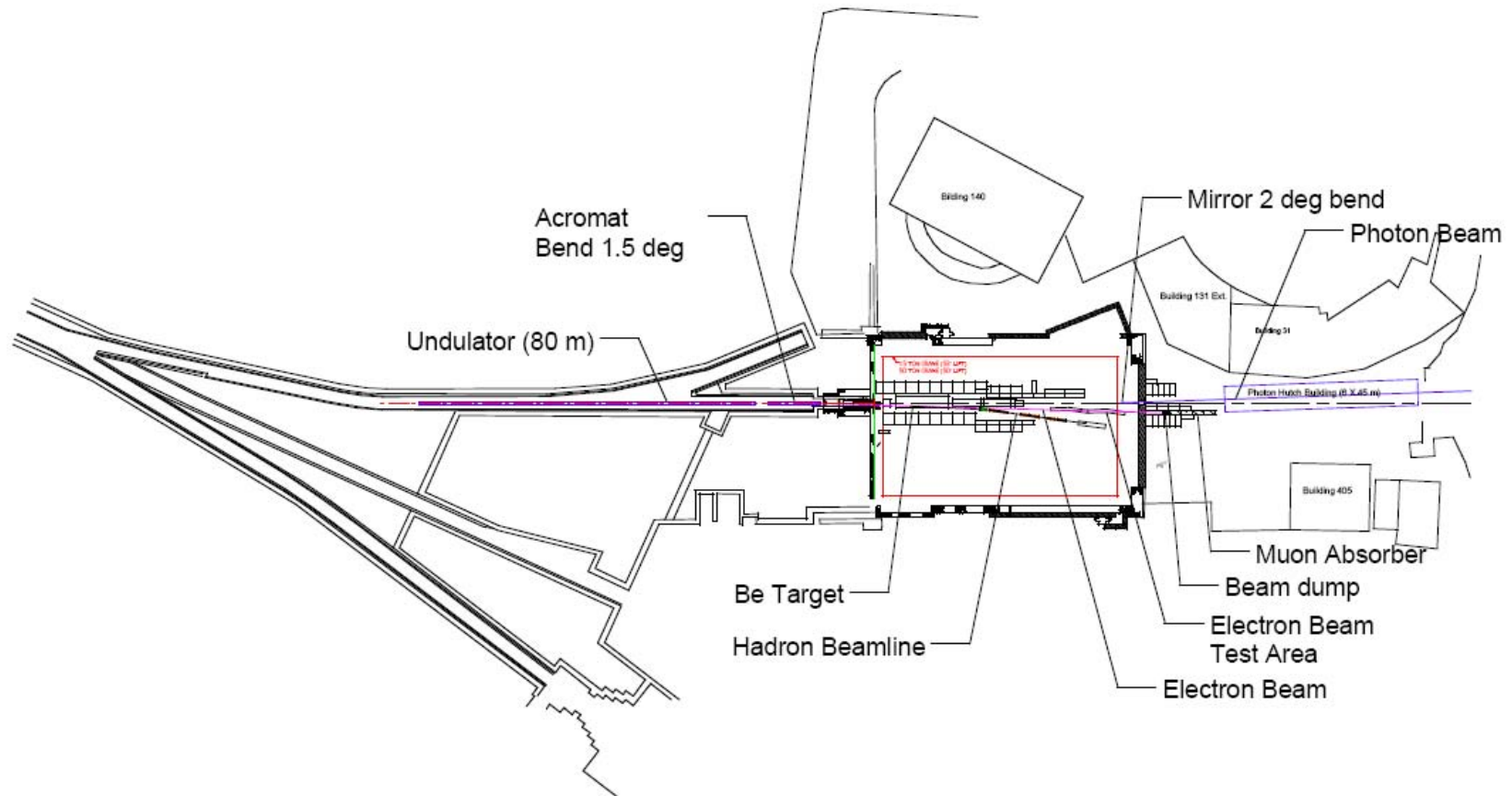
Possible for ESA test beam program

- * Phase 1: prior to LCLS-U2 project, roughly 2010-2012
 - With agreement of BES, build program on the basis of ~1% pulse-shared fraction of LCLS beam
 - Pulse sharing is key to LCLS-U2 project, so early development and operation important
 - Will require redesign and rebuild of ESA PPS system (previous estimates ~\$500k)
- * Phase 2: post LCLS-U2 project, roughly 2014 onwards
 - LCLS-U2 involves rebuilding A-line for low emittance preservation and installation of undulator 2 (U2)
 - Test beams source is spent electron beam emerging from U2
 - Electron and secondary beams would service experimental area still inside ESA to the south of x-ray beams
 - Some additional modest investment to create secondary target and possible rearrangement of PPS systems

Concept for LCLS-U2 with test beams

LCLS 1.5 Layout

v1 2008-03-31



Concept for LCLS-U2 with test beams

