

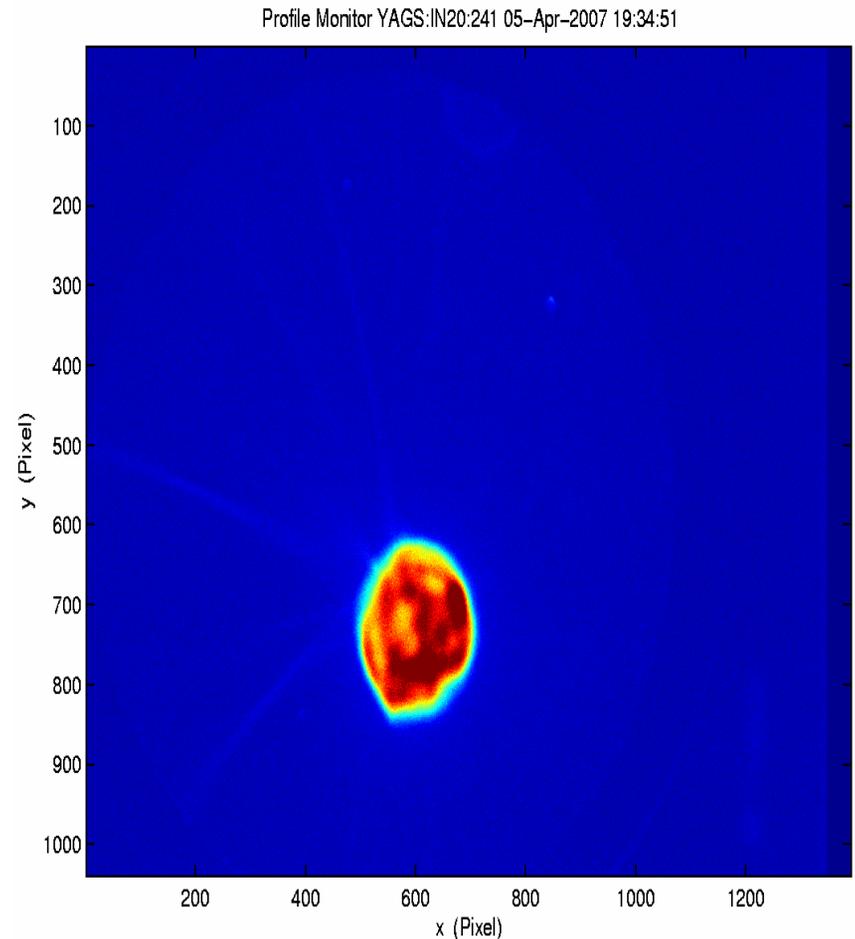
LCLS Status and Plans

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First Beam

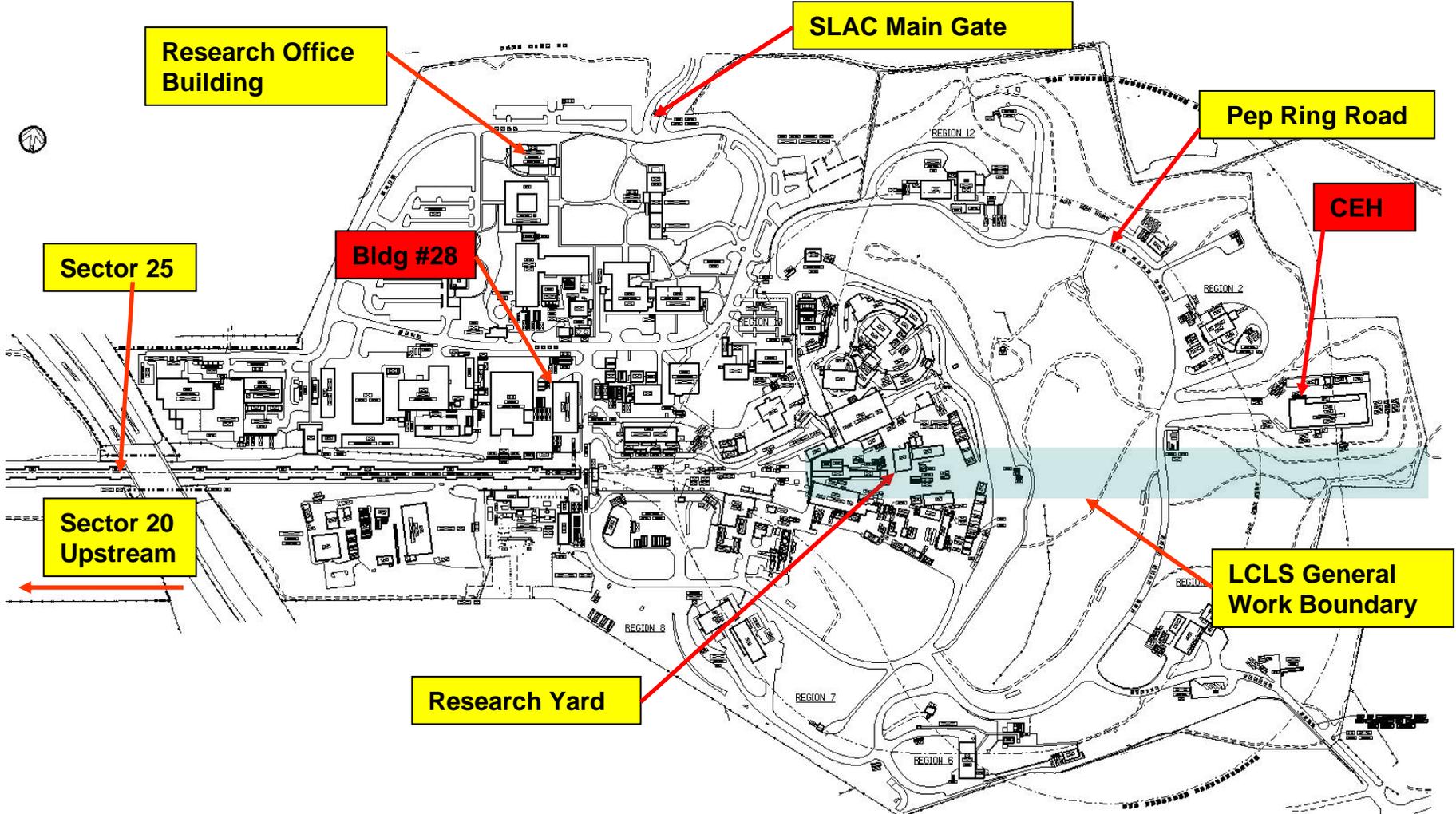
- LCLS commissioned a new injector with beam
- AND commissioned a new Control System



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SLAC Site Plan

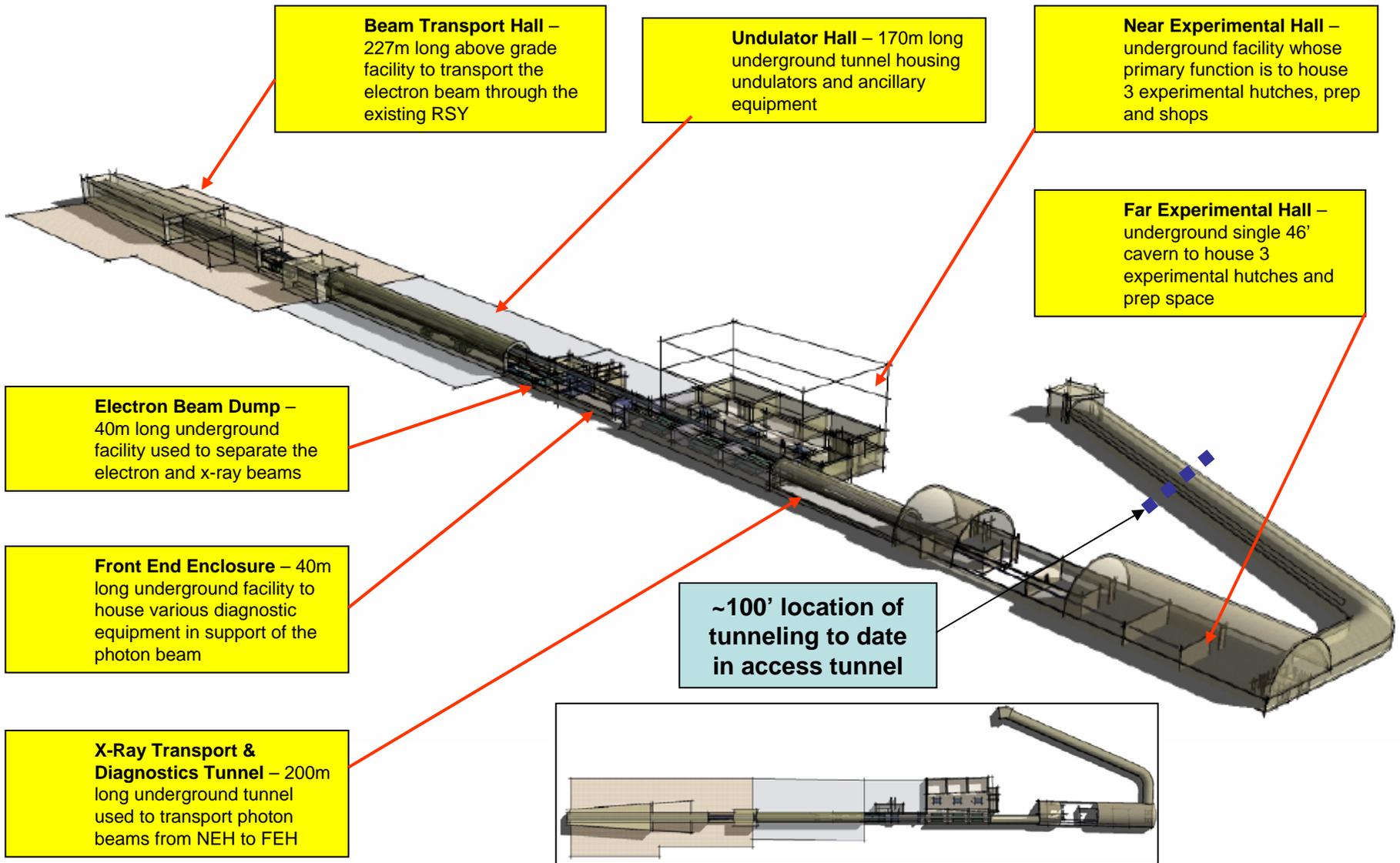


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Scope of Construction

- Systems Description remain unchanged
 - Sector 20 Injector Facility – completed in May 2006
 - Magnetic Measurement Facility – completed in April 2006
 - Linac Improvements – to be completed in 07 shutdown
 - Beam Transport Hall – in process ~ 15% complete
 - Undulator Hall – in process ~ 5% complete
 - Front End Enclosure – in process 5% complete
 - Electron Beam Dump – in process ~ 5% complete
 - Near Experimental Hall – in process ~ 35% complete
 - X-Ray Transport & Diagnostics Tunnel – in process ~ 5% complete
 - Far Experimental Hall – in process ~ 10% complete
 - Lab infrastructure - design is imminent



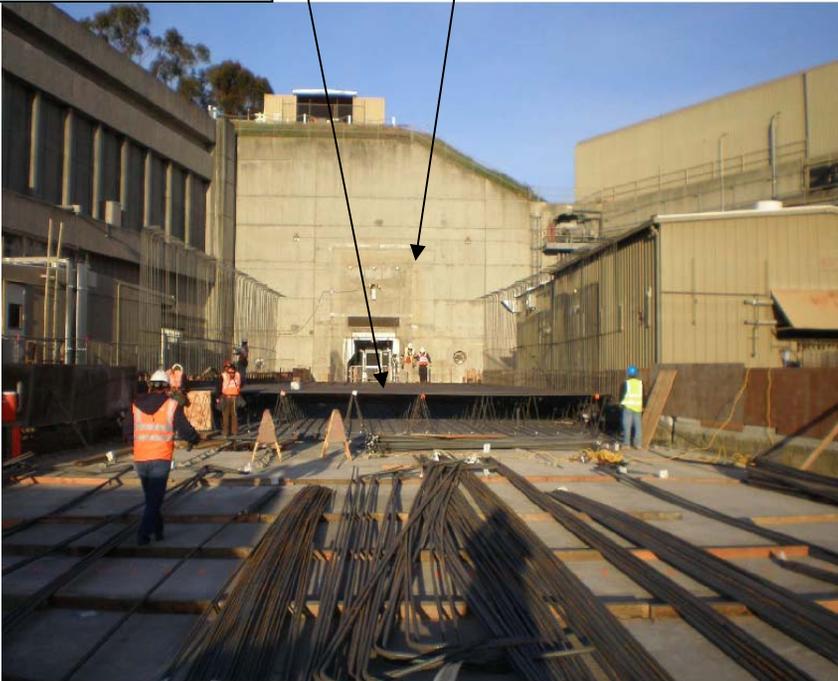
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BTH Head-
house
Rebar at
Slab

Headwall

BTH Head-
house Slab



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Road header
for UH



UH initial
penetration of
portal



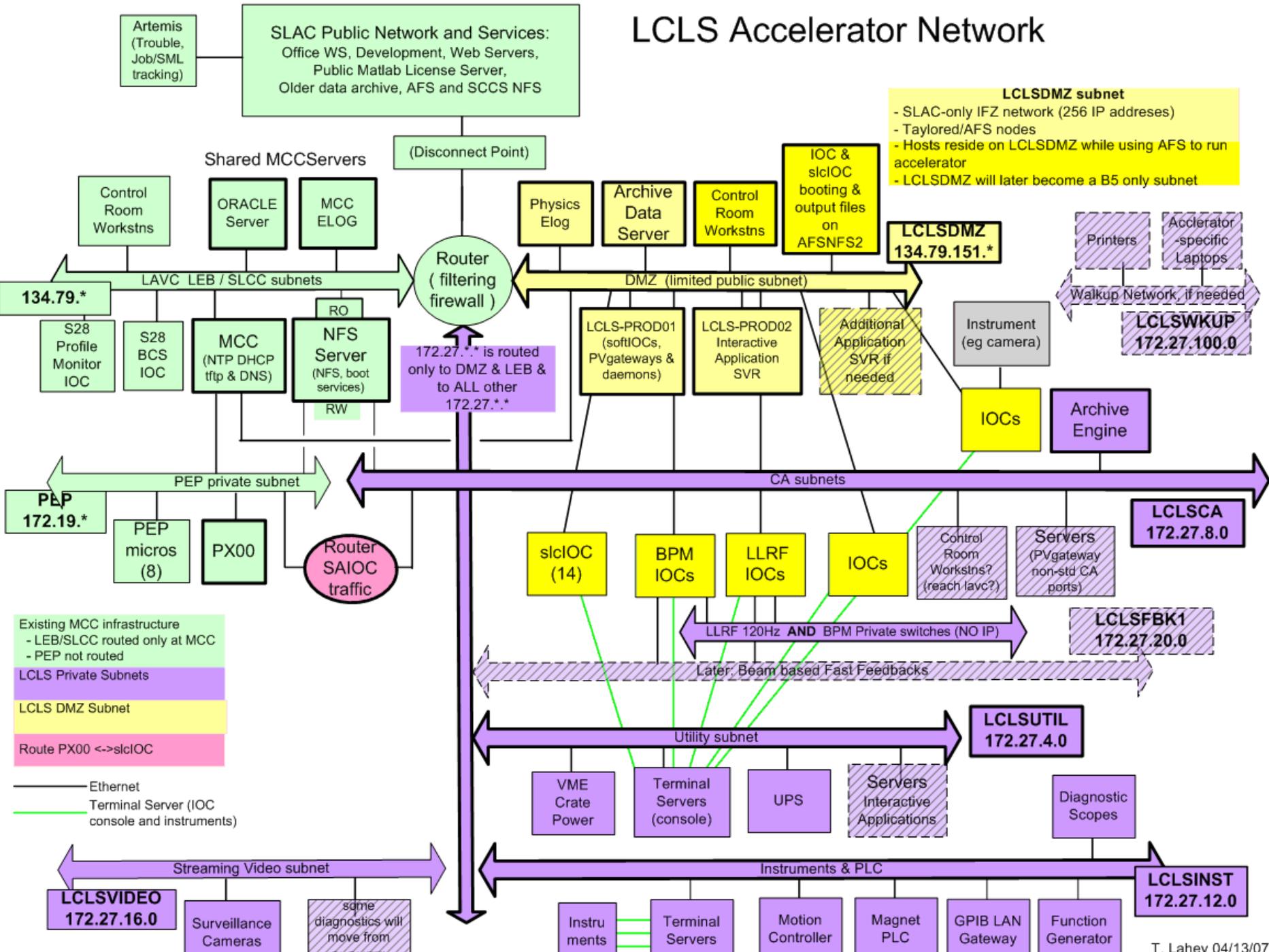
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Accomplishments in the past six months

- Field installation of large amount of cable plant, networking, racks, electronics and software for injector control
- Development of detailed plans for linac and BC2 installation
- Coordination and re-planning of undulator control with ANL
- Development of a conceptual design for X-ray End Stations DAQ and Controls
- AIP projects for MCC networks upgrade, LCLS MPS and Linac BPM
- Starting the design of next generation applications software

LCLS Accelerator Network



MCC, Networks, Servers, & Workstations

- Production Systems Delivered
 - Networks at S20 RF Hut & MCC: physical and wireless
 - LCLSDMZ, LCLS private, wireless
 - MCC infrastructure upgrade: power & racks
 - LINUX Servers for applications and EPICS data archiving
 - Control Room Linux Workstation
 - MCC and S20 Laser Room are actively in use for commissioning

Controls Sub-Systems installed

- ✓ Cable Plant, Racks, etc.
- ✓ Networking
- ✓ MCC infrastructure
- ✓ Magnet power supply
- ✓ Vacuum Controls
- ✓ LLRF
- ✓ Timing
- ✓ Laser control
- ✓ Laser alignment
- ✓ OTR/YAG image acquisition
- ✓ BPM
- ✓ Toroid
- ✓ Wire Scanners

- ✓ Faraday Cup
- ✓ Cerenkov monitor
- ✓ Moveable collimator
- ✓ BC1 beamline control
- ✓ Bunch length monitor
- ✓ LSS
- ✓ PPS
- ✓ MPS
- ✓ BCS
- ✓ Gun Temp stabilization
- ✓ Image management
- ✓ Online Models
- ✓ MATLAB interface

LCLS Controls Home Screen

Schuh
Norum

LCLS Home Screen: Electron Beam Systems

Help... Home Screen... Exit

Subsystems and Areas

All	IN20	LI21	LI22	LI23	LI24	LI25	LI26	LI27	LI28	LI29	LI30	BSY1	LTU1	UND1	DMP1
BPM/Toro/FC/BLen															
Feedback															
Magnet	■	■	■	■	■		■	■							
Profile Monitor															
Wire Scanner															
Collimator/Motion															
Laser															
RF		■	■				■								
Event															
Network															
Watr/Pwr/Gas/Smok															
Vacuum	■	■	■	■	■		■								
Temperature															
MPS															
PPS															
BCS															

Applications

- SCP...
- Bunch Length...
- Image Acquisition...
- Matlab Feedback...
- User Dev Displays...

Tools

- Archive Viewer...
- CMLog...
- Strip Tool...
- Alarm Handler...
- Firefox...
- Matlab...
- IRMIS...

Map

IN20 LI21 LI22 LI23 LI24 LI25 LI26 LI27 LI28 LI29 LI30 BSY1 LTU1 UND1 DMP1

PRODUCTION 04/11/2007 11:18:31

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Magnet Controls

LCLS Subsystems and Areas: mgnt in20

Help... Home Screen... Exit

All IN20 LI21 LI22 LI23 LI24 LI25 LI26 LI27 LI28 LI29 LI30 BSY1 LTU1 JND1 DMP1

Map

Device Lists

All Units...	■
BENDs...	□
LGPSs...	■
QUADs...	□
SOLNs...	□
XCORs...	□
YCORs...	□

Diagnostics

IOC...

SLC Aware...

Time of Boot:
04/05/2007 1:05:42

VME Hardware Status...

PLC Hardware Status...

EPSC Hardware Status...

MCOR Hardware Status...

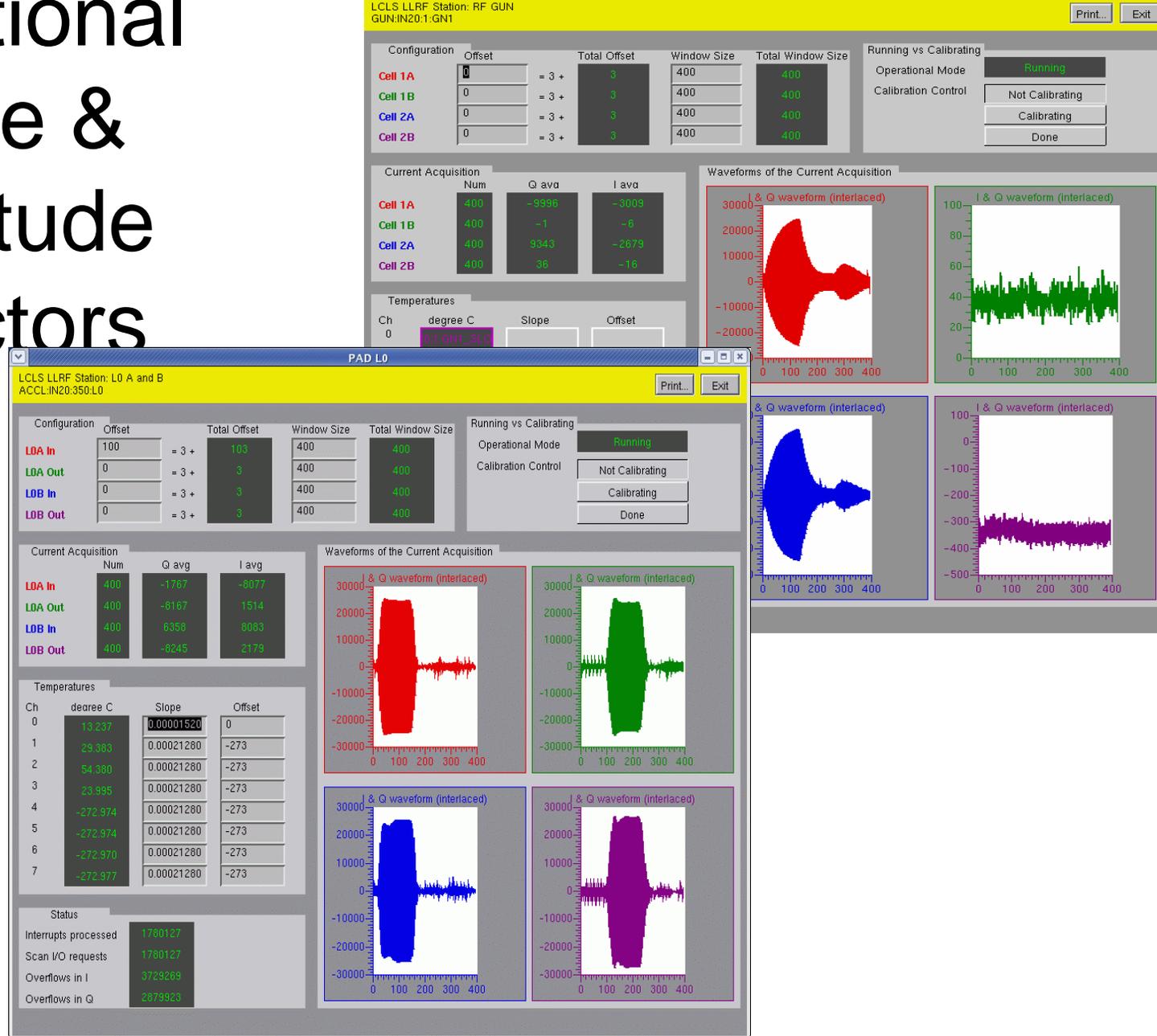
EVR Event Diagnostics...

04/13/2007 16:15:10

PRODUCTION mgnt_in20_rain.edl 04/13/2007 16:15:11

Operational Phase & Amplitude Detectors

- S-Band Ref System
- Laser
- Gun
- L0 (A&B)
- L1-S

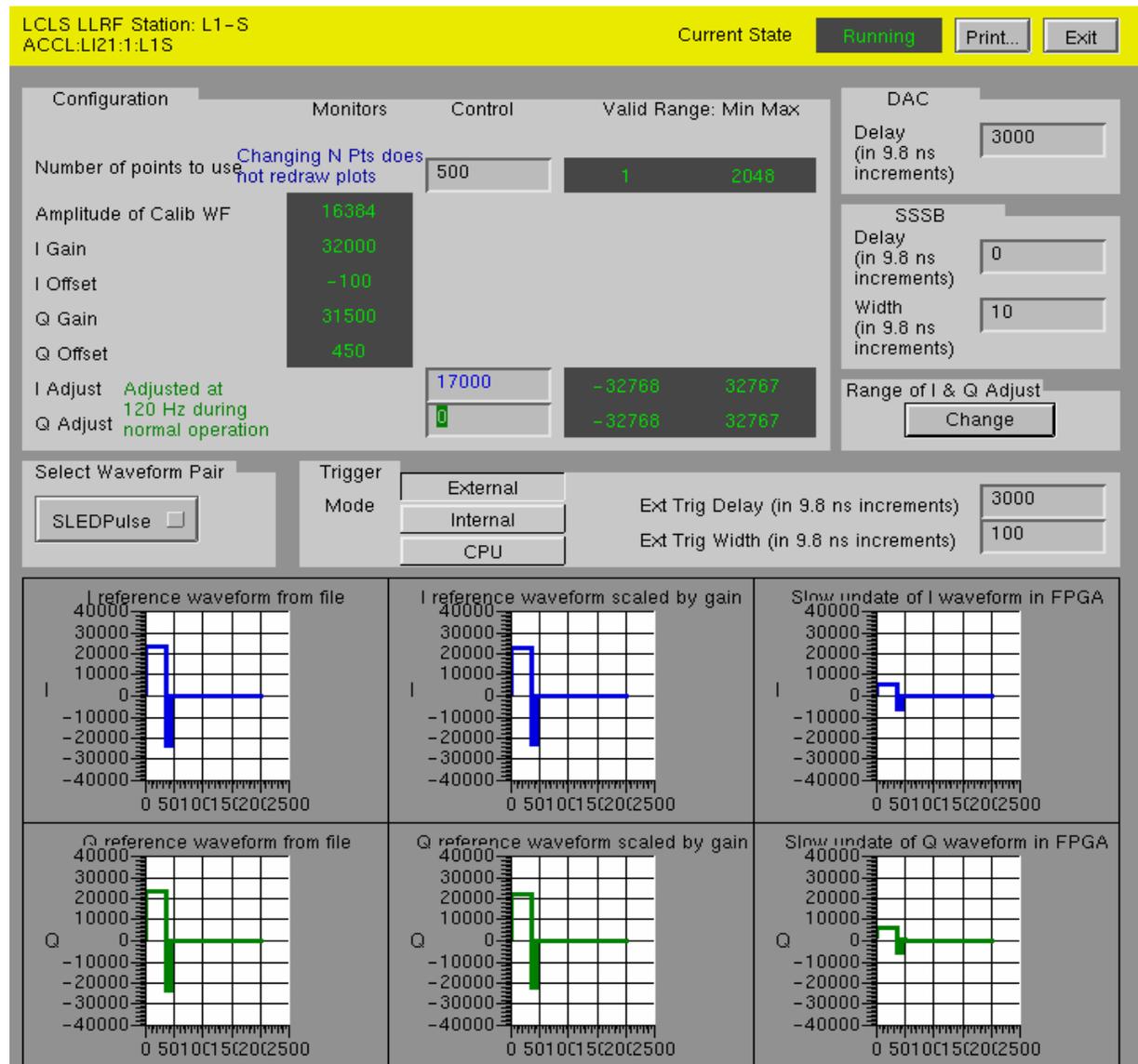


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Operational Phase & Amplitude Controllers

- S-Band Reference System
- Laser
- Gun
- L0-A
- L0-B
- L1-S



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Monitoring IOCs

LCLS Subsystems and Areas: ntwk in20

Help... Home Screen... Exit

All IN20 LI21 LI22 LI23 LI24 LI25 LI26 LI27 LI28 LI29 LI30 BSY1 LTU1 UND1 DMP1

All
BPM/Toro/FC/BLen
Feedback
Magnet
Profile Monitor
Wire Scanner
Collimator/Motion
Laser
RF
Event
Network
Watr/Pwr/Gas/Smok
Vacuum
Temperature
MPS
PPS
BCS

VME IOC Status

VME IOC Name	SLC Micro Name	Time of Last Boot
IOC:IN20:AM01	n/a	<IOC:IN20:AM01:STA
IOC:IN20:BC01	n/a	04/10/2007 11:03:03
IOC:IN20:BP01	IA20	<IOC:IN20:BP01:STA
IOC:IN20:BP02	IB20	<IOC:IN20:BP02:STA
IOC:IN20:EV01	n/a	03/27/2007 15:36:26
IOC:IN20:IM01	ID20	<IOC:IN20:IM01:STAF
IOC:IN20:LS11	IK20	<IOC:IN20:LS11:STAF
IOC:IN20:LS12	IJ20	<IOC:IN20:LS12:STAF
IOC:IN20:LS13	n/a	<IOC:IN20:LS13:STAF
IOC:IN20:LS14	n/a	<IOC:IN20:LS14:STAF
IOC:IN20:LS15	n/a	<IOC:IN20:LS15:STAF
IOC:IN20:MC01	n/a	04/12/2007 18:24:52
IOC:IN20:MG01	IM20	04/05/2007 11:05:42
IOC:IN20:MP01	n/a	04/05/2007 00:14:14
IOC:IN20:PM01	n/a	<IOC:IN20:PM01:STA
IOC:IN20:PM02	n/a	<IOC:IN20:PM02:STA
IOC:IN20:PM03	n/a	<IOC:IN20:PM03:STA
IOC:IN20:PM04	n/a	<IOC:IN20:PM04:STA
IOC:IN20:PM05	n/a	<IOC:IN20:PM05:STA
IOC:IN20:PM06	n/a	<IOC:IN20:PM06:STA
IOC:IN20:PM07	n/a	<IOC:IN20:PM07:STA
IOC:IN20:PP01	n/a	04/10/2007 11:38:23
IOC:IN20:RF01	IR20	<IOC:IN20:RF01:STAF
IOC:IN20:TM01	n/a	03/30/2007 14:28:59

Coldfire IOC Status

EIOC Name	SLC Micro Name	Heartbeat	EIOC Name	SLC Micro Name	Heartbeat
EIOC:IN20:IM01	n/a	<EIOC:IN20:IM01:STA	BPMS:IN20:221	n/a	<BPMS:IN20:221:STA
EIOC:IN20:RC01	n/a	<EIOC:IN20:RC01:STA	BPMS:IN20:235	n/a	<BPMS:IN20:235:STA
EIOC:IN20:RC02	n/a	<EIOC:IN20:RC02:STA	BPMS:IN20:371	n/a	<BPMS:IN20:371:STA
EIOC:IN20:RC03	n/a	<EIOC:IN20:RC03:STA	BPMS:IN20:425	n/a	<BPMS:IN20:425:STA
EIOC:IN20:RC04	n/a	<EIOC:IN20:RC04:STA	BPMS:IN20:511	n/a	<BPMS:IN20:511:STA
EIOC:IN20:RC05	n/a	<EIOC:IN20:RC05:STA	BPMS:IN20:525	n/a	<BPMS:IN20:525:STA
EIOC:IN20:RC06	n/a	<EIOC:IN20:RC06:STA	BPMS:IN20:581	n/a	<BPMS:IN20:581:STA
EIOC:IN20:RC07	n/a	<EIOC:IN20:RC07:STA	BPMS:IN20:631	n/a	<BPMS:IN20:631:STA
EIOC:IN20:RC08	n/a	<EIOC:IN20:RC08:STA	BPMS:IN20:651	n/a	<BPMS:IN20:651:STA
EIOC:IN20:RC11	n/a	<EIOC:IN20:RC11:STA	BPMS:IN20:731	n/a	<BPMS:IN20:731:STA
EIOC:IN20:RD01	n/a	<EIOC:IN20:RD01:STA	BPMS:IN20:771	n/a	<BPMS:IN20:771:STA
EIOC:IN20:RD02	n/a	<EIOC:IN20:RD02:STA	BPMS:IN20:781	n/a	<BPMS:IN20:781:STA
EIOC:IN20:RD03	n/a	<EIOC:IN20:RD03:STA	BPMS:IN20:821	n/a	<BPMS:IN20:821:STA
EIOC:IN20:RD04	n/a	<EIOC:IN20:RD04:STA	BPMS:IN20:925	n/a	<BPMS:IN20:925:STA
EIOC:IN20:RD06	n/a	<EIOC:IN20:RD06:STA	BPMS:IN20:945	n/a	<BPMS:IN20:945:STA
EIOC:IN20:RD11	n/a	11899	BPMS:IN20:981	n/a	<BPMS:IN20:981:STA

Soft IOC Status

Soft IOC Name	SLC Micro Name	Time of Last Boot
IOC:IN20:VA01	n/a	04/05/2007 17:22:57
IOC:IN20:WA01	n/a	04/05/2007 17:27:08

More IOC Info & IOC Reboot...

PRODUCTION ntwk_in20_main.edl 04/13/2007 18:59:25

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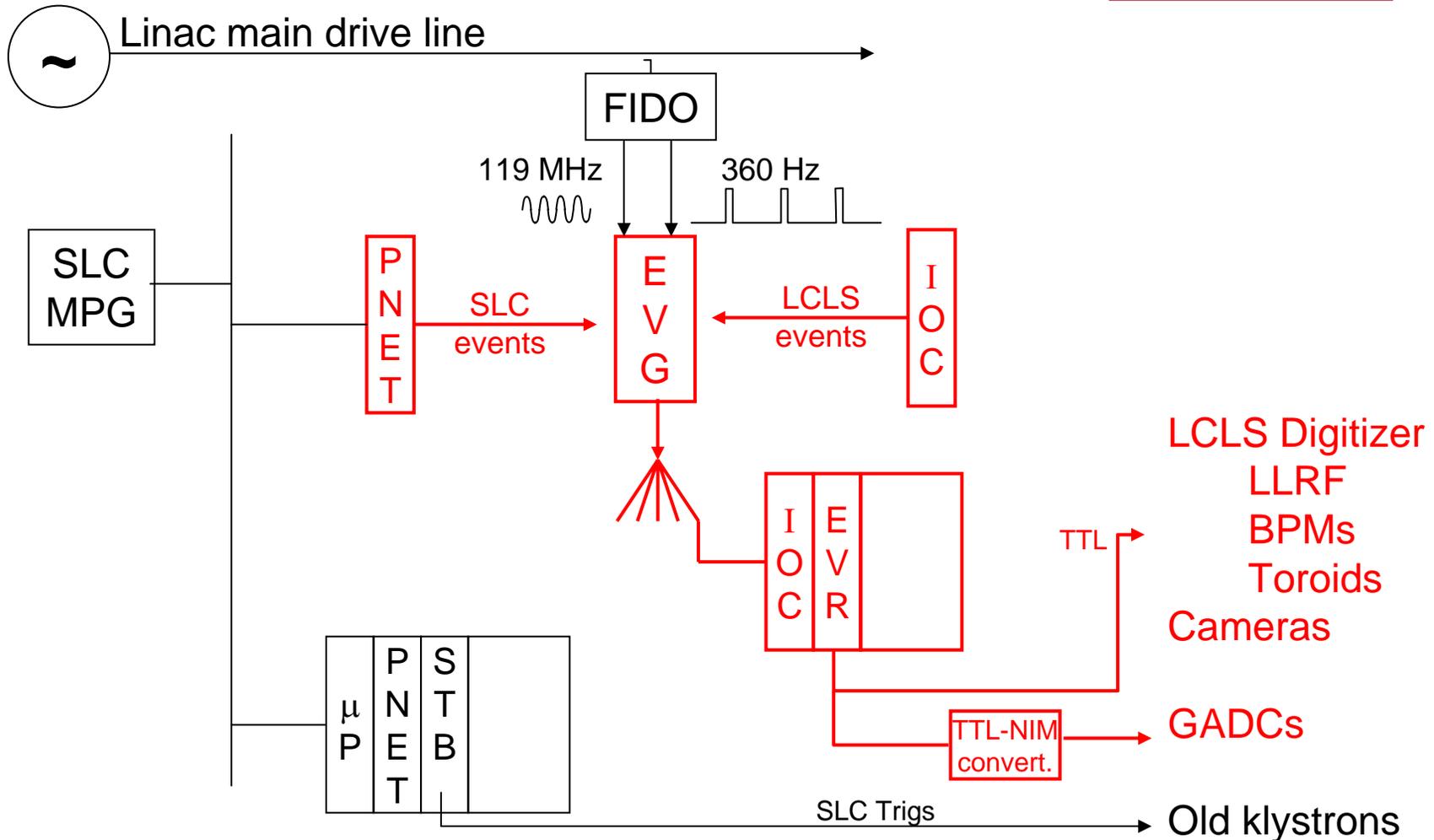
Injection Laser Control System

- The injector laser stabilization system includes two feedback loops
 - The first loop includes two mirrors, each with two actuators and one camera. It stabilizes laser traveling through a 10-meter tube
 - The second loop includes one mirror with two actuators and adjusts the laser position on the cathode.
- The IOC reads the image from camera, calculates the laser's position error and applies a correction to the actuators.
- The loop operates @ 1 Hz, and the camera is synced to 120Hz.

S. Peng

Timing System

Stephanie

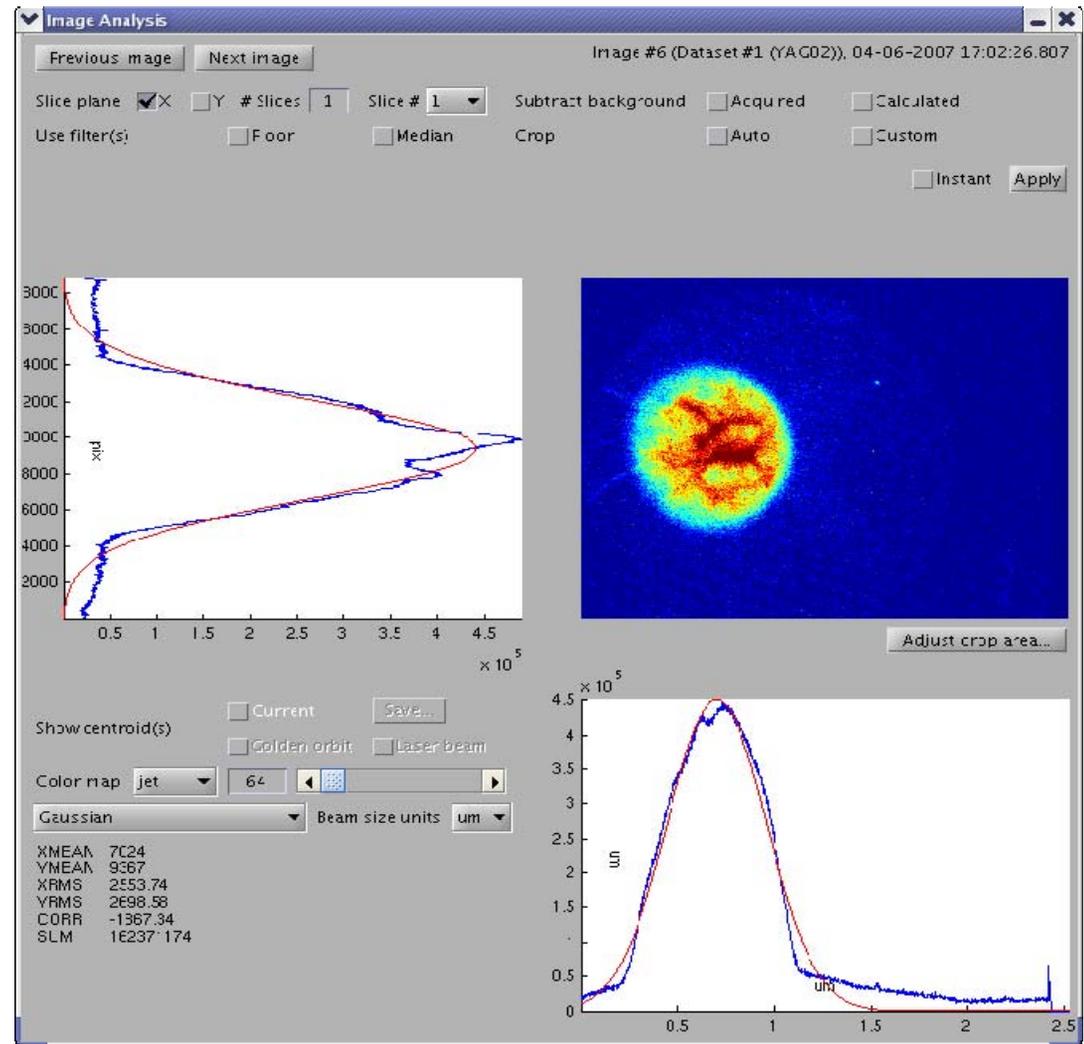
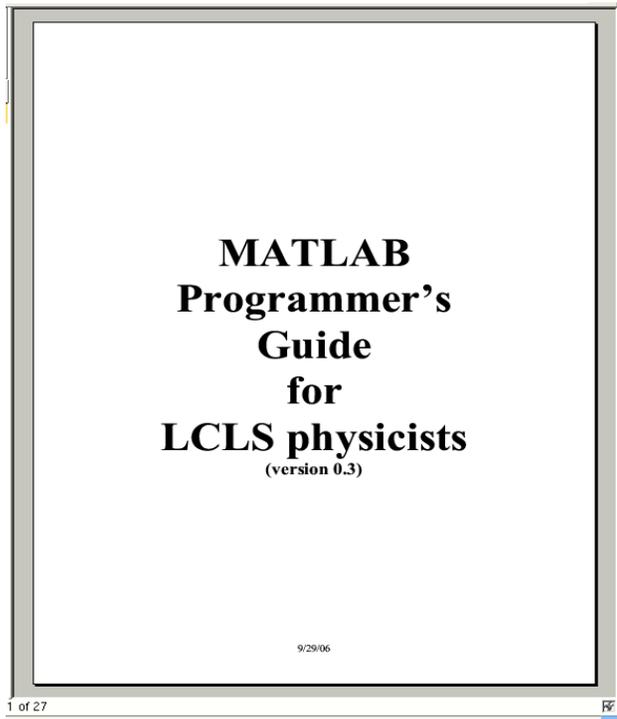


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Applications provided in MATLAB

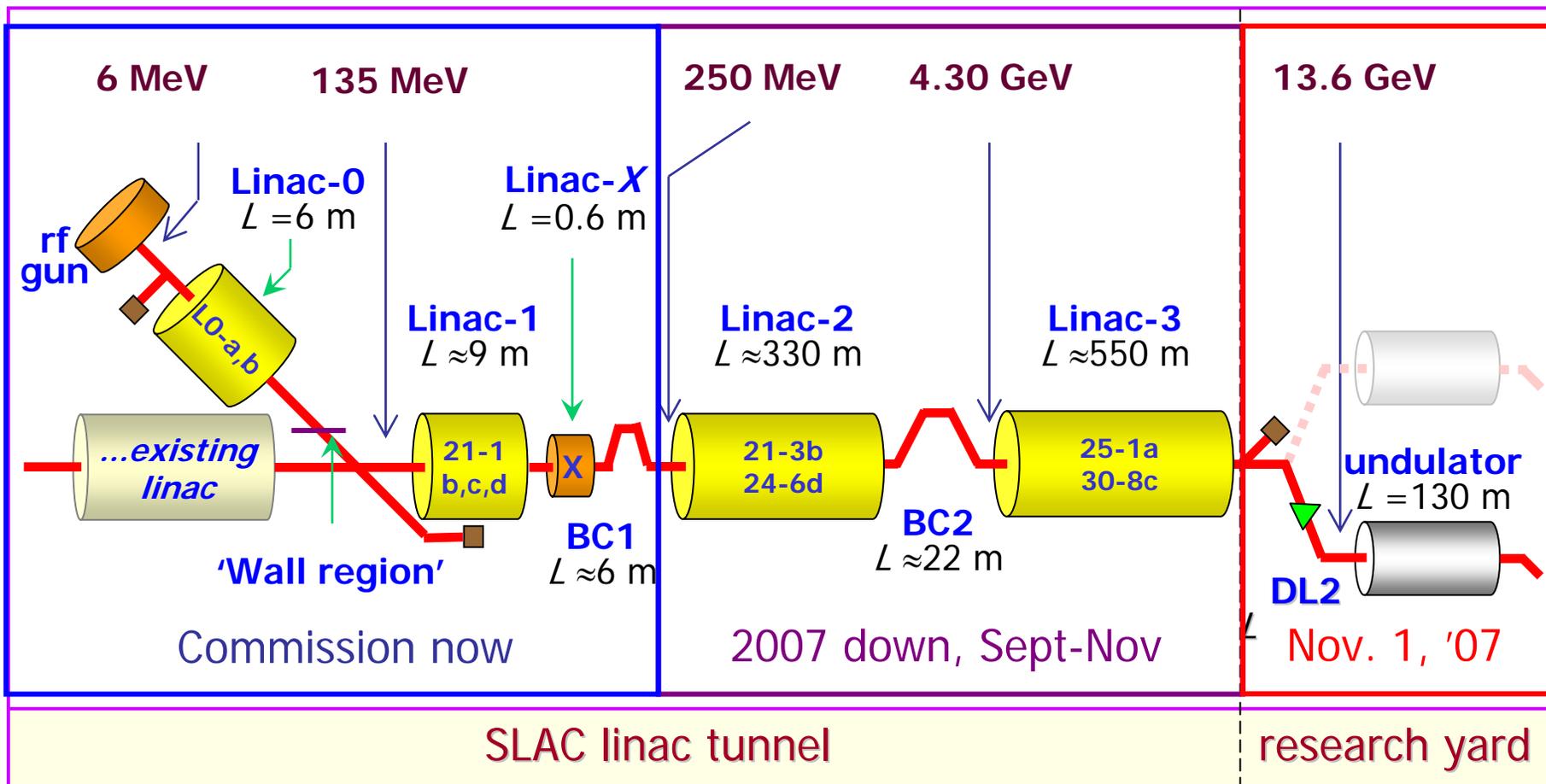
- Image Management
- Bunch Length Measurement
- Emittance and Energy Application



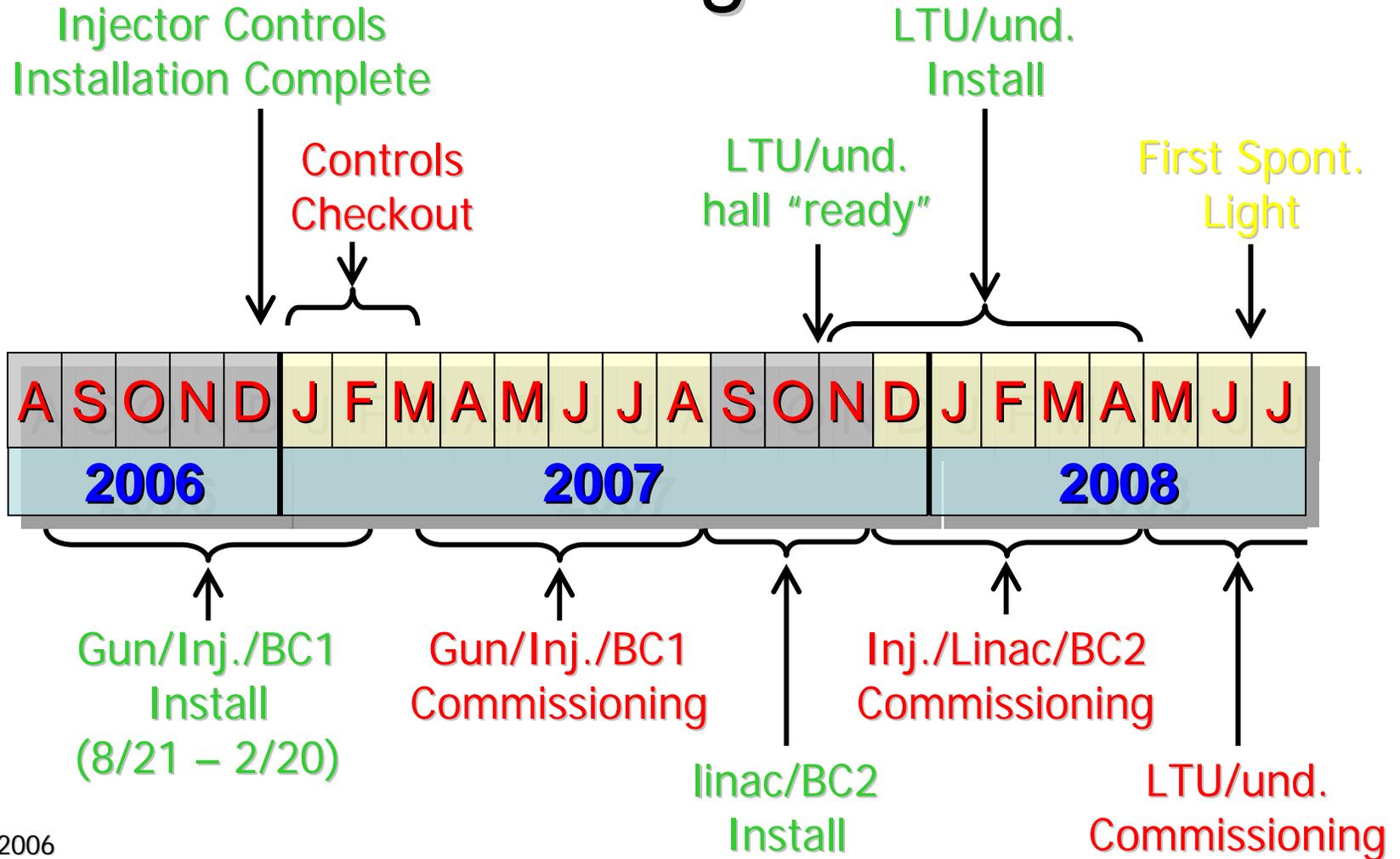
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LCLS Accelerator Regions



LCLS Installation and Commissioning Time-Line



Oct. 19, 2006

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Linac & BC2 Controls Installation (Fall '07)

- BC2 installation, similar scope to BC1
- Very little engineering development
- The biggest challenge is meeting the schedule
- The scope includes
 - Extending the new timing system
 - Safety systems (MPS, BCS)
 - Adding new magnets including pulsed horizontal dipole magnet
 - Adding BPM, x-collimator, OTR screen
 - BPM electronics upgraded (resolution improved)

Other Developments

- Hamid Shoaee now Controls Department Head (former LCLS Controls now fully integrated)
- New hires
 - Chris Larrieu
 - Paul Chu
 - Ernest Williams
- PEP shutting off Sept. 30, 2008
- SLAC becoming a Basic Energy Science lab (with some High Energy Physics activity)

Plans for the Next Six Months

- Complete the majority of Linac BC2 installation
- Develop detailed plans for LTU, Undulator installation
- Complete the design of XES controls, DAQ and data management
- Complete Accelerator Improvement Projects
- Detailed design for next generation high level applications

Long Term Plans

- LUSI – 6 experimental areas to support
- LCLS-2 – add a second undulator + more experimental areas
- Higher energy electrons -> lower wavelength X-rays; build new injector at sector 10
- Plenty to do at SLAC for the next decade

X-Ray End Station DAQ & Controls

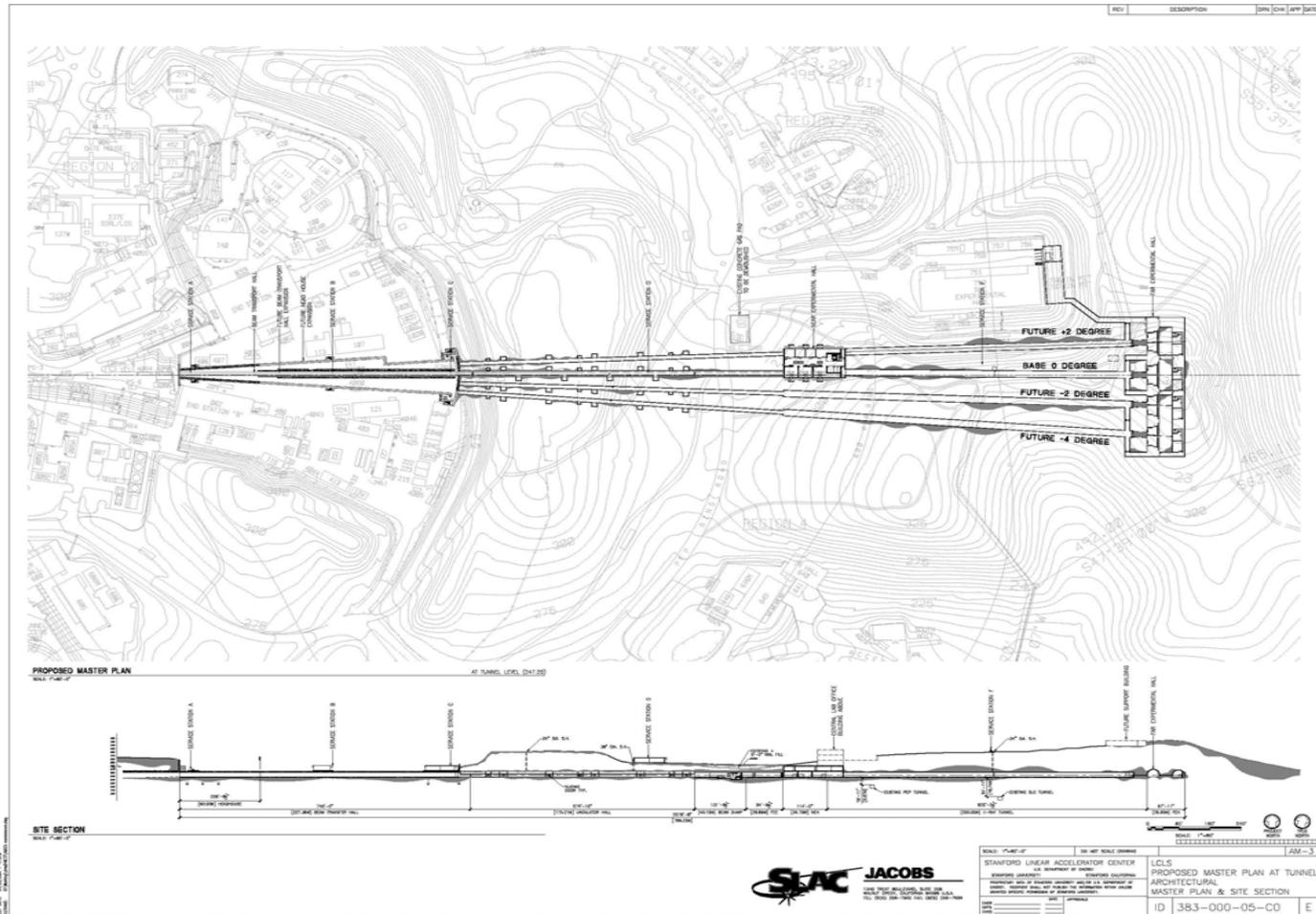
- Developed a conceptual design for end station data acquisition and control
- Held a Conceptual Design Review
- Developed a detailed task list and a project plan

- The AMOS experiment may eventually take data @120Hz producing ~700 MB/second or 2.4 TB/hour or **~58 TB/24 hour**
- The plan is to build on previous experience.
- Initially use commercial digitizer and COTS CPU for spectrometer data.
- Use scalable technology developed for LSST for CCD data.

- Capitalize on years of BaBar experience with hierarchical storage and management of HEP data.
 - ~1 TB/day raw data.
 - ~1 TB/day derived data.
 - ~1.5 PB total Babar data.

- **Extend/integrate several SLAC-developed Java-based technologies for data retrieval and analysis.**

Long Term Plans



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