

News from SLAC

James McEwan Paterson

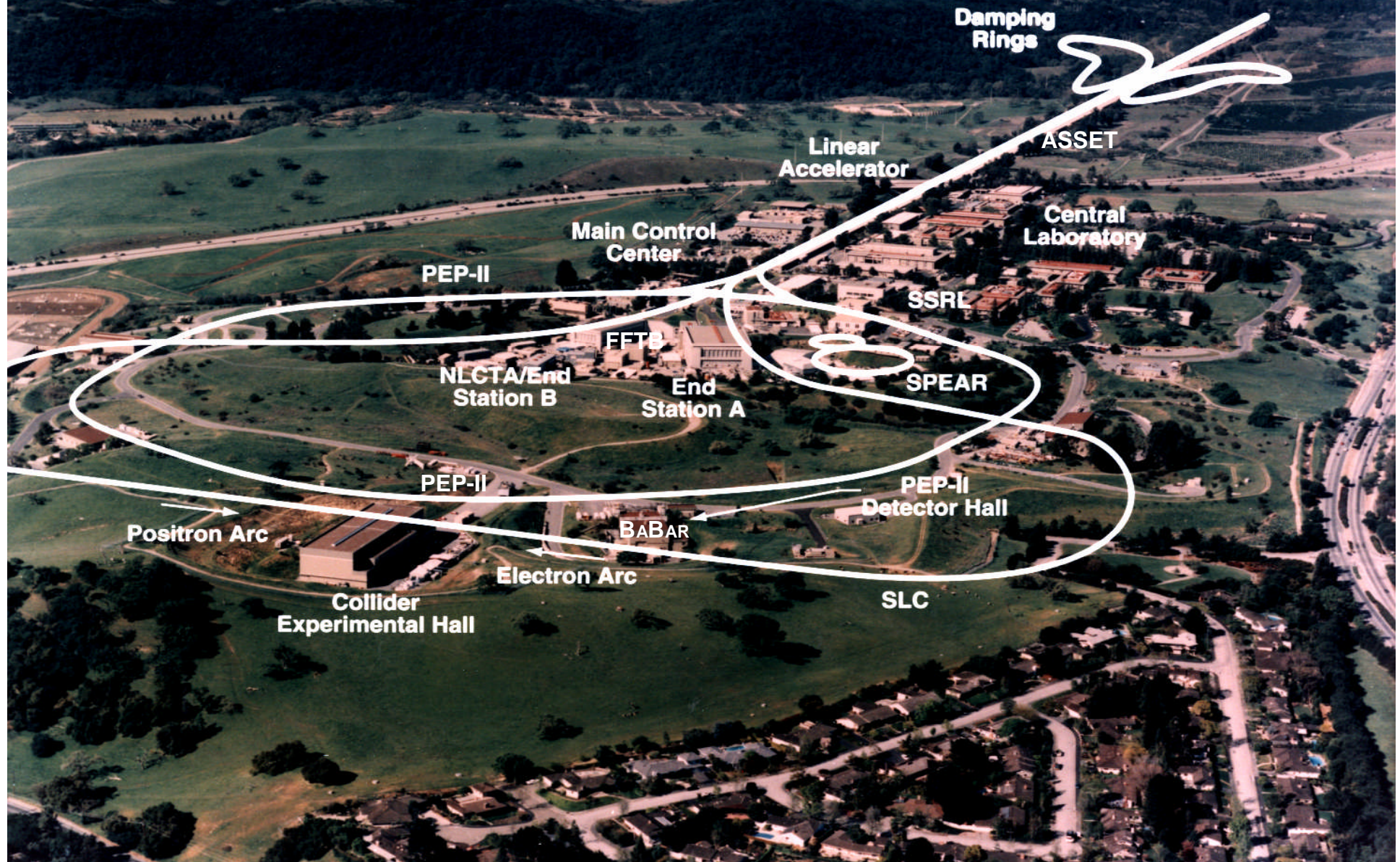
6/9/05

OUTLINE

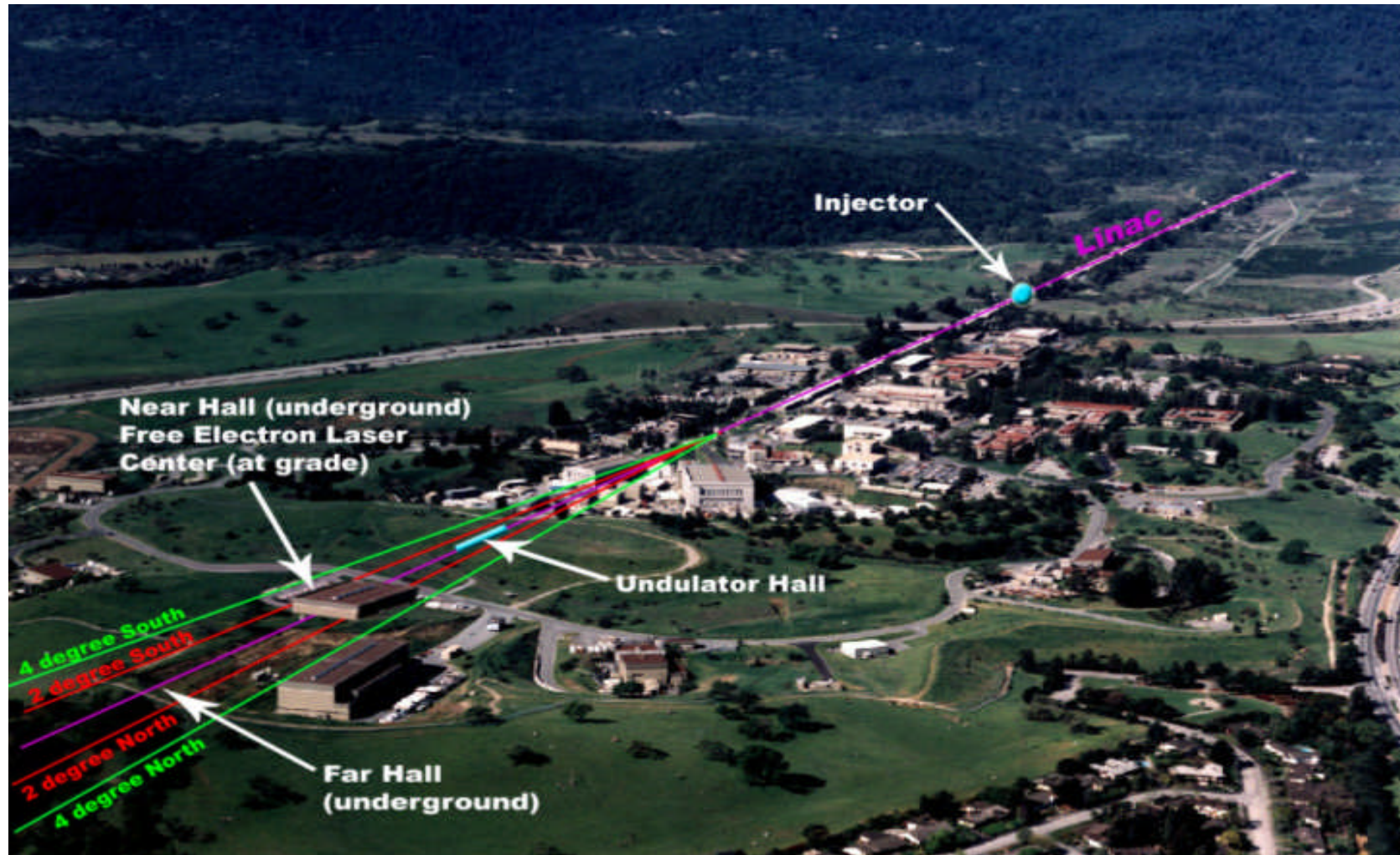
- SLAC as a Multi Program Laboratory
- Programs....Status and Plans
 - The Linac Coherent Light Source
 - PEP-II
 - Particle Astrophysics
 - ILC
 - Other
- Summary

6/9/05

Stanford Linear Accelerator Center



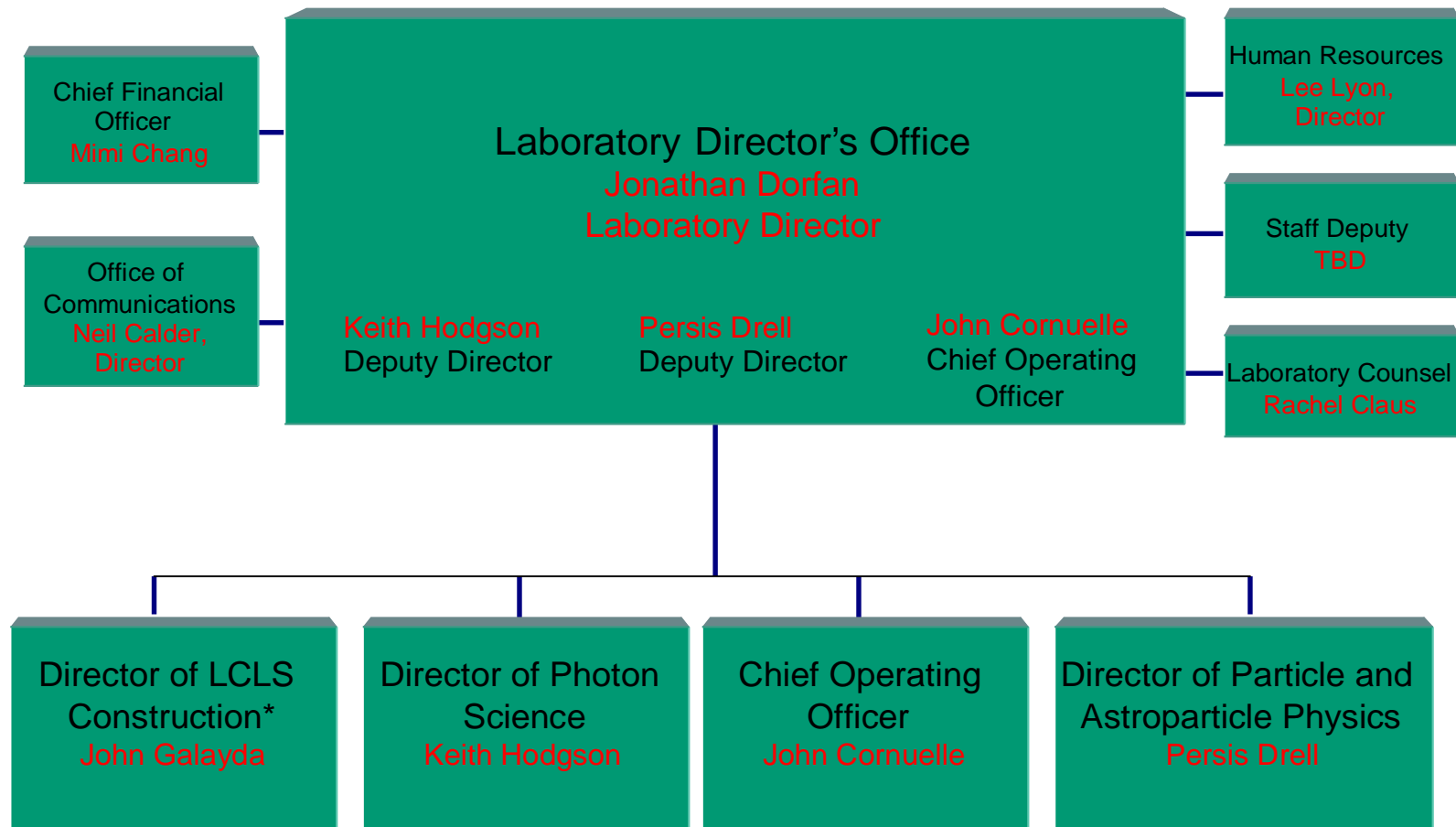
Linac Coherent Light Source at SLAC: The Next Revolution in X-Ray Science



LCLS Will Be The World's First X-ray Laser

Organization

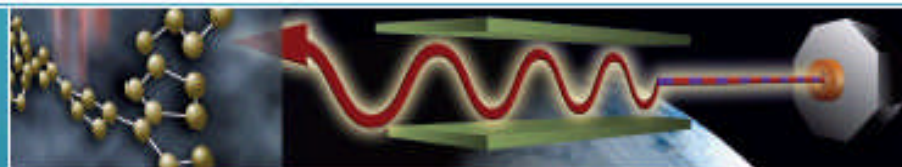
Stanford Linear Accelerator Center



*Reports directly to Lab Director

May 23, 2005





See Slideshow

Photon Science

[LCLS](#) | [LUSI](#) | [SSRL](#) | [Ultrafast Center](#) | [more](#)

Particle & Particle Astrophysics

[BaBar](#) | [GLAST](#) | [ILC](#) | [KIPAC](#) | [PEP-II](#) | [more](#)

Search

[SLAC WEB](#) [PEOPLE](#)

[Detailed Index](#)

[For Users](#)

[For Staff](#)

[For Students](#)

[For Educators](#)

[For Media and Press](#)

[About SLAC](#)

[Safety](#)

[Research Resources](#)

[Visit SLAC](#)

[Events](#)

[Jobs](#)



Searching for the Neutrino's Identity

Neutrinos are like no other particle in the universe. The more we learn about these "little neutral ones," the less we seem to understand them. SLAC and Stanford physicists are looking for the answers in an experiment called EXO, the Enriched Xenon Observatory.

[Read more...](#)

News

[SLAC reorganizes to position itself for major discoveries](#)

[Archimedes Manuscript Yields Secrets Under X-ray Gaze](#)

[LCLS Construction Gathering Steam](#)

[First SPPS Results: Electro-optic Sampling and Ultra-fast Melting](#)

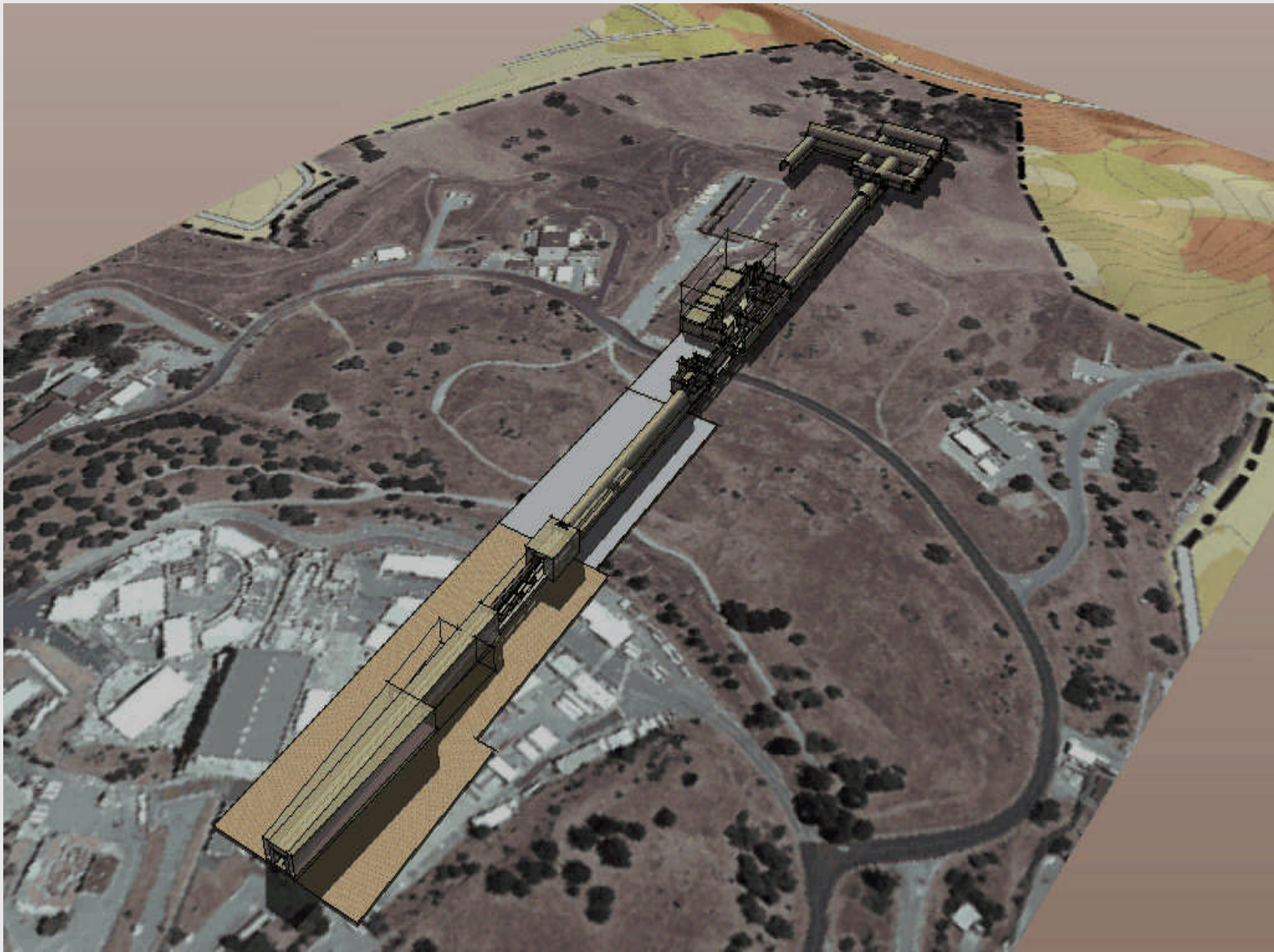
[ES&H Safety Tip of the Week: Using Ladders Safely](#)

News Sources

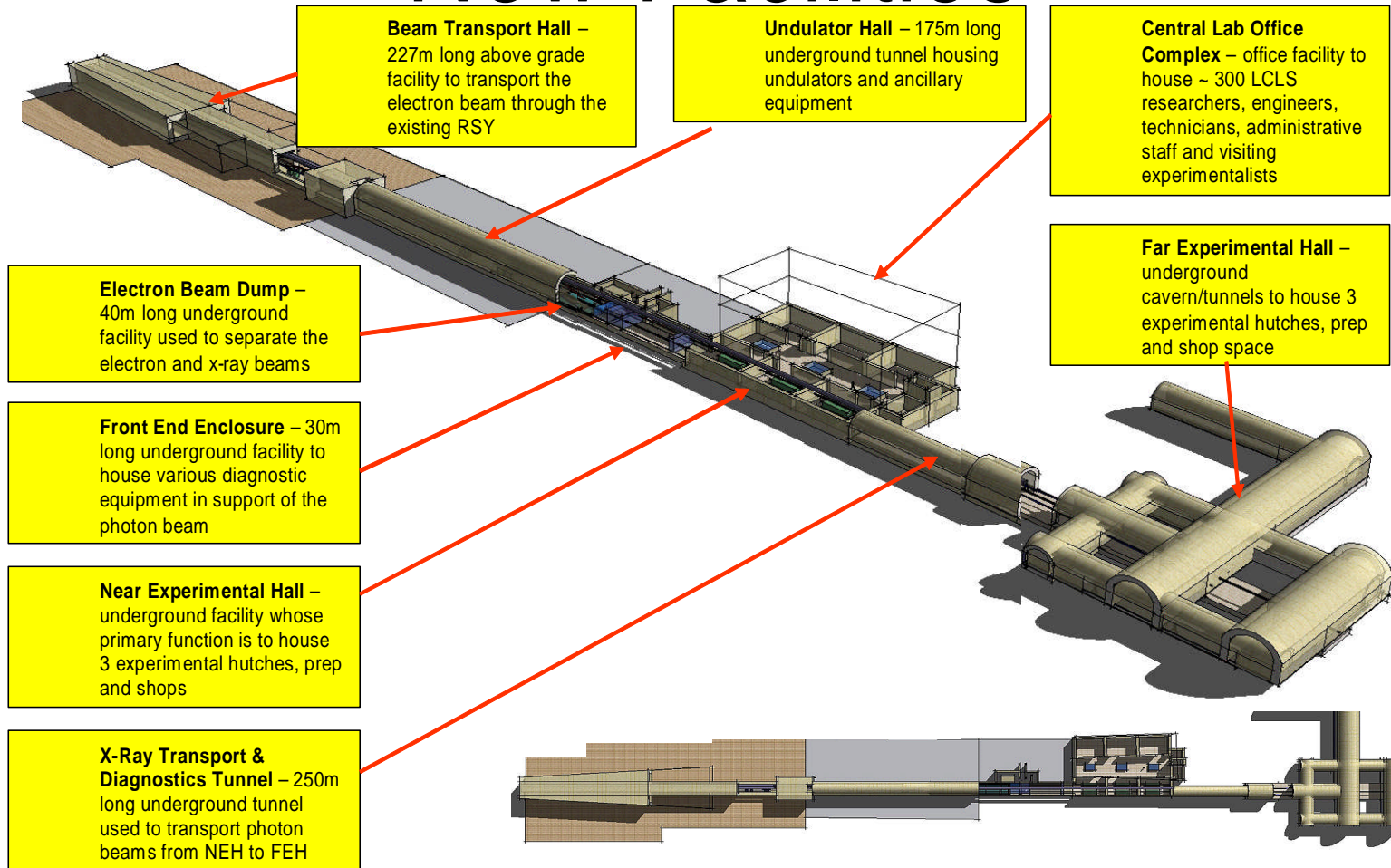
[SLAC Today](#) | [SSRL Headlines](#) | [symmetry](#) | [Interaction Point](#) | [Lightsources.org](#) | [Interactions.org](#)

SLAC Celebrates [2005 World Year of Physics](#) with [Quantum Diaries](#)





New Facilities



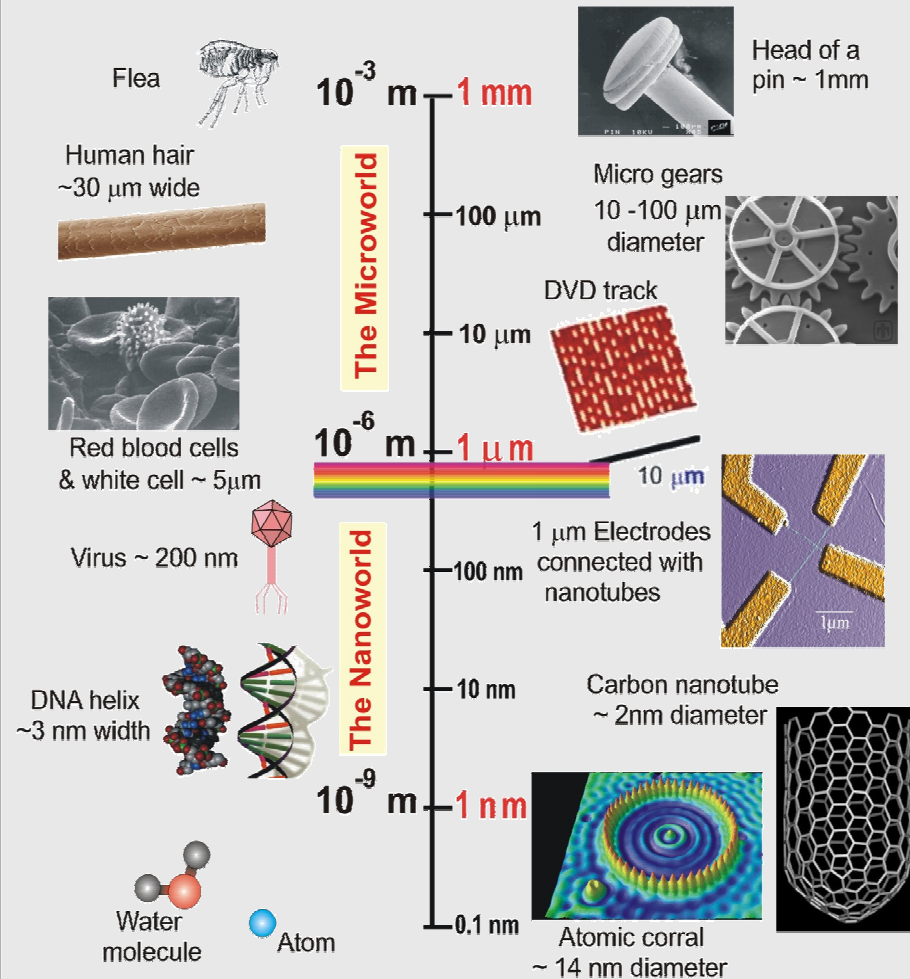
X-Rays have opened the Ultra-Small World X-FELs open the Ultra-Small and Ultra-Fast Worlds

Ultra-Small

Ultra-Fast

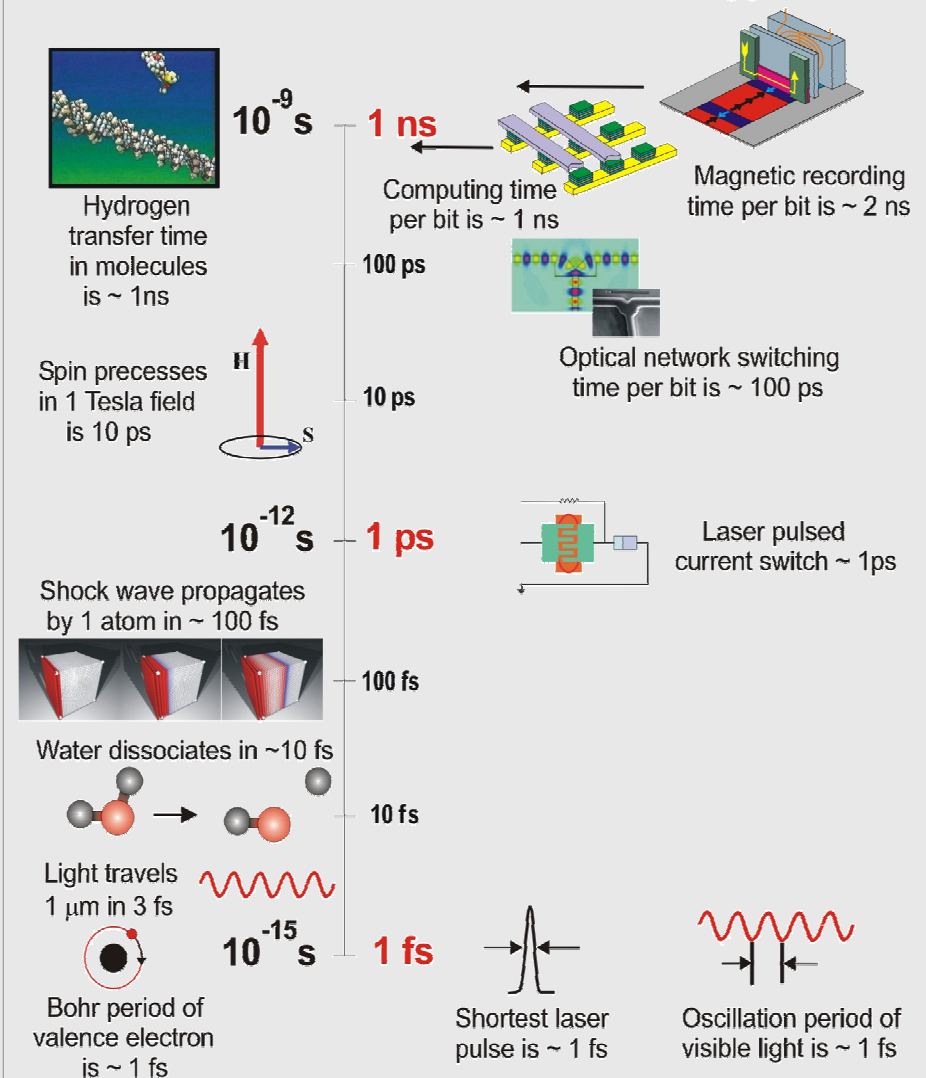
Nature

Technology



Nature

Technology



LCLS Science Program – Remarkable Opportunities for Discovery



Program developed by international team of scientists working with accelerator and laser physics communities

*

Femtochemistry and Biology – watching motions of atoms and molecules

Nanostructured materials – their structure and function

Atomic Physics – exploring how electrons move

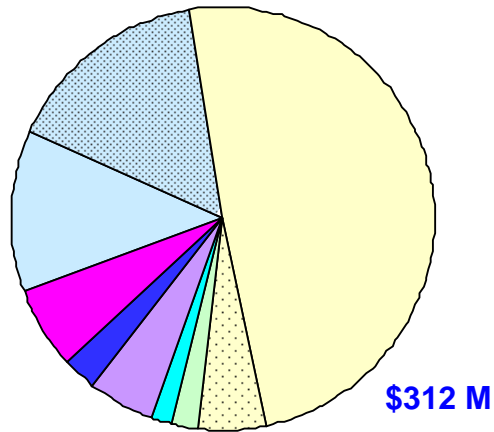
Plasmas and Warm Dense Matter – creating And studying exotic states of matter

Imaging of Nanoclusters and Single Biomolecules – structures without crystals

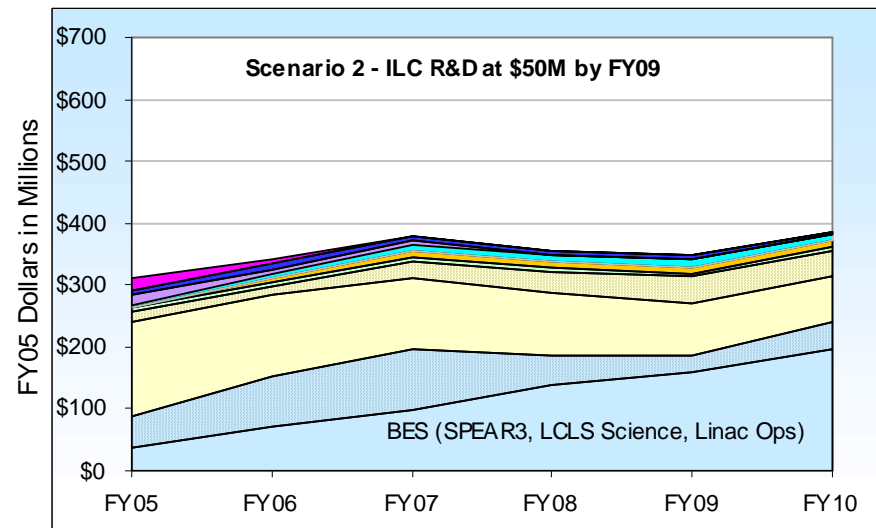
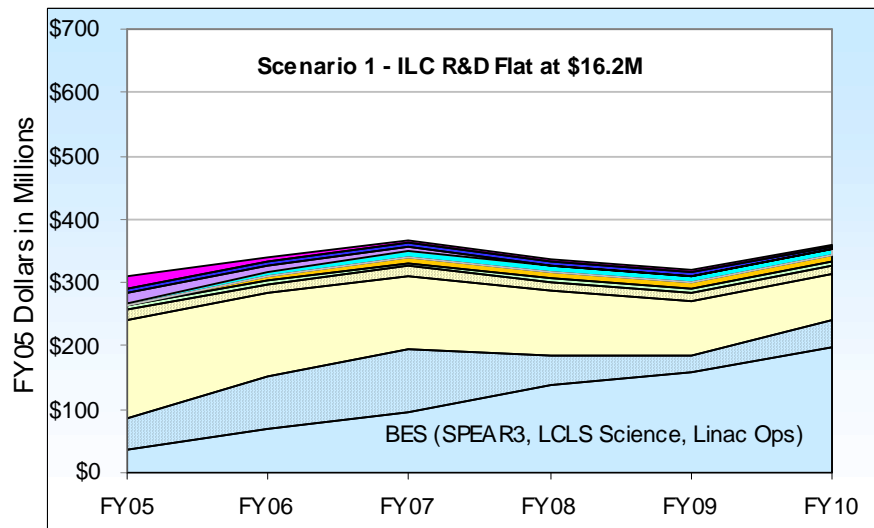
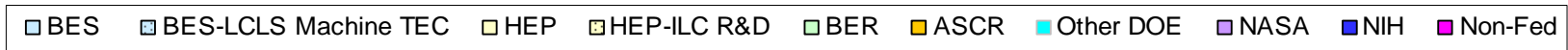
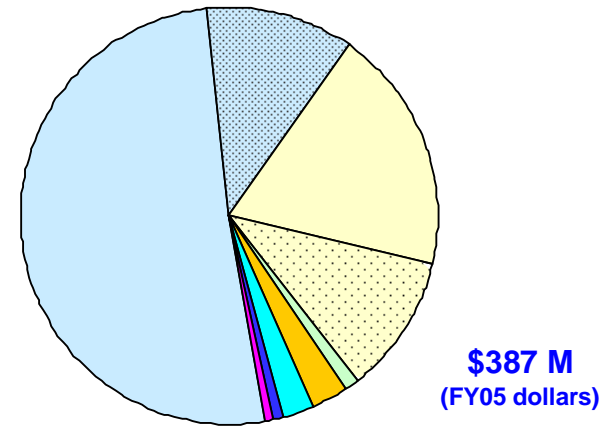
X-ray Laser Physics – pushing the boundaries of x-ray properties

Laboratory Funding Outlook

FY2005



FY2010 – Scenario 2
ILC R&D growing to \$50M by FY09

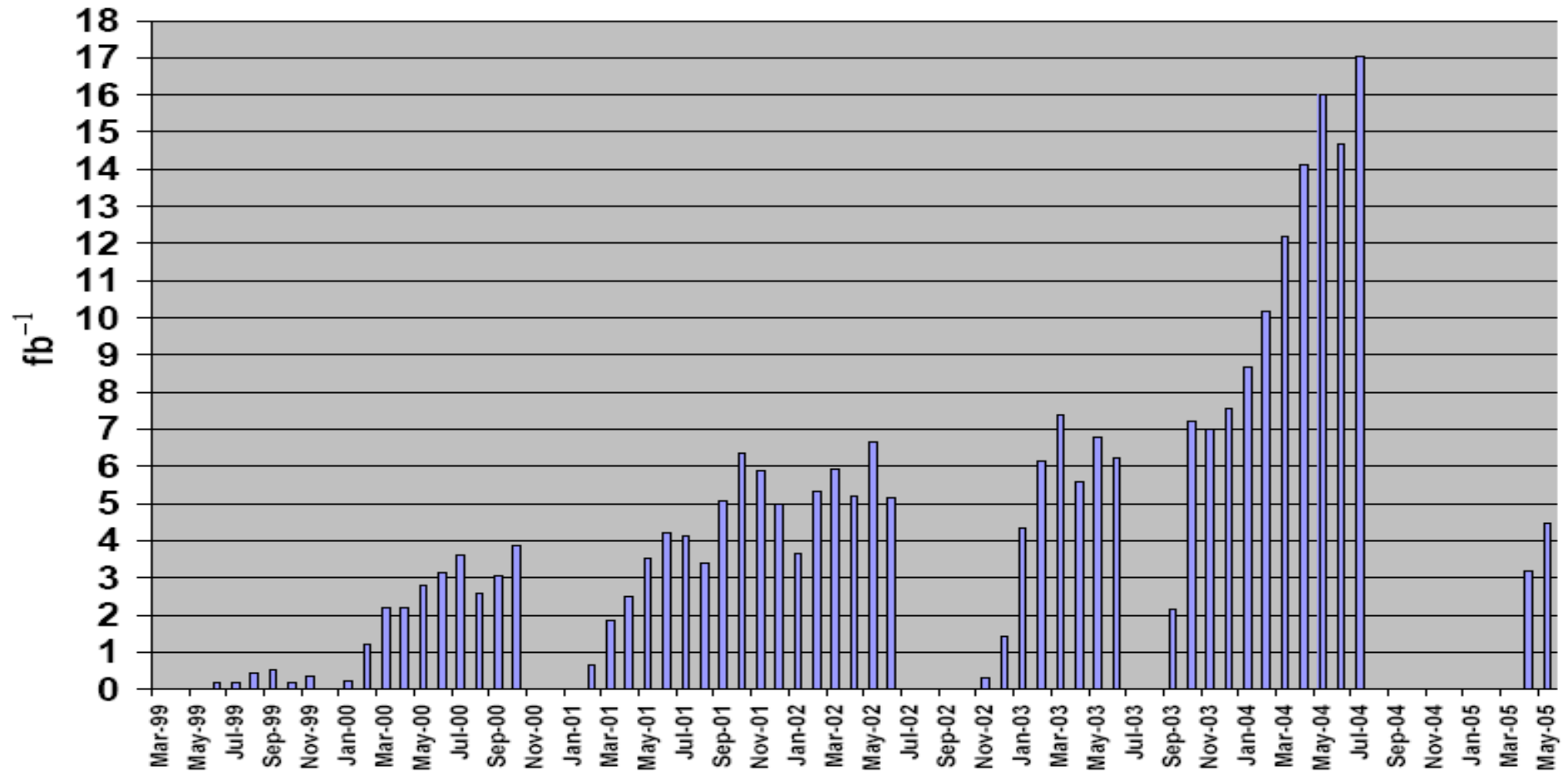


THE PEPII PROGRAM

PEP and BaBar are Back

Last updated:
5/16/2005
12:04

PEP-II Monthly Integrated Luminosity



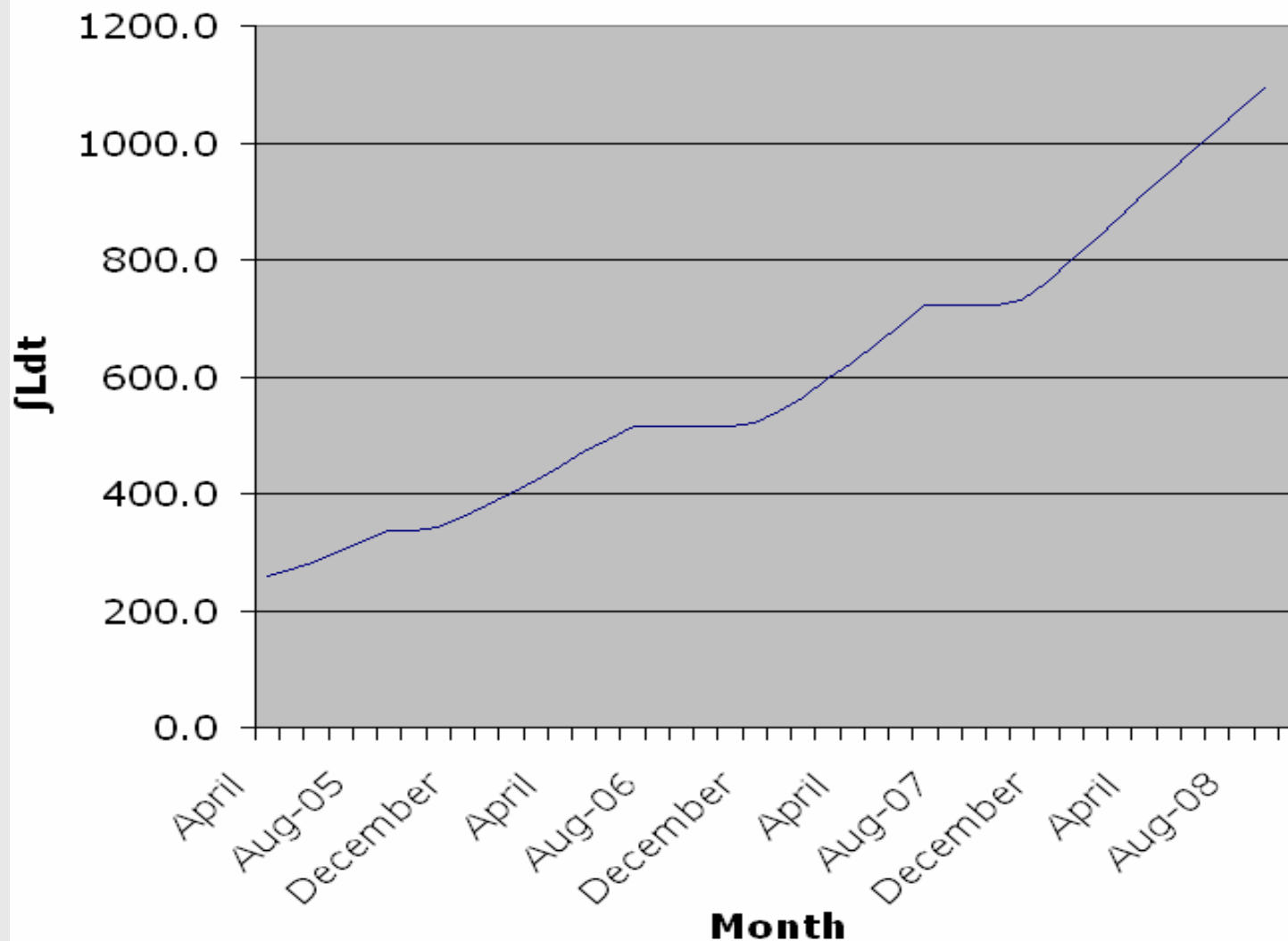
PEP-II Run Schedule

- PEP-II Run 5 started April 15, 2005
- Will collide steadily from April 2005 through July 2006 with a one month break in October 2005
- Down in 2006 August through November for BaBar and PEP-II upgrade work
- Three month down in Summer-Fall 2007
- Collide through September 2008

6/9/05

Integrated Luminosity Goals

PEP II Integrated Luminosity (1/fb)

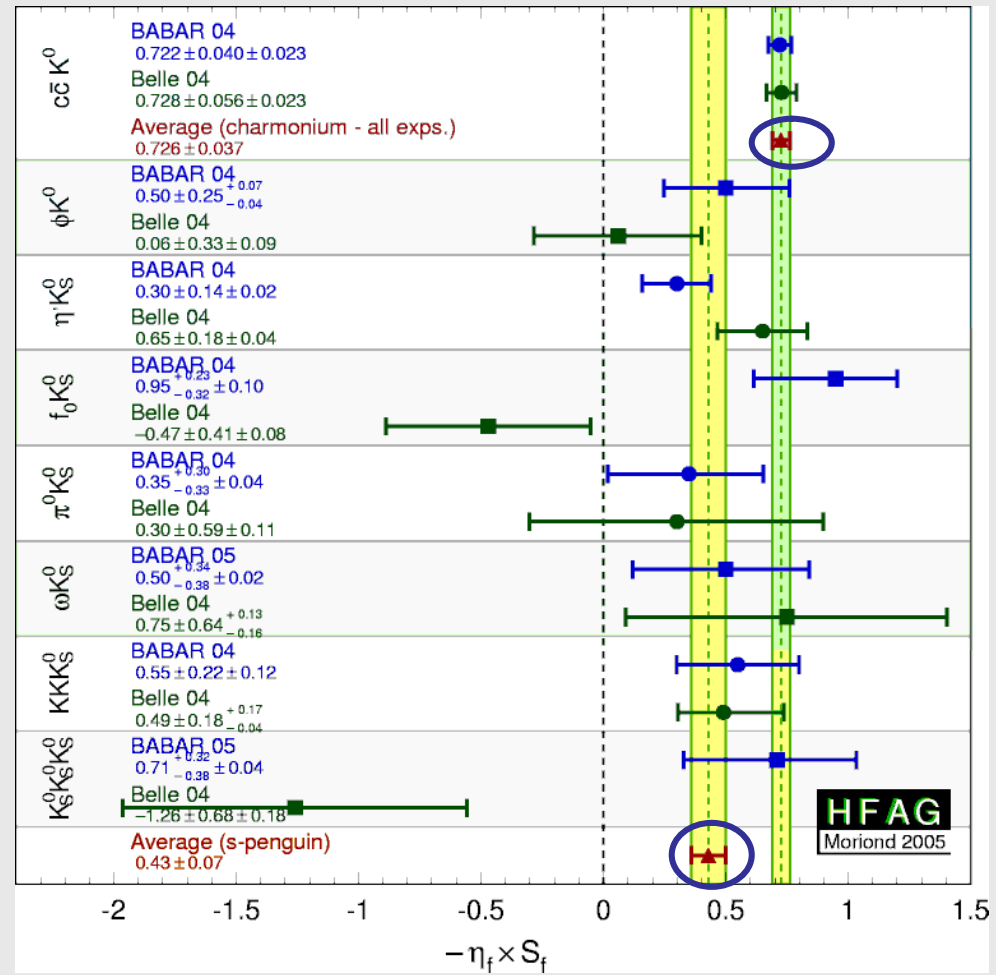


Intriguing Hint?

Good consistency between B Factory experiments

charmonium ($b \rightarrow c$) modes

$b \rightarrow sss$ modes
 ~ 3.7 sigma below charmonium modes



Summary

- Data taking began in mid April 2005. PEP-II and Babar have made a rapid return to full, safe operation
 - Goal for 2005-2006: double current data set
 - Delay in Run 5 can be overcome by summer 2006 with extended running period, with substantial reduction in errors on CP violation asymmetries in rare decay modes
 - Error on average of Penguin modes should reach 0.06
 - Goal for 2007-2008: double again to $\sim 1 \text{ ab}^{-1}$
 - Individual Penguin modes with errors in range 0.06-0.12
- **Sensitivity to New Physics through rare decays & CP violation, with a significant discovery potential**
 - **Rich program of flavor physics/ CP violation also pursued**

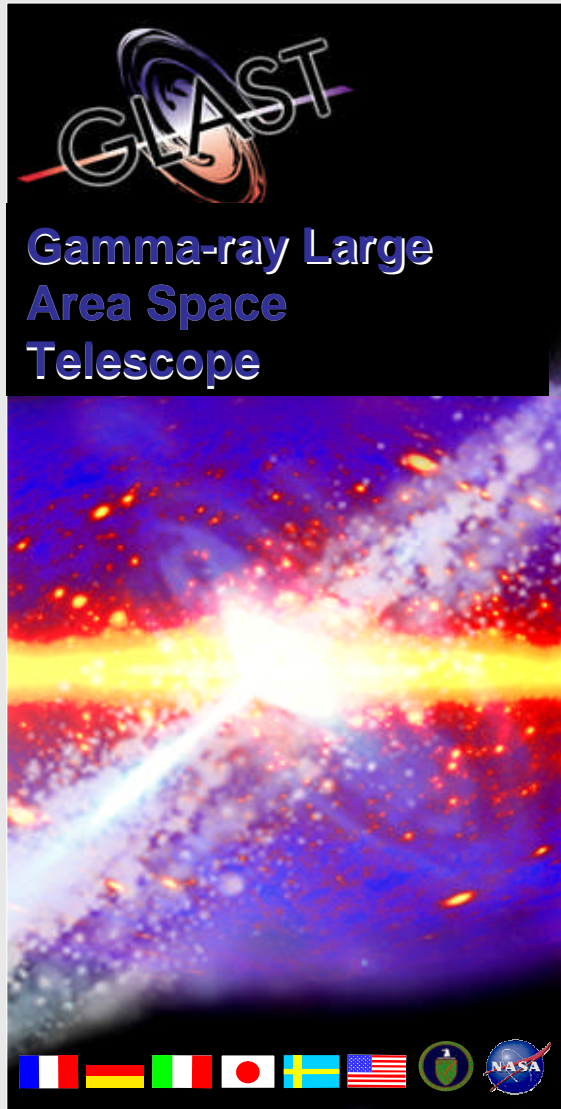
Particle Astrophysics and Cosmology

- GLAST

- KIPAC: Kavli Institute for Particle
Astrophysics and Cosmology

KIPAC: Kavli Institute for Particle Astrophysics and Cosmology

- Institute of Stanford University
 - Institute building on the SLAC site funding by gift from Fred Kavli
 - Director: Roger Blandford
 - Deputy Director: Steve Kahn (also Assistant RD)
- Director reports to Stanford Dean of Research
 - 9 new faculty (4 in place)
 - Most if not all will be joint campus/SLAC
 - Establishes Stanford/SLAC/DOE as intellectual force in field
- Institute brings in funds from NASA and NSF in addition to DOE funds through SLAC
 - Highly leveraged by > \$20M investment by Stanford University
- Growing fast!
 - Institute 50 strong and growing
 - > 20 new people including 4 professional staff, 4 faculty, postdocs, students, 2 admins and lots of visitors



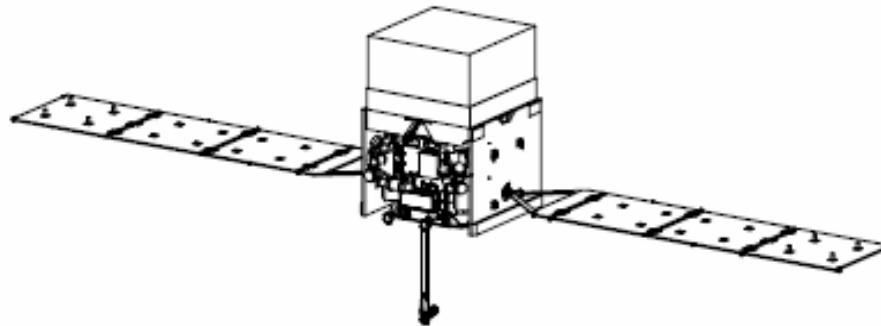
GLAST Large Area Telescope: Status of the Instrument

Lowell A. Klaisner
Stanford Linear Accelerator Center
Project Manager

Klaisner@slac.stanford.edu
650-926-2726

GLAST Mission Summary

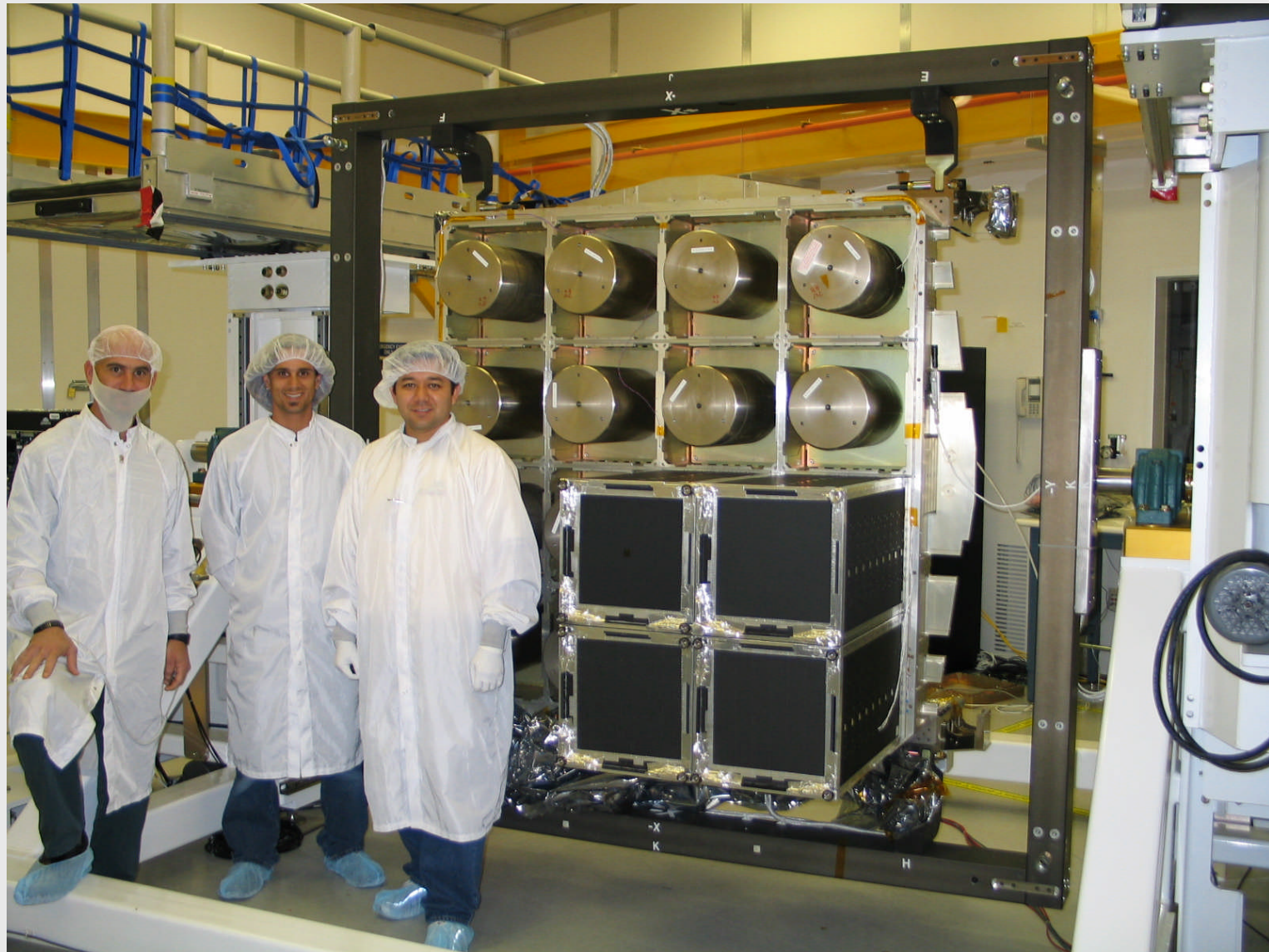
•Objective: Larger field of view (FOV), higher sensitivity, and broader energy detection range than any previously flown gamma-ray mission.



•Mission Duration:	5 yrs (10 yr Goal)
•Orbit:	565 km Circular, 28.5° Inclination
•Launch Date:	May 2007
•Launch Vehicle:	Delta 2920H-10
•Launch Site:	Kennedy Space Center

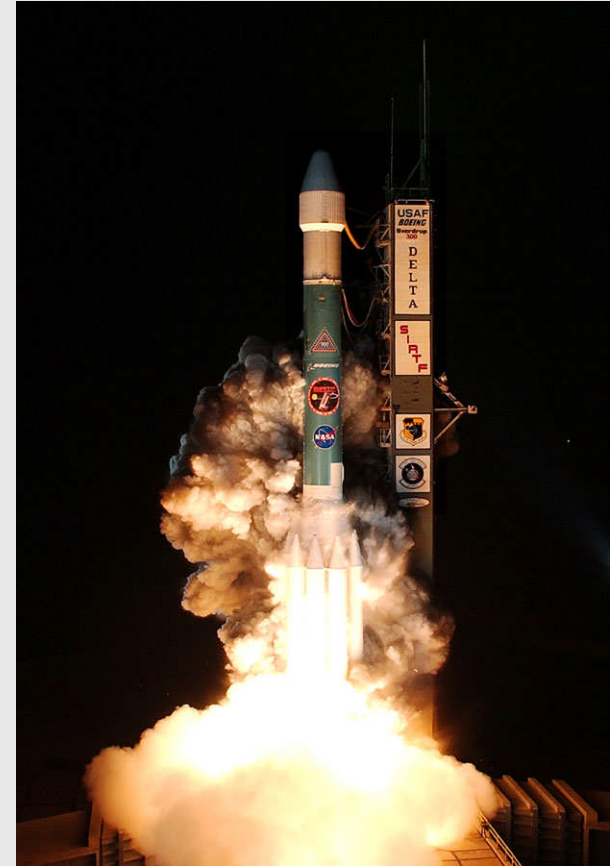
Instrument Status Overview

- Seven Tracker modules at SLAC
- Ten Calorimeter are at SLAC
 - All 16 plus 2 spares are complete
- Anti-Coincidence Detector complete and ready for environmental test
- Four flight towers integrated into the Grid and taking data
 - Instrument Integration and Test is going well!



Master Schedule

- LAT complete and tested
January 9, 2006
 - To NRL for environmental testing
- Delivery to Observatory Integration
June 1, 2006
 - Mate with spacecraft and GBM and test
- Launch
August 31, 2007
 - Kennedy Space Flight Center



**Spitzer Telescope
Launch on a Delta II
Heavy**

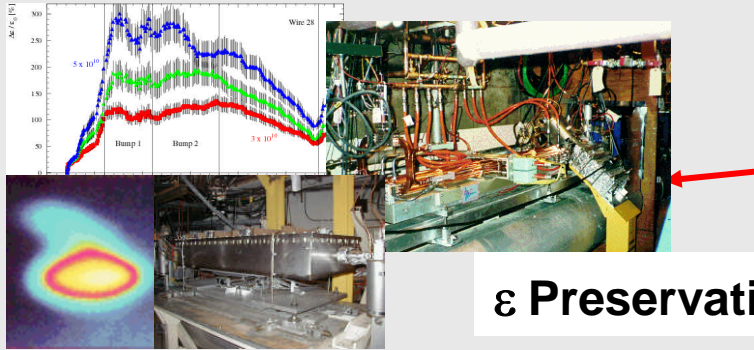
ILC PROGRAM at SLAC

SLAC ILC Program

- Program for FY05 and FY06 has two main elements
 - Preparation for the Snowmass and the ILC CDR
 - Overall design: Beam parameters, Optics, Emittance preservation, Stability/alignment, Instrumentation, Availability, MPS, and Operational issues
 - Electron & Positron sources and Damping rings
 - Linac design and wakefields/cavity optimization
 - Beam Delivery System and Interaction Region
 - Conventional construction implications and site development
 - R&D on linac rf technology
 - Klystrons, modulators, rf distribution, and possibly couplers
 - Not (much) SC Cavity fabrication
 - Plan is posted on SLAC ILC website: <http://www-project.slac.stanford.edu/ilc/slacprogram.html>

Experimental Basis for the ILC

SLC, FFTB, ASSET, E-158



ϵ Preservation

TESLA Test Facility
(SMTF & STF in the future)



Linac rf system

SLC, E-158

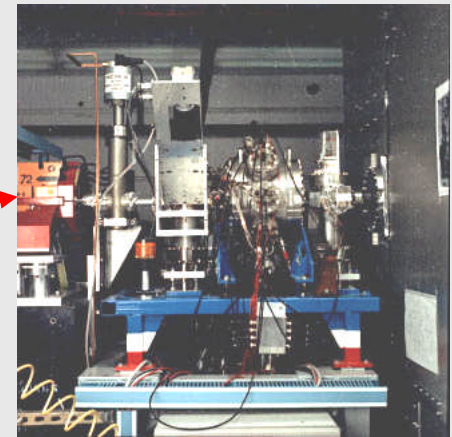
e^+ / e^- Sources



Bunch Compression

SLC and FEL's

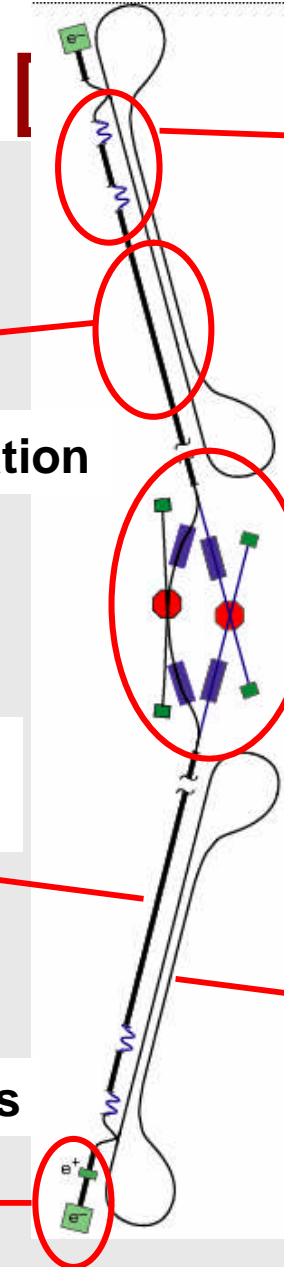
SLC and FFTB
(ATF2 in the future)



BDS & IR

ATF, 3rd Gen Light Sources, SLC

Damping Rings



- **End Station B**
 - Complete X-band program in NLCTA
 - Create new L-band rf Test Facility
 - Develop klystron and modulators for ILC
 - Test normal conducting structures for e⁺/e⁻ sources
 - Construct coupler test facility
 - Facilities also available in Klystron Test Lab
- **End Station A**
 - Study Interaction Region issues and instrumentation
 - Mockup of full IR
- **ATF-2 (Located at KEK but with major SLAC participation)**
 - Test final focus system using very low emittance beam
- **Work on the linac test facilities around the world: TTF, SMTF, and STF**

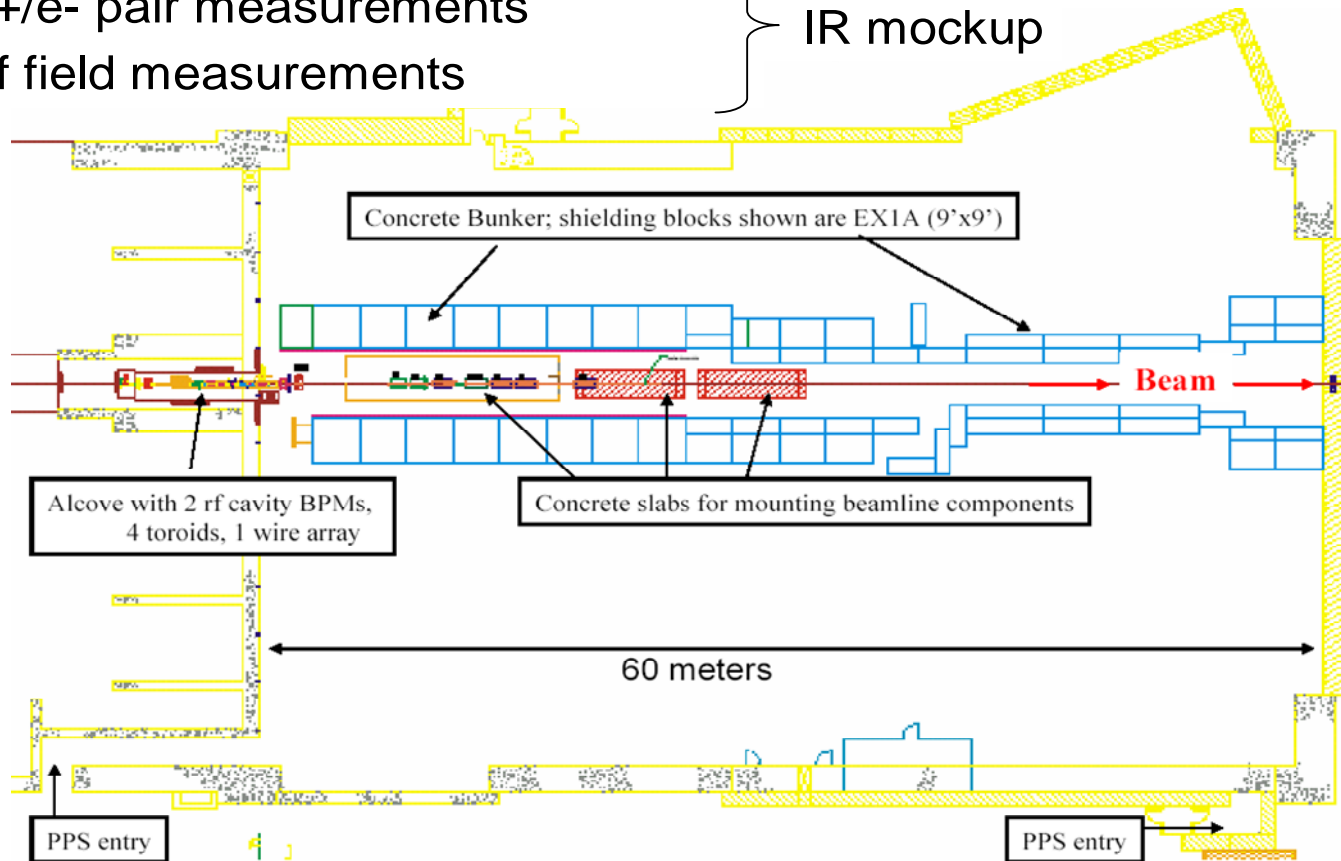


End Station A BDIR Test Facility

- Significant international interest

- Energy measurement techniques
- E+/e- pair measurements
- Rf field measurements

IR mockup

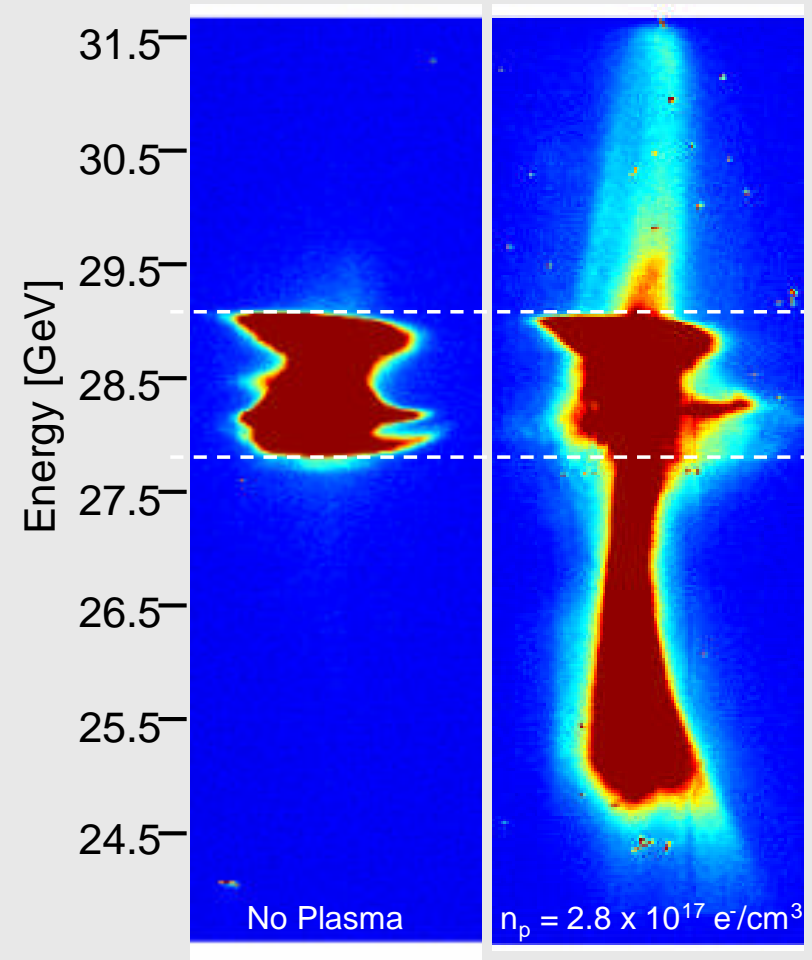


Accelerator R&D

- Explore underlying physics
 - Theoretical efforts in many areas supporting current experiments and pushing capabilities of existing facilities
 - Beam Dynamics
 - Collective Effects
 - Accelerator Structures
- Proof of principle experiments
 - E164/E164X – Plasma wake field acceleration program using Short Pulse Source
 - Producing surprising results
 - LEAP/E163 – Laser Acceleration in Dielectric Microstructures
 - Commissioning this summer
 - First data late 2005
 - E166 Production of Polarized Positrons for ILC
 - Starting data acquisition June 05

Plasma Acceleration-E164X

- Past year
 - Generated short (<100fs) pulses
 - Wake Field Amplitude $\sim 1/\sigma_z^2$
- 27 GeV/m acceleration of particles demonstrated over 10 cm
 - First time a PWFA has gained more than 1 GeV
 - Two orders of magnitude larger than previous beam-driven results



SUMMARY

- The SLAC Programs are
- **DYNAMIC**

DIVERSE

DOWNRIGHT EXCITING