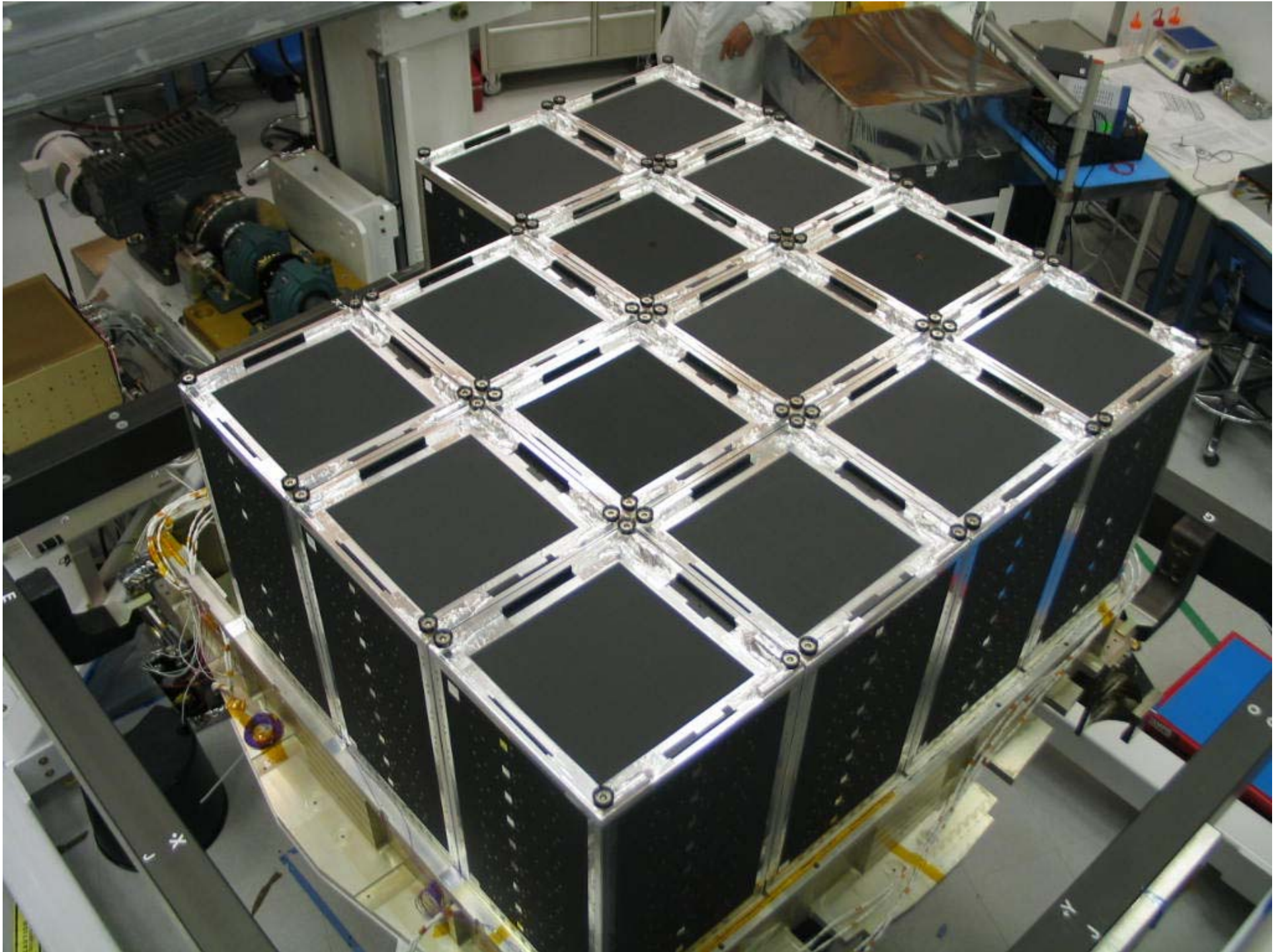


GLAST IFC: Update and Meeting Goals

Persis S. Drell
Deputy Director
SLAC



Tremendous Progress Since March

- All detector elements at SLAC
- 15 towers installed
- ACD will be installed at the end of October
- Your strong support has been essential to get the project to this point
- THANK YOU!!***

Outline of my Talk

- A Laboratory in Transition
 - How is the laboratory changing in the next few years
- Events of the Last 6 Months
- Current and future Particle and Particle Astrophysics program
 - Scientific Challenges and Opportunities

A Laboratory In Transition

An Exciting Time in Particle Physics

- The Standard Model of quarks and leptons is fabulously successful
 - It only describes 5% of the Universe
- Dark Matter and Dark Energy make up 95% of the Universe
 - New forms of matter and energy outside of current understanding
- We don't understand why the Universe is matter dominated (what happened to the anti-matter?)
- Compelling Questions confront us
 - Within this decade tools coming on line to make progress in our understanding
 - Developing tools for discovery in the next decade
 - Many are not accelerator based

A Challenging Time in Particle Physics

- Premier US HEP accelerators will turn off by the end of the decade
 - B-Factory (SLAC) 2008
 - CESR (Cornell) 2008
 - Tevatron (FNAL) 2009
- By end of decade, the frontiers of accelerator based HEP may all be off shore
 - LHC (CERN)
 - JPark (KEK)
 - KEK-B (KEK)
- Long term health and future of the field of HEP relies on ILC
 - Excellent progress towards international realization of such a machine---but not a certainty
- Non accelerator strategies essential components achieving our scientific goals
- Budgets are very constrained

SLAC: A Lab in Transition

- SLAC's research vision is evolving dramatically.
 - The balance and content of the scientific foci is changing in substantial ways
- Photon science is rapidly expanding
 - It will be the dominant laboratory program by the end of the decade.
 - In 2009, the major accelerator-based facilities will both be primarily serving photon science
- Particle Physics and Particle Astrophysics
 - Will no longer have forefront accelerator based HEP program on site.
 - Non-accelerator efforts are growing

Evolution of the Laboratory

- Particle Astrophysics at SLAC is growing
 - GLAST
 - Launch in 2007
 - KIPAC
- B-factory will turn off in 2008
- Progress with ILC
- LCLS construction starting this year
 - By 2009, onsite accelerators will be operating for photon science rather than HEP

Photon Science Future

- X-Rays have opened the Ultra-Small World -- Realm of SPEAR3
 - 10^{12} photons/sec from high brightness undulator
 - 400 eV –40 KeV
 - 50 ps pulse
 - limited coherence at x-ray wavelengths
- X-ray Lasers will open the Ultra-Small and Ultra-Fast Worlds –Realm of LCLS
 - Operations start in 2009
 - 10^{12} photons/pulse
 - 800 eV – 9 KeV
 - 200 fs pulse at commissioning; few * 10 fs within 1-2 yrs
 - fully coherent at x-ray wavelengths

SPEAR3—A New Machine



Octo

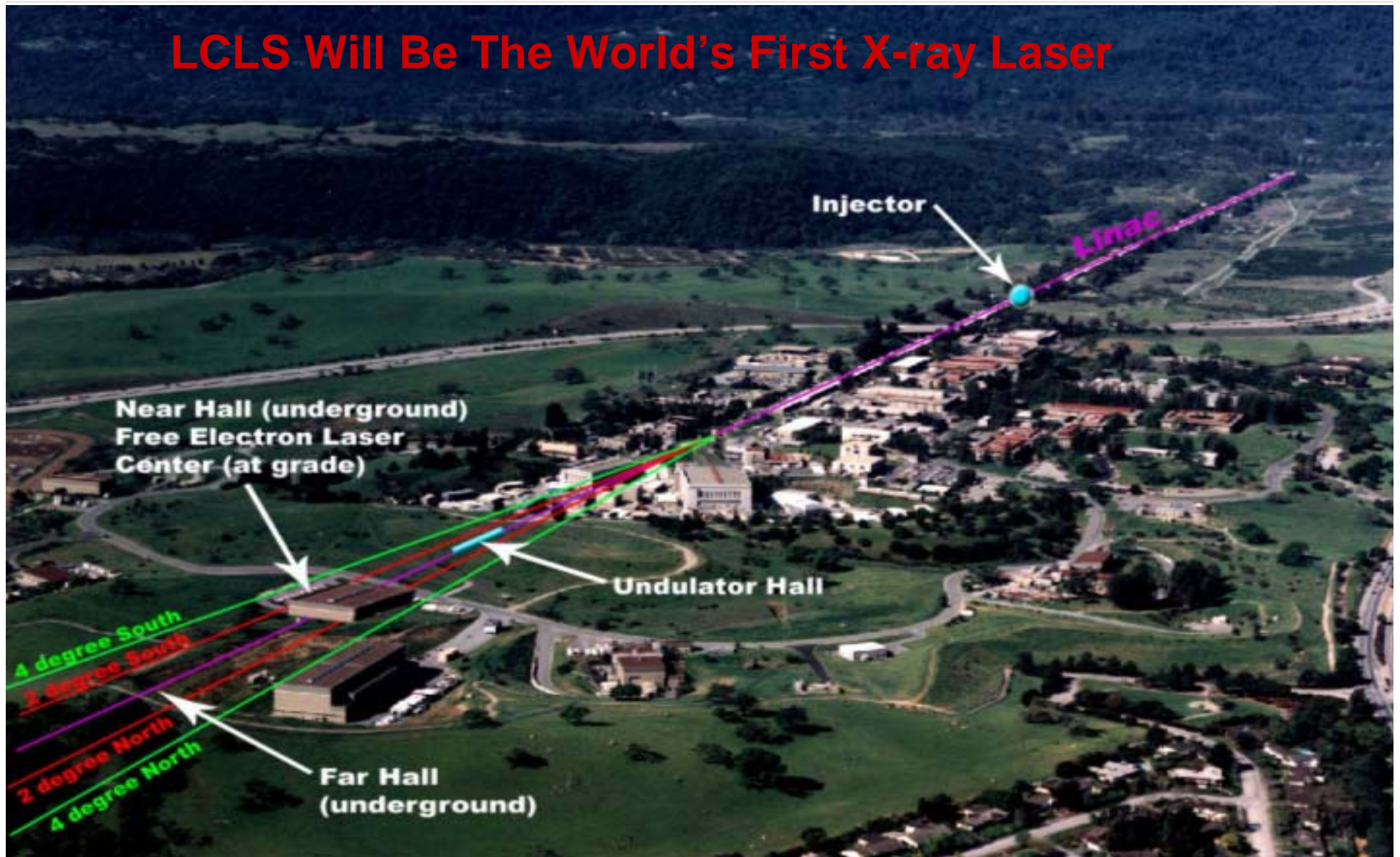
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SPC Meeting

Linac Coherent Light Source

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

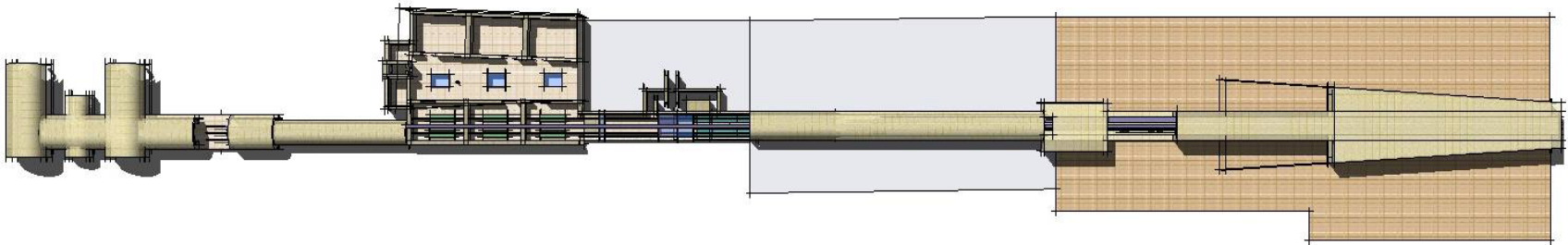
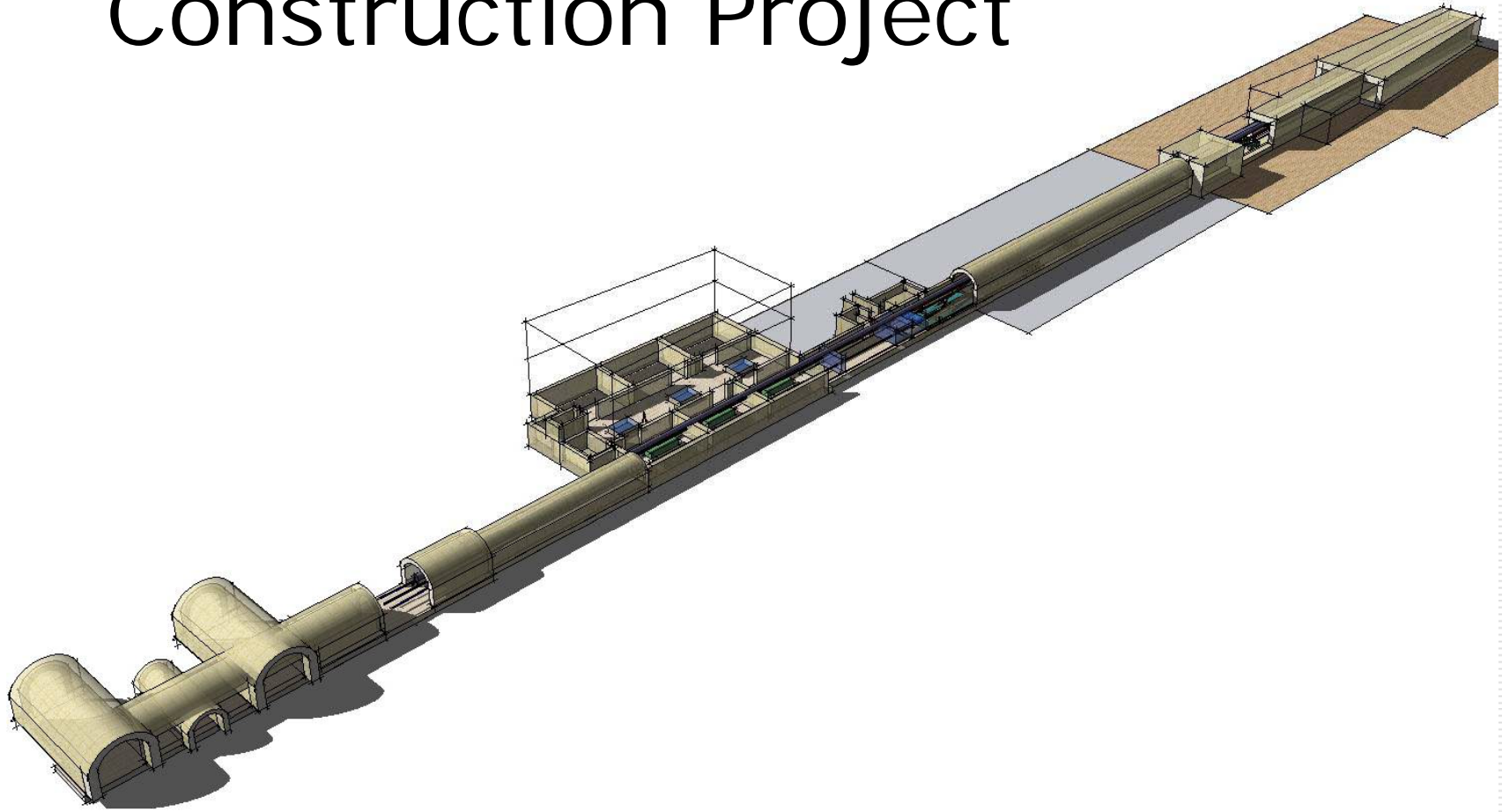


LCLS: Remarkable Opportunities for Discovery

- Femtochemistry and Biology
- Nanostructured Materials
- Atomic Physics
- Plasmas and Warm Dense Matter
- Imaging of Nanoclusters and Single Biomolecules
- X-ray Laser Physics

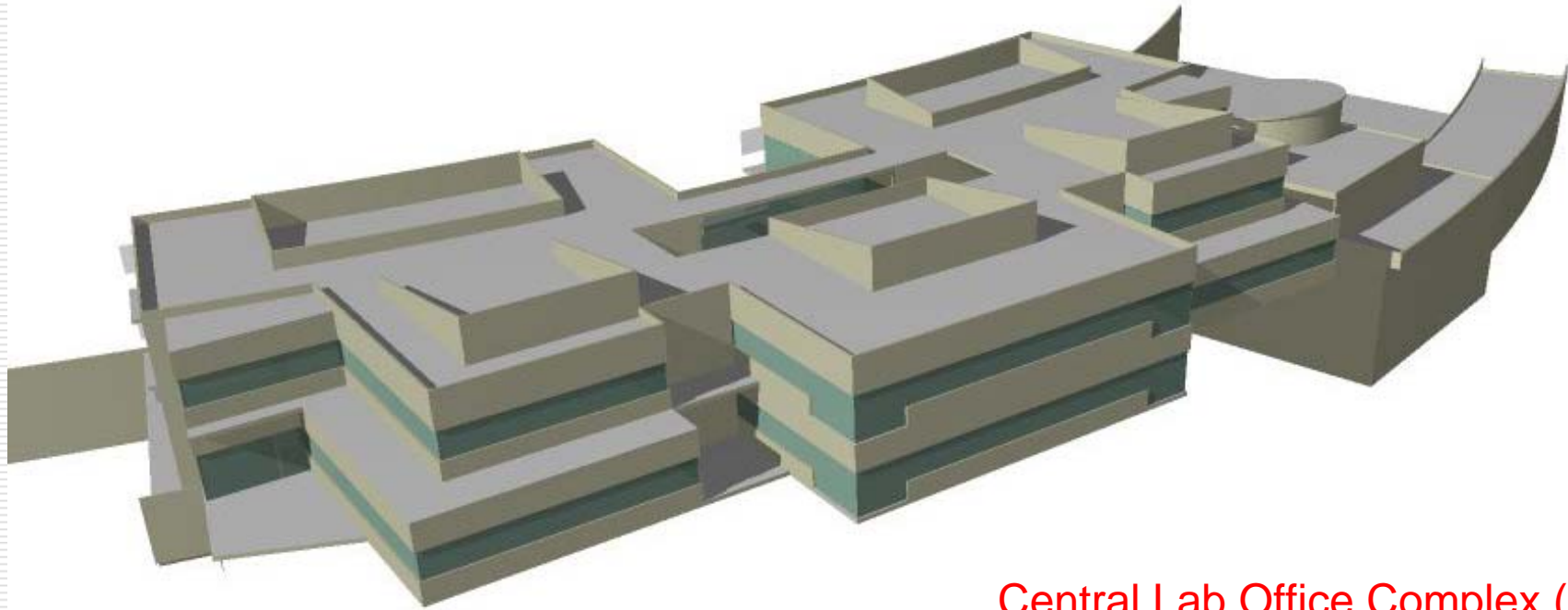


LCLS – A Large Construction Project



The CLOC Building: Home to the Ultra-fast Science Center

**The Ultra-fast Science Center
will be located in the CLOC building**



**Central Lab Office Complex (CLOC)
Capacity >260
72,000 GSF Total
150-Seat Conference Room**

October 17, 2005

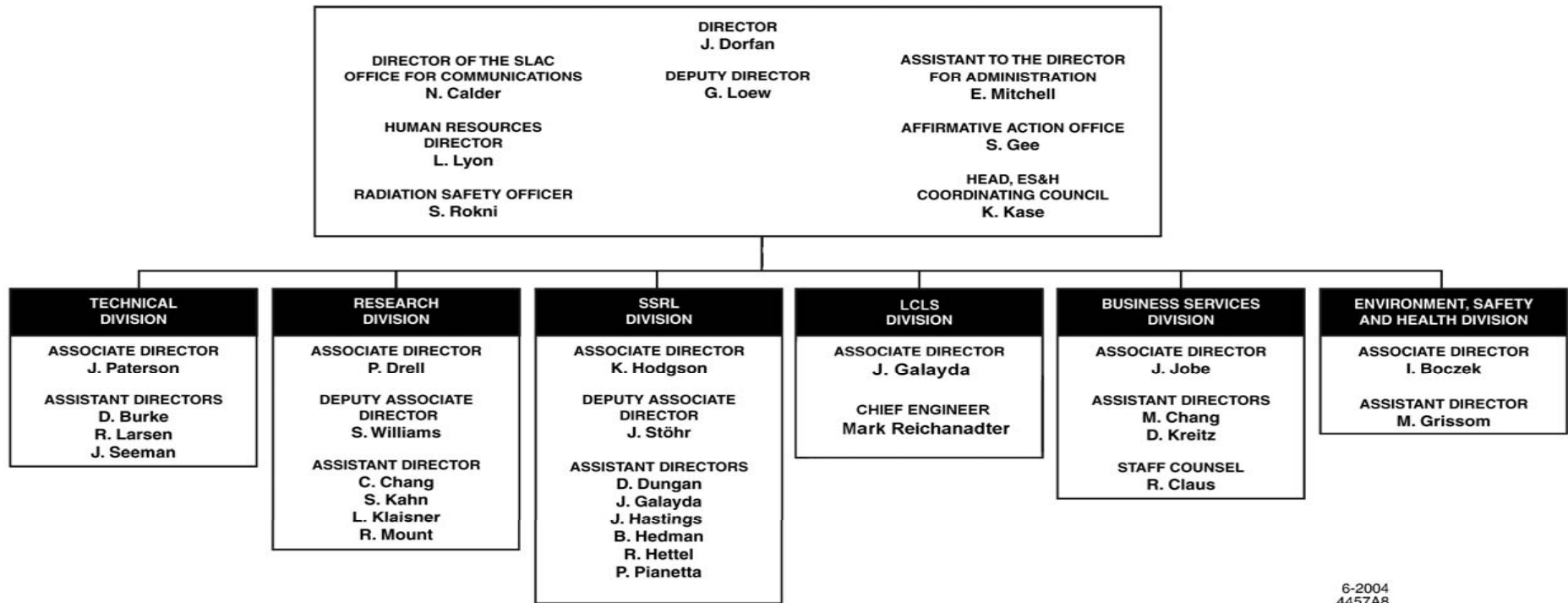
GLAST IFC Meeting

Changes to Optimize Lab for its Future

- Laboratory Organization and Management Structure
 - New structure is built around four new directorates -- Particle & Particle Astrophysics, Photon Science, LCLS Construction, and Operations.
 - Lab is better positioned to serve the two science focus areas
 - New structure stresses the importance of strong and effective line management at the laboratory

Previous SLAC Organization

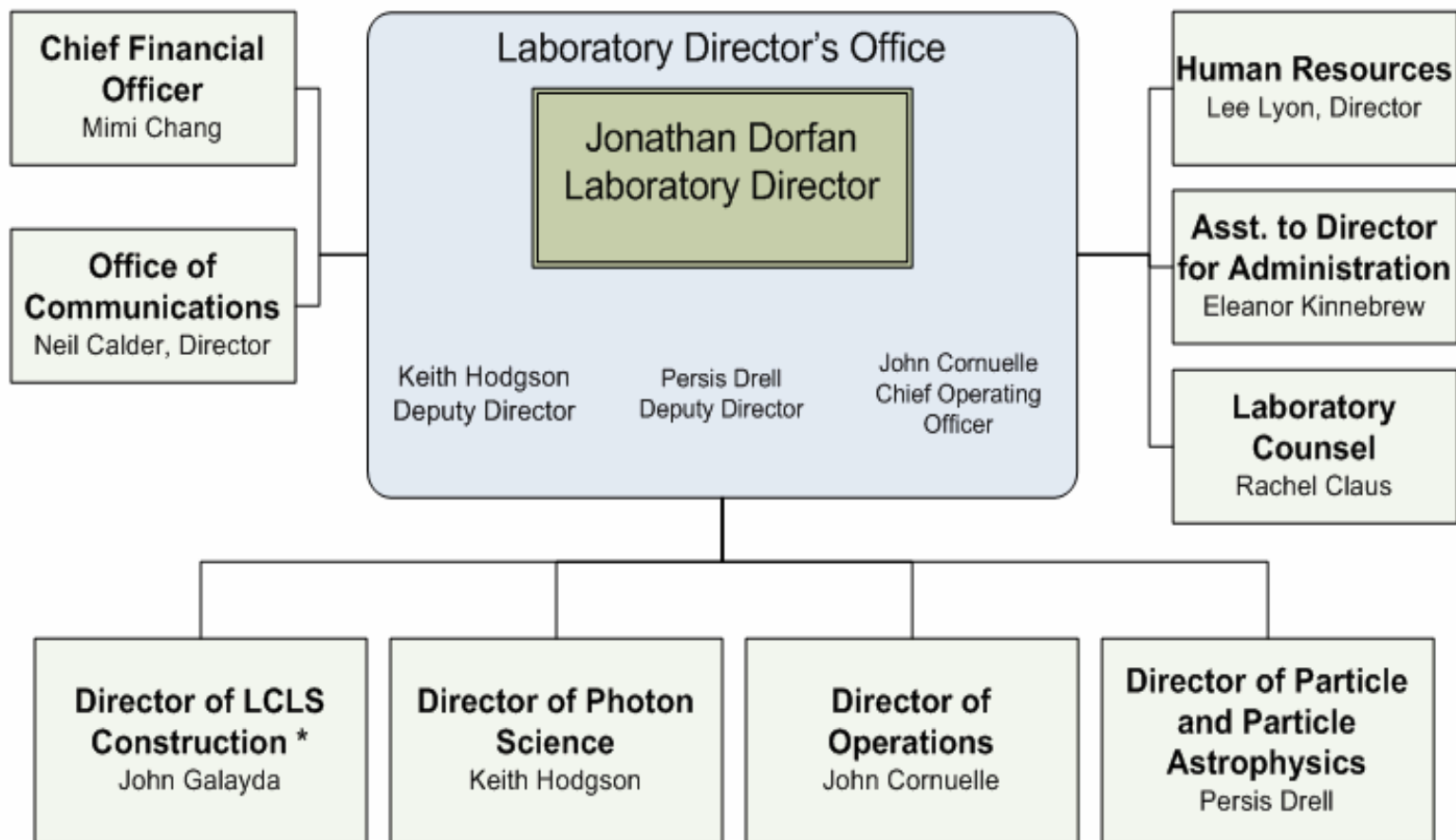
STANFORD LINEAR ACCELERATOR CENTER ORGANIZATION



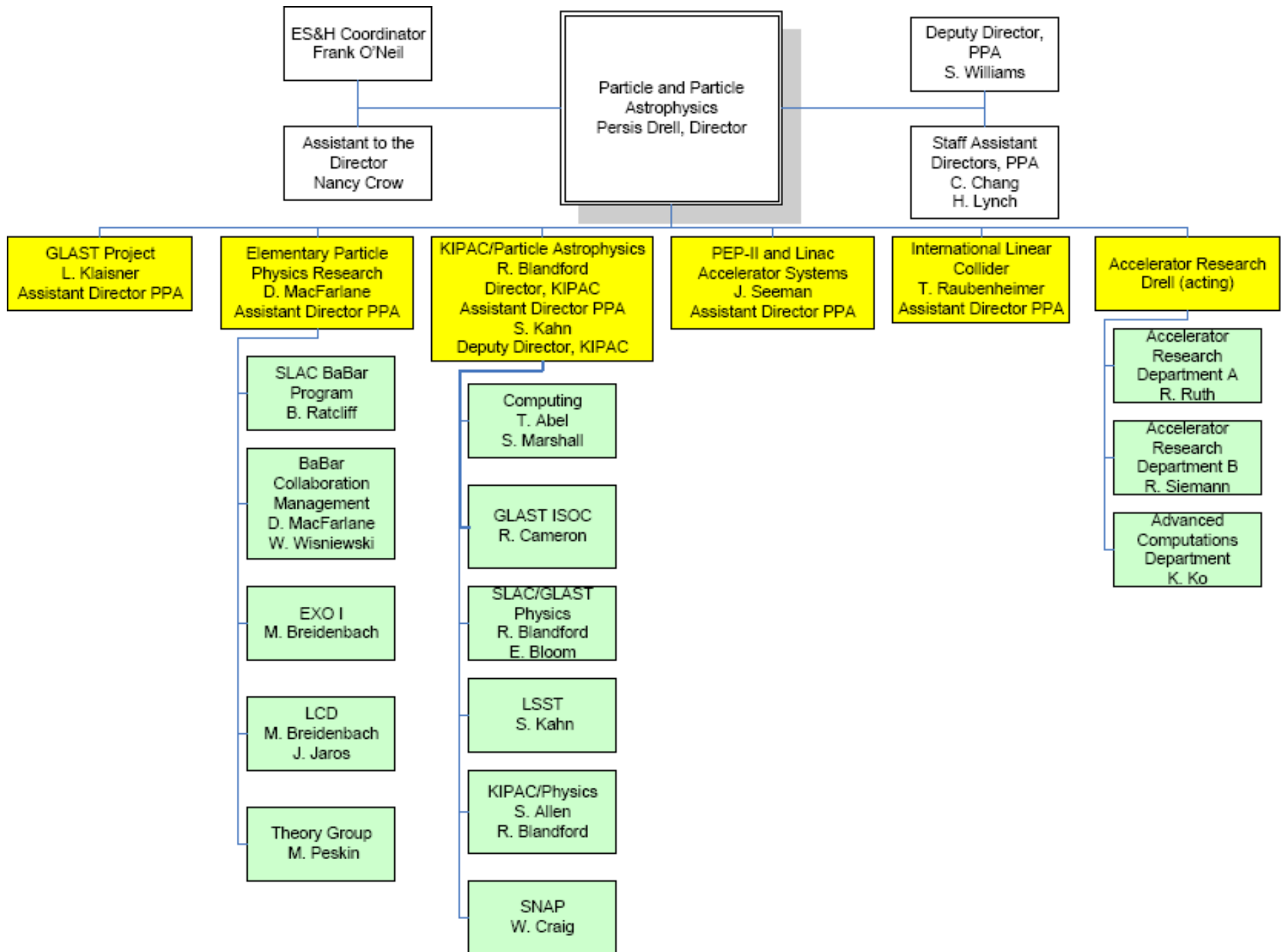
6-2004
4457A8

Stanford Linear Accelerator Center

Directorate Level Organization



* Reports directly to the Laboratory Director



Events of the Past 6 Months

Events of the past 6 months

- In the past 6 months the lab has emerged from a very challenging period
 - Aftermath of a serious electrical accident
 - Budget
 - For GLAST: Budget and Schedule

Challenging Times – The Accident

- We had a serious electrical accident in the laboratory on October 11, 2004
 - Laboratory operations significantly impacted
 - Accelerators were down
 - SPEAR – restarted in January
 - PEP-II—restarted in May
- In general, GLAST fared well in reviews and was able to resume normal work in a timely manner
 - Work authorization process and documentation required for a space project to protect instrument are also effective at ensuring compliance with safety standards at the lab
- Accident led to top to bottom review of safety at the laboratory

Challenging Times (cont.)

- FY2005 HEP program delayed by 6 months
 - With help from DOE, program readjusted so that the B-factory ran through summer
- Budget appropriations were only concluded in January 2005
 - HEP budget was well short of expectation
 - Had to make program adjustments and to lay-off 55 HEP supported people
 - At same time GLAST rebaseline required redirection of resources from other programs in the lab to GLAST

Current and Future Particle and Particle Astrophysics Program

Scientific Challenges and Opportunities

SLAC's Role in these Uncertain Times

- SLAC's Particle and Particle Astrophysics mission:
 - responsibility and an obligation to provide technical and scientific leadership and support to the national (and international) user community
 - provide unique technical capabilities for the management and construction of large-scale projects
 - design, build and operate the accelerators, detectors and observatories that define the frontiers of the field
 - enable members of the user community to play leadership roles in the program and have full access to the science
 - participate in the education of a scientifically trained workforce, and in the training of the future leaders in the field
- Challenge:
 - carry out mission at a time when major changes from past way of doing business
 - No onsite frontier HEP machine
 - carry out mission at time when future options uncertain
 - ILC, LSST, JDEM, ...

Program Elements

- Experimental Initiatives:
 - B-factory → CP violation in flavor sector
 - Precision definition of SM paradigm of CP violation from flavor mixing in CKM
 - Search for new physics in loop processes sensitive to new high mass particles
 - Determine the 'footprint' in the flavor sector of the new physics that will be discovered at the LHC
 - GLAST → High Energy Astrophysics and search for dark matter
 - ILC → Precision energy frontier studies
 - Discover identity of dark matter
 - Resolve mysteries of the Higgs
 - Connect the laws of the very small to the very large
 - EXO → Explore fundamental nature of electron neutrino and measure its mass
 - LSST, JDEM → Fundamental Cosmology
 - Accelerator Research

Program Elements (cont.)

- Computational Initiatives
 - Petacache embedded memory machine
 - First star simulations
 - Dark Energy Studies
 - Fluid Dynamical Simulations of Gamma Ray Bursts
 - Relativistic Shock Structure
- Theoretical Efforts
 - Strings and Quantum gravity
 - Physics at Bottom and Charm Factories
 - Phenomenology of Supersymmetry and Grand Unified Theories → Connections to cosmology
 - Tests of the Standard Model
 - QCD Phenomena
 - Physics at the ILC and LHC
 - Lensing
 - Cluster Cosmology
 - GRB's, Pulsars, AGN's

Status of Program Elements

- B-factory
 - Spectacular Physics Productivity continues
 - Run May -- Sept 2005, Nov – July 2006
 - Luminosity Improvement Program Continues
 - 10^{34} achieved!!
 - Sunset date of end of 2008 for facility called out in President's FY06 budget
- GLAST
 - Integration Activities in Bldg 33 proceeding very well
 - Launch August 2007
 - Build-up of ISOC at SLAC
 - OMB capped DOE support for GLAST operations at \$5M/yr
 - We do not anticipate this will be a problem
 - Will hear many more details at this meeting

Status of Program Elements

- ILC R&D
 - Reprogrammed effort to optimize for support of cold design
 - Linear Collider Detector R&D
- EXO
 - Funding secured to construct 200kg prototype to measure 2 neutrino decay rate of Xe 136
- LSST/JDEM
 - Studies of dark energy and dark matter using weak lensing and high redshift supernovae
 - In proposal phase
- Advanced Accelerator R&D
 - Plasma wake field acceleration
 - Laser acceleration experiment in construction
 - Developing proposals for high gradient R&D

KIPAC: Kavli Institute for Particle Astrophysics and Cosmology

- Operates as independent research center of Stanford University
 - Roger Blandford—Director
 - Steve Kahn – Deputy Director
 - 9 new faculty
 - Most (if not all) will be joint SLAC/Campus
 - Exploit synergy that has come from birth of GLAST
- It is anticipated the institute will bring in funds from NASA and NSF that will flow through campus in addition to DOE funds that will flow through SLAC

KIPAC

- KIPAC is launched!
 - Tremendous Growth in the Past Year
 - > 60 new people including 4 new faculty, 5 new professional staff, 14 postdocs, 25 students, and lots of visitors
 - Search for next 2 faculty underway
- Physical Location
 - Kavli building in construction on SLAC site
 - Varian II building in construction on campus
- GLAST will be part of KIPAC intellectual environment
 - Many Stanford/SLAC members of GLAST are members of KIPAC
 - KIPAC will house some of the GLAST scientists

KIPAC will define the future of Particle Astrophysics at SLAC

- Approved KIPAC Project:
 - NuStar
 - Will be the first focusing X-ray telescope in the hard X-ray band
 - Will study the extragalactic hard X-ray sky in unprecedented detail
 - Will map diffuse non-thermal and nuclear line emission
 - Will resolve source populations in the Galactic plane
- Potential SLAC/KIPAC Projects
 - SNAP Collaboration (JDEM)
 - 2m telescope, 0.7 sq deg field in space
 - Study high z SNe → Dark Energy
 - Strong Lensing → Small scale structure
 - LSST
 - 8.4 m telescope, 8.6 sq deg field on the ground
 - Weak lensing survey of entire sky → Dark matter power density spectrum → Constraints on Dark Energy
- Many other NASA funded KIPAC Projects under discussion (Exist, Next, POGO, ...)
- Theory effort already very productive

Program Timelines: Exploiting the present and preparing for the future

- Science now or soon
 - BaBar (now to 2008)
 - GLAST (2007 – 2012/17)
 - Proof of principle experiments in accelerator research
- R&D for near term science (2012)
 - Ground Based Dark Energy: LSST (first light 2012??)
 - Neutrinoless Double Beta Decay: EXO (2012?? if R&D successful)
 - Space Based Dark Energy: JDEM (20??)
 - ILC (2016?)
- R&D for farther future
 - Accelerator Research

Agenda and Goals for the Meeting

- Overview of LAT Project and GLAST Mission
 - Mission Status
 - Project Status
 - Project Overview, Collaboration Status and Overview of Science Working Group Activities
- Discussion of ISOC, Operations phase support and OCF
 - Goal to agree on final document for signature
- Proposal on how to handle participation from countries without current IFC participation
 - Presentation of first year budget
 - Will seek approval at our March meeting
- IFC Roundtable
- Approval of March Minutes