Emergency Information

- Be aware of exits in your building
  - Speaker will indicate locations for this meeting

- Fire or other emergency evacuation
  - Follow building residents out of building to the assembly area

- Earthquake
  - Remain in building: Duck, cover, and hold position until shaking stops
  - Evacuate building to assembly area outside (follow others)
  - Stay away from windows, downed power lines

- In the event of an emergency
  - Dial 9-911 from a SLAC phone; or
  - Dial 911 from your cellular phone
  - Provide SLAC address (2575 Sand Hill Road, Menlo Park, CA; cross street Saga Lane) and your building/room number.
Laboratory Overview

Persis S. Drell
Deputy Director
SLAC
Our Goal is to Deliver Spectacular Science

- You will be hearing a lot in the next 2 days
- My talk will focus on an overview of the program and the strategy for its evolution
Observation of DD Mixing

\[ RS: D^{*+} \rightarrow D^0 \rightarrow K^- \pi^+ \pi^+ \]
\[ WS: D^{*+} \rightarrow D^0 \rightarrow K^+ \pi^- \pi^+ \]

- More precise background estimates for LHC via QCD loops
  - Precise estimates need one-loop QCD scattering amplitudes
  - Thousands of complicated Feynman diagrams
- Better strategy: construct amplitudes using their basic analytic properties
  - Main concepts in method established
- Next steps will include much automation
L-Band cavity for ILC

>80 GeV e- @ SLAC
From plasma accelerator

SLAC Prototype Collimator Jaw
Allen et al. combine cluster, SN and CMB data to show that $w = -1.01 \pm 0.09$.

Greenhill, Madejski et al. have discovered a new edge-on Megamaser disk orbiting a three million solar mass black hole.

Abel, Wang & Zhang have written a new 3D relativistic hydrodynamics code incorporating Adaptive Mesh Refinement and used it to model extragalactic jets.

Wechsler et al. have completed a major study of nearby SDSS clusters and are using it to measure major cosmographic parameters.
SLAC: The Lab is Changing

- 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
  - 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.
  - Will be serving user community at accelerator facilities that will be off site
    - e.g. ILC; LHC
  - A vibrant program of accelerator research will continue
  - Non-accelerator efforts will grow
LCLS Construction -- Beam Transport
LCLS Construction -- Two Tunnels ongoing
LCLS Construction Near Experimental Hall
SLAC Program Balance in 2010

- This year for the first time over half the funding coming to the lab is from DOE-BES
  - Includes LCLS project funding
- By FY09, all major on-site accelerator user facilities will be BES funded
  - Possible exception of accelerator R&D facilities funded by HEP
- Anticipate that by end of the decade DOE-HEP programs will be ~40% of the laboratory
  - Contrast with FY04 when DOE-HEP programs ~75% of the laboratory
Transition!

- Laboratory undergoing major transition
  - Scientific focus
  - Style of doing business
    - BES vs HEP

- Aspects of managing the transition
  - Program balance
  - Workforce planning and management

- Laboratory has been through major transitions before
  - Part of keeping vital and healthy
  - This transition is more challenging than most!
Transitions in Particle Physics

- Major US facilities are turning off
  - B-factory, Tevatron
- The energy frontier is the highest priority for the field
  - Energy frontier is moving to Europe with turn on of LHC
  - ILC is highest priority new accelerator for the field
    - It is very expensive
- Not all questions can be answered at the energy frontier
  - Compelling science of dark matter, dark energy, fundamental nature of the neutrino
    - Requires focused suite of non-energy frontier experiments
- SLAC program designed to optimize creating and exploiting opportunities at the energy frontier
  - Balanced with R&D for experiments that will deliver science 2010-2020 in highest priority areas
As Field Evolves so does SLAC

As a national lab, we have a responsibility and an obligation to provide technical and scientific leadership to the national (and international) user community.

Over the past 5 years, we have evolved laboratory program to meet the most exciting future challenges:
- LHC Participation
- KIPAC
- Evolution from warm to cold ILC
- Accelerator Research Center (upcoming)

Goal: Broaden program in strategic fashion
- Simultaneously strengthening and supporting traditional accelerator based mission
- Whole of the program is greater than the sum of the parts
- New initiatives build off core strengths
SLAC Particle Physics Mission

- Successful completion of B-Factory Program
- Explore Physics of the Energy Frontier
  - ILC, LHC, Accelerator Research
- Advance our understanding of the origin, evolution, and future of the universe.
  - GLAST, LSST, SNAP
- Investigate the fundamental nature of the neutrino
  - EXO
- All elements supported by strong program of theoretical investigations
Program Timelines: Exploiting the present and preparing for the future

- Science now or soon
  - BaBar (ops through 2008, science to 2012?)
  - GLAST (2008 – 2013/18)
  - LHC: ATLAS & LARP (now-2020?)
  - Proof of principle experiments in accelerator research

- R&D for near term science (2012 and beyond)
  - ILC/LCD
  - LSST
  - EXO
  - SNAP

- R&D for farther future
  - High Gradient Program
  - Accelerator Research
Strategic Challenges

- How does SLAC stay world class in Particle Physics with no major on site user facility?
- How do we best serve the needs of the University user community?
- Four major areas of effort:
  - Accelerator Based Particle Physics
    - B-factory is turning off
    - LHC turning on at CERN
  - Non-Accelerator Based Particle Physics
    - GLAST, EXO-200, Working to get new initiatives moving
  - Accelerator Research
    - How to maintain unique capabilities for HEP future
  - ILC
    - Critically important for the future of the field
- Each has its own unique strategic challenges
- You will hear how we are addressing these challenges over the next 3 days
Strategic Plan for Accelerator Based Particle Physics

- We are managing the transition from BaBar to new programs over the next 3 years
  - We are delivering the most important B-factory science while also working to grow new programs (ATLAS, LCD)

- We have defined SLAC's future in post-BABAR accelerator based elementary particle physics
  - We are working to make our ATLAS effort strong. We are working to develop the most effective way to serve the ATLAS University user community
  - We are involved in LARP. We are considering what should be our involvement with ATLAS upgrades
  - These investments are being balanced with our investments in the high-priority long-term program of ILC detector R&D
Strategic Plan for ILC

- We are managing the transition into EDR phase
  - we are defining areas of focus with GDE
  - we have developed integrated teams (acc phys and engineering)
  - we are strengthening our BDS/MDI/LCD effort

- We are struggling to maintain laboratory core competencies
  - Examples: klystron, power conversion
  - there is sometimes imperfect alignment with GDE/ART near term priorities
Strategic Plan for Non-Accelerator Based Particle Astrophysics

- KIPAC's vibrant program of computational, observational and theoretical discovery in astrophysics and cosmology will continue.

- We are supporting the GLAST collaboration through the ISOC
  - we will play a leading role in using GLAST data to understand dark matter, relativistic outflows and particle acceleration.

- We are leading the design and construction of the LSST camera.
  - We will use LSST data to understand the properties of dark energy and dark matter in the expanding universe.

- We will participate in SNAP
  - Taking advantage of lessons learned on GLAST.
Strategic Plan for Accelerator Physics

- Accelerator physics is a core competency of the laboratory. We are working to ensure continued health and viability in service of the HEP mission.
  - SABER is an essential component of this strategy for our future when we no longer have a major on site HEP operating accelerator facility.
  - We have work to do to make SABER a reality.

- We are working to develop a broad, integrated program of accelerator physics that meets mission needs for both BES and HEP.
What is SLAC’s role for the field going forward?

As a national lab, we have a responsibility and an obligation to provide technical and scientific leadership to the national (and international) user community. We do this with:

- Support for University users on ATLAS
  - Over ½ of the University FTE effort will be working on LHC experiments
  - University researchers *must* be effective participants in the frontier science located off shore
- Unique accelerator research facilities and staff
  - University connection to draw in students
- Unique technical capabilities and experienced staff:
  - Allow University users to couple to machine and detector efforts for ILC
  - Hope to provide technical support for University based efforts on LHC upgrades
  - Development of non accelerator projects
- Strong intellectual community behind all of these efforts
Managing the Program

In A Time of Change...
Where the money is: Budget by Program

Table 1: Annual Budget in Thousands Including Overhead in Millions

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<th>Programs</th>
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[1] No Allocation of PPA Direct Program Support
[2] Total ILC at SLAC is 20.5M and 36.4M. PPA Dir Program support, 2.2 and 3.2M respectively in 08 & 09, would be allocated starting in 08
### Where the people are: FTE’s by Program

#### Tabel 2: FTEs By Programs - FY 07

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Overview of Agenda

- **Plenary Talks:** High level program overviews
  - **Speak to Charge**
    - Organized by themes (as much as teaching and travel schedules will allow)
  - Plenary talks will focus on lab program
  - Theory talks (Blandford, Hewett, Peskin) to help motivate the experimental program

- **4 Breakouts--Interactive**
  - **Theory**
    - Includes astrophysics and cosmology
  - **Accelerator Research**
    - ILC, LARP, Other R&D activities
  - **Accelerator Based Particle Physics Research**
    - BaBar, LCD, ATLAS
  - **Non Accelerator Based Particle Physics and Particle Astrophysics Research**
    - EXO, GLAST, LSST, SNAP

- **Breakouts will focus on efforts of SLAC staff**

- **Thursday:** Planning for the future
Where would we like PPA to be in 10 years?

- SLAC will be a thriving user center for west coast ATLAS
- ILC will be in construction at Fermilab with strong SLAC participation
- GLAST will be approaching the end of operations
- LSST will be in operation under KIPAC umbrella
- A ton scale double beta decay experiment will be in operations somewhere
- A new suite of next generation of experiments will be under development
- Accelerator research with experiments in higher gradients and novel acceleration mechanisms will be showing the way to the future of accelerator based particle physics
- .....but we have to deal with the uncertainties ....
Where will PPA be in 10 Years?

- SLAC-PPA is evolving and diversifying --- as it must!
  - Not changing the core principles under which it serves the national scientific enterprise
  - Not changing crucially important need for strong ties with the university community.

- We have thought long and hard about which programs to develop
  - Each is making remarkable progress
  - You will be hearing the details over the next 2 days

- We know that some of our investments will never come to fruition
  - We are confident that many will do so and we will continue to adapt.

- We face significant challenges
  - As does the entire field

- The SLAC-PPA program is structured to be robust against the uncertainties in the field at this time.