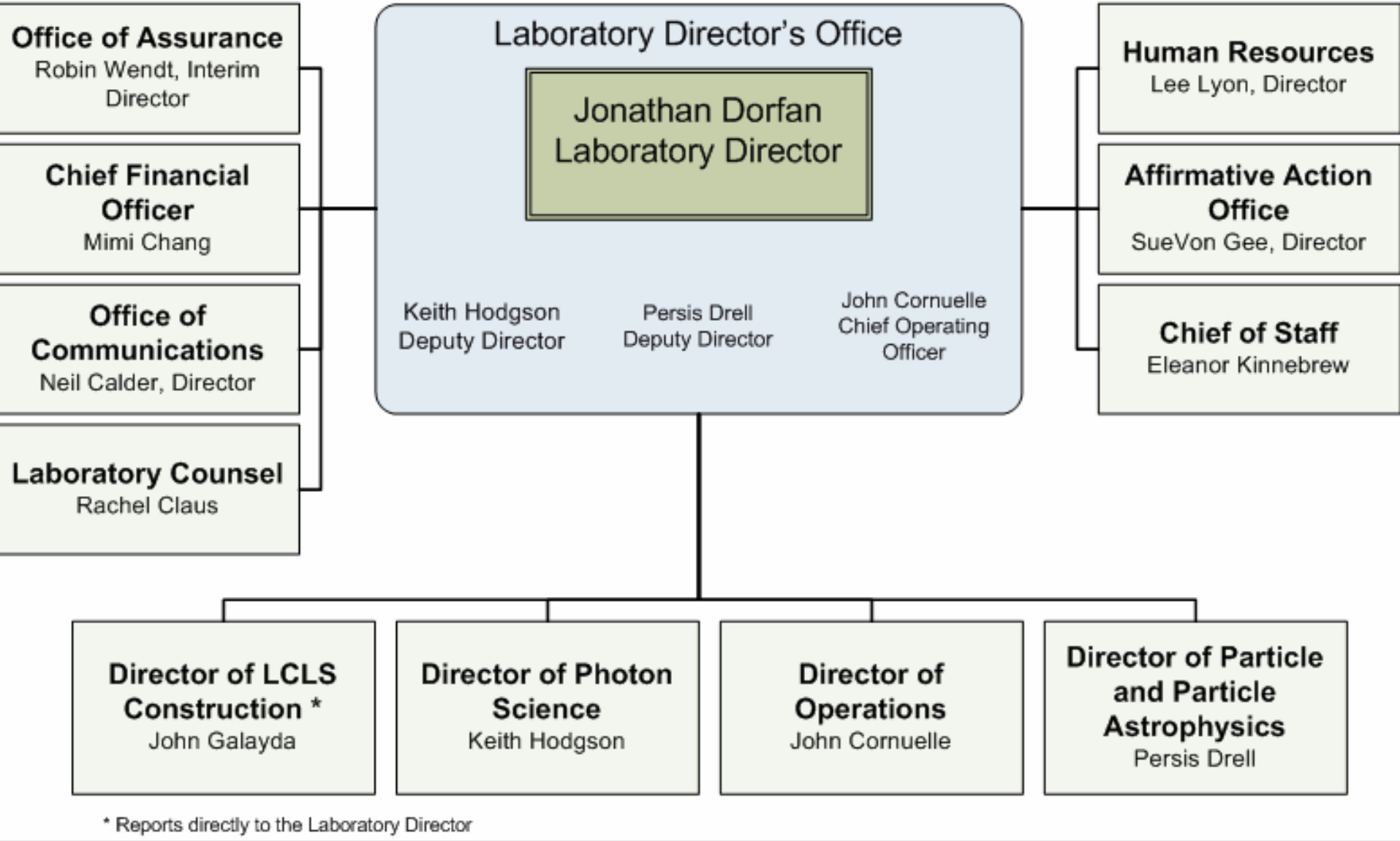
PPA Overview and B-Factory Project Tracking

Persis S. Drell
Deputy Director

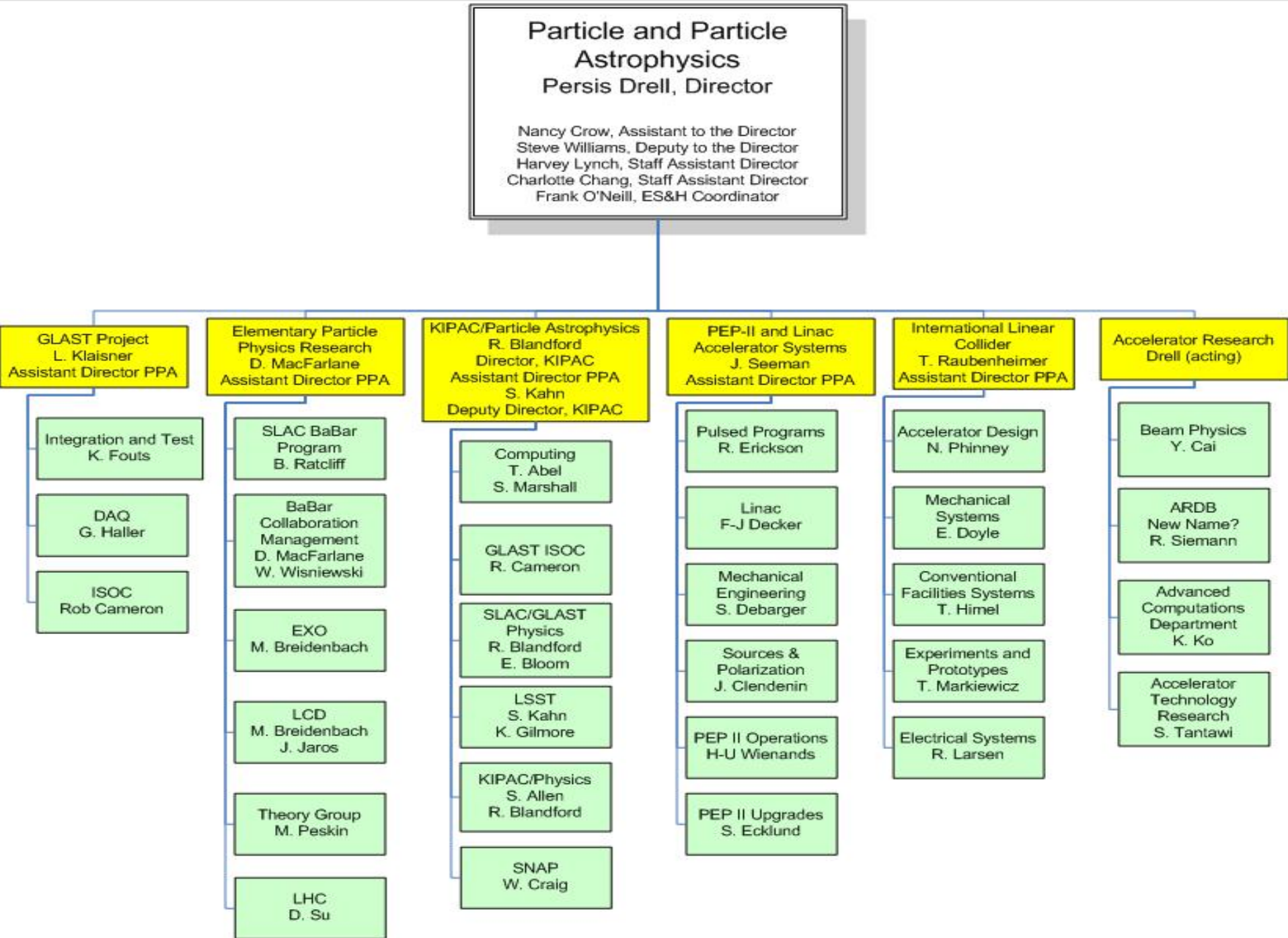
PPA Overview

Stanford Linear Accelerator Center

Directorate Level Organization



* Reports directly to the Laboratory Director


Particle and Particle Astrophysics
Persis Drell, Director
Nancy Crow, Assistant to the Director
Steve Williams, Deputy to the Director
Harvey Lynch, Staff Assistant Director
Charlotte Chang, Staff Assistant Director
Frank O'Neill, ES&H Coordinator
GLAST Project
L. Klaisner
Assistant Director PPA
Integration and Test
K. Fouts
DAQ
G. Haller
ISOC
Rob Cameron
Elementary Particle Physics Research
D. MacFarlane
Assistant Director PPA
SLAC BaBar Program
B. Ratcliff
BaBar Collaboration Management
D. MacFarlane
W. Wisniewski
EXO
M. Breidenbach
LCD
M. Breidenbach
J. Jaros
Theory Group
M. Peskin
LHC
D. Su
KIPAC/Particle Astrophysics
R. Blandford
Director, KIPAC
Assistant Director PPA
S. Kahn
Deputy Director, KIPAC
Computing
T. Abel
S. Marshall
GLAST ISOC
R. Cameron
SLAC/GLAST Physics
R. Blandford
E. Bloom
LSST
S. Kahn
K. Gilmore
KIPAC/Physics
S. Allen
R. Blandford
SNAP
W. Craig
PEP-II and Linac Accelerator Systems
J. Seeman
Assistant Director PPA
Pulsed Programs
R. Erickson
Linac
F-J Decker
Mechanical Engineering
S. Debarger
Sources & Polarization
J. Clendenin
PEP II Operations
H-U Wienands
PEP II Upgrades
S. Ecklund
International Linear Collider
T. Raubenheimer
Assistant Director PPA
Accelerator Design
N. Phinney
Mechanical Systems
E. Doyle
Conventional Facilities Systems
T. Himel
Experiments and Prototypes
T. Markiewicz
Electrical Systems
R. Larsen
Accelerator Research
Drell (acting)
Beam Physics
Y. Cai
ARDB
New Name?
R. Siemann
Advanced Computations Department
K. Ko
Accelerator Technology Research
S. Tantawi

PPA Management Overview

- Close knit management team
  - Staff Assistant Directors and Deputy Director
    - Make things happen and administer the directorate
    - Weekly budget and planning meeting with PPA director
  - Science Assistant Directors
    - Responsible for the major programs and projects
    - Individual meetings weekly with PPA director
    - Biweekly meetings of senior management team including all Asst. Directors, Deputy Director and PPA Director
- Allows efficient communication on issues from strategic to tactical
- Allows fast deployment of resources to places where they are needed

Major Programs in PPA

- B-Factory Operations
  - Operations of facility serving our largest user community
  - ***Successful Operation of the B-Factory is PPA's highest priority***
- ILC/LCD
  - Growing program, vitally important for future of SLAC and HEP
- GLAST
  - Construction project completed; Moving into operations phase
- New Initiatives
  - LSST/EXO/ATLAS/JDEM
- Ongoing program in accelerator research
  - FFTB→ SABER
- ***Challenge is to optimally balance the near term, mid term, and long term focus of the program***

PPA Resource Management Philosophy

- All HEP funding planned in uniform/integrated way
  - Including activities in Ops Directorate funded by HEP
- Managers are asked to prepare budget requests that clearly identify resources for:
  - Support for ongoing operations and manpower
  - Program support (BaBar, ILC, GLAST, ...)
  - Support for technology development and R&D efforts (LCD, LSST, High power RF, ...)
    - Include description of planned scope of work
    - Justification of budget request
- Guidance provided to help manage expectations
- Funds are allocated based on achieving a balanced program that can be justified on technical and scientific merit.

Resource Planning with ISM in mind

- Program managers/ Department Heads must clearly identify resources assigned to hazard analysis
- Hazard mitigations must be embedded in program resource requests – people and M&S
- Program managers/ Department heads must ensure that controls are in place before commencement of operations
- Director, Program Managers, supervisor must oversee execution with controls

PPA Resource Management

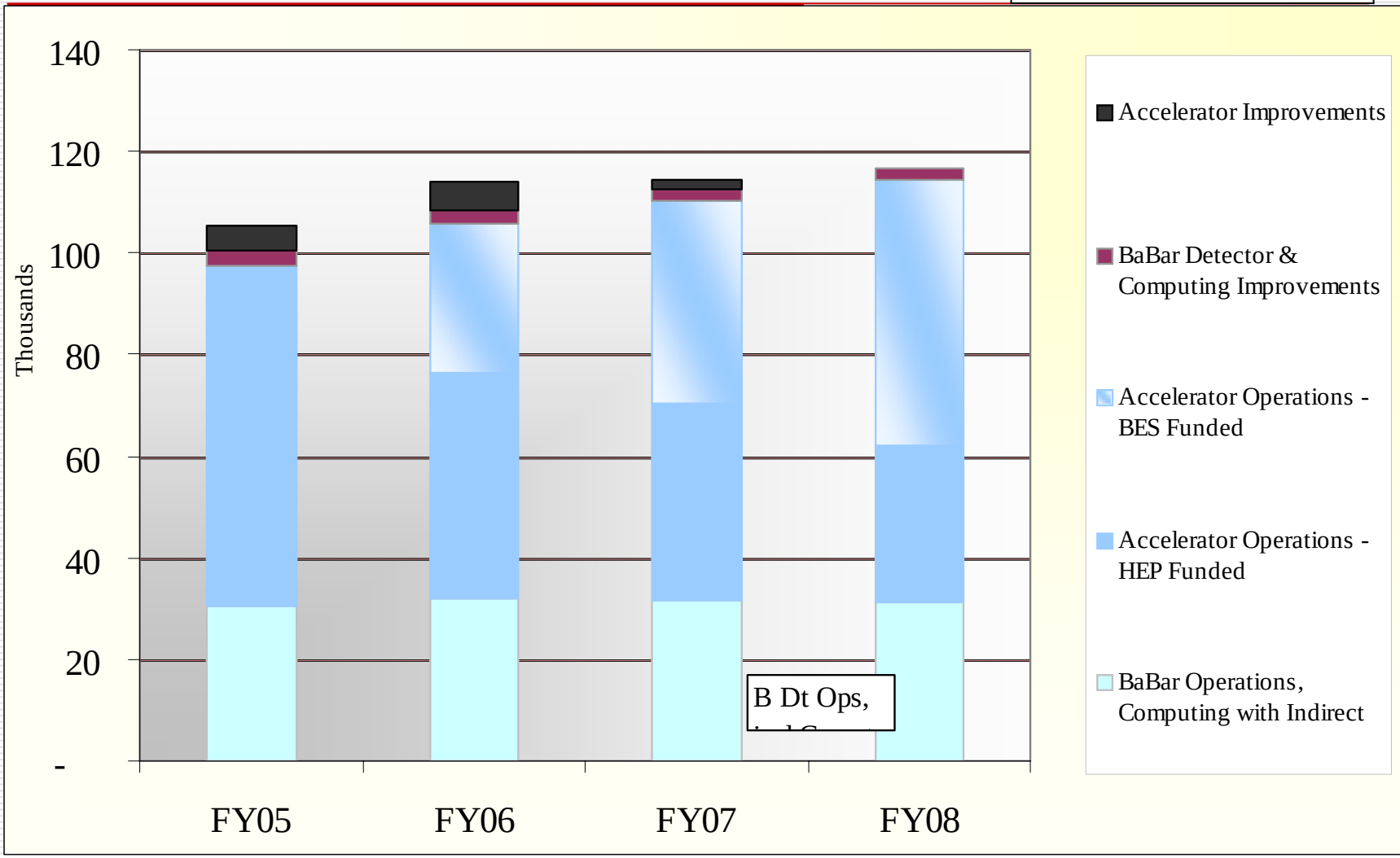
- Most resource issues are identified and resolved by line management at the department level
- Resource conflicts within PPA are resolved at the PPA management level by me and my Assistant Directors
  - e.g. ILC and PEP-II
  - e.g. GLAST and BaBar
- Resource issues between directorates resolved in daily 9AM meetings of Director, Deputies, COO and LCLS Project Manager
  - Laboratory Liaison for LCLS: Steve Williams

Laboratory Liaison for LCLS

- **Director's Office All Hands (3/06):** The Linac Coherent Light Source (LCLS) is a major construction project, and during the next three years it will require a smooth and effective interface with virtually every department and function at SLAC. Ensuring the success of the LCLS, while maintaining our usual outstanding performance for all other functions at SLAC, is essential. To make that happen, I have asked Steve Williams to expand his role with the new assignment of "Laboratory Liaison for LCLS". This assignment will last for the duration of the LCLS construction. Steve's task is to work with LCLS and the leaders of the major non-LCLS activities in the Lab, to anticipate and mitigate, as best is possible, the impacts and interferences resulting from the construction. Paramount in this assignment is ensuring that the Lab's ISEM Systems are fully engaged, namely that roles and responsibilities in the interfaces are well defined, that unexpected impacts are minimized and that Lab-wide safety is never compromised. Steve will continue his role as Deputy Director of the Particle and Particle Astrophysics (PPA) Directorate.

B-Factory Accelerator and Detector Operations Costs*

*Includes indirects



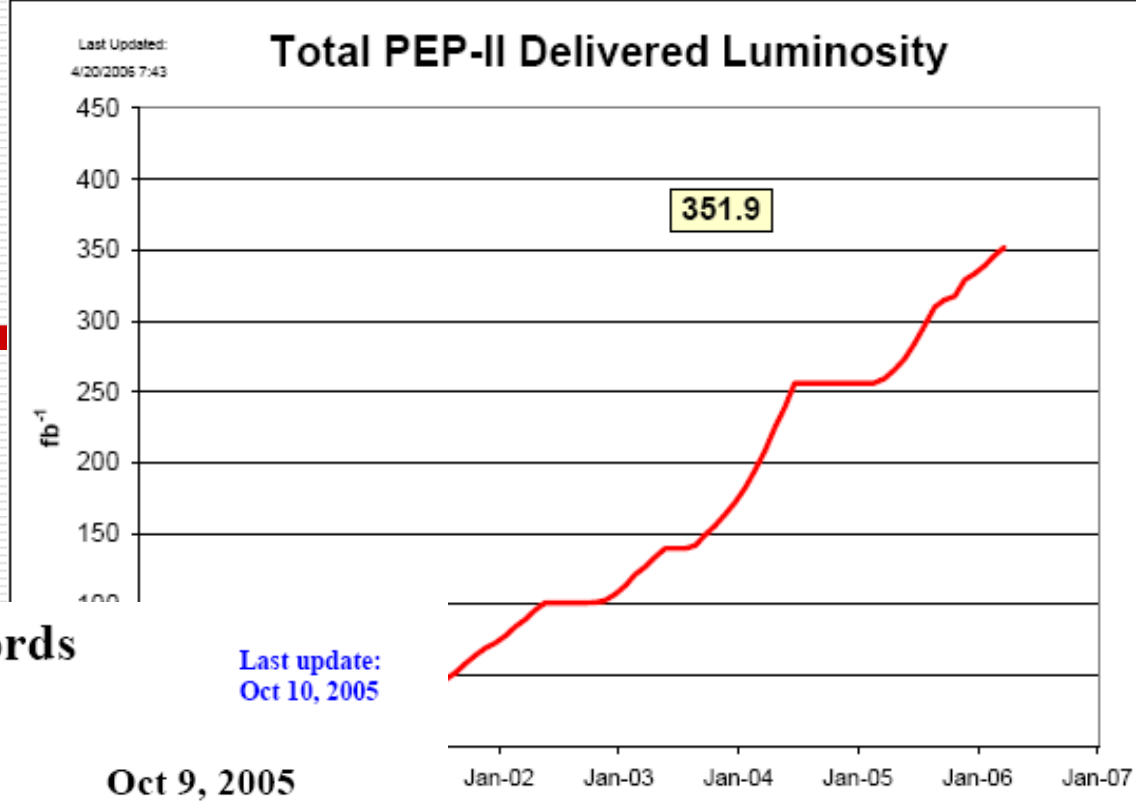
B-Factory Performance

B-Factory Program

- PEP-II Accelerator
  - Collides e+ and e- with unequal beam energies at E_{CM}=10.58 GeV
  - Premier tool for studying physics of heavy flavor
- BaBar Detector
  - Optimized for B-physics at asymmetric energy collider
  - Run by International Collaboration of ~623 physicists from 80 institutions in 11 countries
- Program of Rich Physics
- B-factory program operates until end of FY2008
  - Ultimate goal: Deliver to BaBar: ~1ab-1 end of FY2008
  - Laboratory committed to delivering luminosity

Journal Papers	BABAR	Belle
<2003	32	54
2003	39	28
2004	52	35
2005	60	36
2006	21	14
Total	204	167

Machine Performance



PEP-II Records

Last update: Oct 10, 2005

Peak Luminosity

10.025×10^{33} $cm^{-2}sec^{-1}$ **Oct 9, 2005**

1732 bunches 2940 mA LER 1740 mA HER

Integration records of delivered luminosity

Best shift (8 hrs, 0:00, 08:00, 16:00)	247.2 pb^{-1}	Oct 7, 2005
Best 3 shifts in a row	727.8 pb^{-1}	Oct 7, 2005
Best day	710.5 pb^{-1}	May 24, 2004
Best 7 days (0:00 to 0:00)	4.464 fb^{-1}	Jul 25-Jul 31, 2004
Best week (Sun 0:00 to Sat 24:00)	4.464 fb^{-1}	Jul 25-Jul 31, 2004
Peak HER current	1745 mA	Oct 10, 2005
Peak LER current	2995 mA	Oct 10, 2005
Best 30 days	16.720 fb^{-1}	Jul 2 – Jul 31, 2004
Best month	17.036 fb^{-1}	July 2004

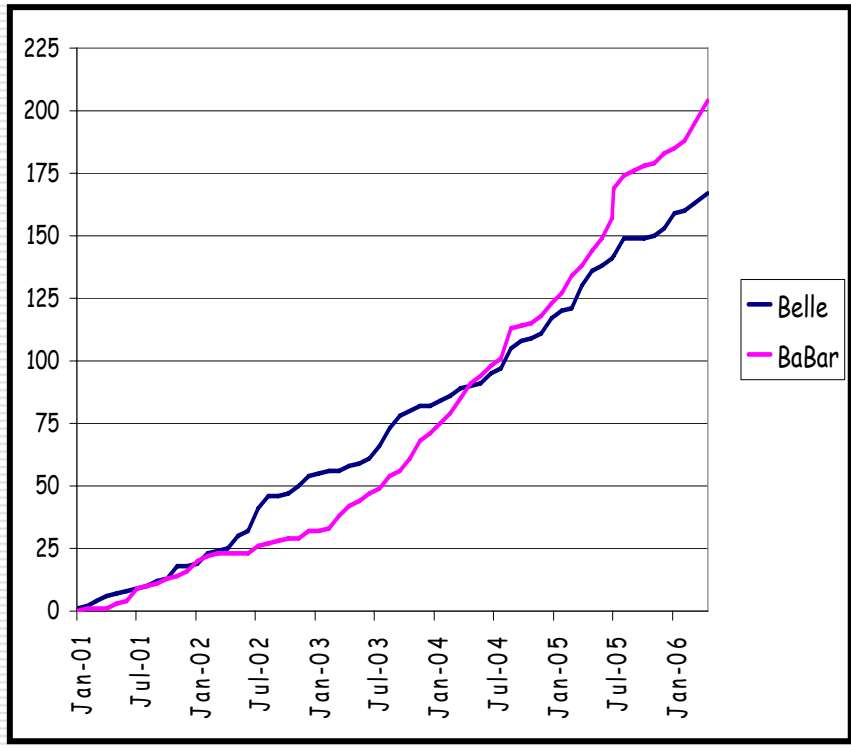
B-Factory Program

- The physics program at the SLAC B Factory remains absolutely compelling
  - The scientific program at 1000 fb^{-1} has enormous discovery potential and provides access to leading questions in heavy quark and heavy lepton physics that are uniquely achievable at an e^+e^- asymmetric B Factory
- Accordingly, the Laboratory's commitment to the B Factory Program has never been stronger.
- We are fully committed to running PEP-II/BABAR through the end of FY2008, maximizing the integrated luminosity at every turn

B-Factory Physics Performance

- SLAC B Factory continues to be a physics fountain
  - Babar produces, on average, one, high-quality journal publication per week. Many of these are “first-ever” measurements
  - By any metric, Babar’s productivity is outstanding; but it is especially impressive as measured by physics/fb^{-1}

Journal Papers vs time



FY2005 was a Very Challenging Year

- Impact of accident
  - FY2005 began with a very serious electrical accident. Laboratory operations were significantly impacted at all levels
  - The start of the FY2005 HEP scientific program was delayed by 6 months
  - B-Factory schedule reprogrammed and planned IFR upgrade delayed to FY06
- Impact of FY05 budget
  - Needed to layoff ~60 staff to accommodate very difficult budget
  - B-factory AIP reduced $2M
- PEP-II responded to the challenge by achieving record luminosity in FY2005
  - Peak luminosity $1x10^{34}$ (over 3x design)
  - Daily integrated luminosity reached 5x design

FY2006 has its Challenges as well

- Shortfall of $2M from FY06 President's budget
  - B-factory protected
  - All other HEP programs have been cut
- B-factory turn on 11/05 after 1 month down excellent
  - Fast return to high luminosity
- Machine performance in the past three months was limited by an extremely subtle and difficult-to-isolate problem.
  - Tremendous ingenuity and agility that went into the diagnosis and repair of this problem, which is fixed

Machine and Detector Upgrade Plans On Schedule

- Hardware will be installed this Summer that enable the as-promised peak luminosity of $2x10^{34}$ $cm^{-2}sec^{-1}$
- PEP-II Machine Advisory Committee met January 18-20, 2006. They reviewed in great depth the upgrade plans for PEP-II and stated:

  "**With the announcement of a termination of the PEP-II HEP program no later than the end of FY2008, the PEP-II staff has reexamined major luminosity improvement projects and realigned priorities and plans appropriately. The staff has presented to this committee a sound plan to optimize productivity of the machine during this period, with a doubling of the luminosity to 2x1034 cm-2-sec-1, reaching a total integrated luminosity of 1000 fb-1**"

B-Factory Project Tracking

PEP-II

BaBar

PEP-II Strategic Direction

- Series of dedicated task forces
  - Meet weekly in dedicated areas of focus for machine improvement
- Task forces deal with accelerator issues with the goal to provide more luminosity and higher integrated luminosity.
  - identify key issues
  - proposed machine studies, hardware improvements, and personnel changes.
- All the task force leaders meet on Wednesdays to provide a common focus and clear overall leadership
  - Wednesday meeting attended by Laboratory Director, PPA Director, and COO, representatives of key ops depts.
- Weekly meeting of Assistant Director for PEP-II and Linac Accelerator Systems and PPA Director
  - Address resource issues and strategic planning
- External review provided by Machine Advisory Committee
  - Chaired by Dave Rice of Cornell
  - Meets every 6 months at SLAC for 3 days
  - Recommendations taken seriously (e.g. Lattice Effort)

PEP-II Project Tracking

- Three distinct types of work
  - Operations tracking
    - Daily 8AM operations meeting followed by daily 8:15 PEP-II/BaBar coordination meeting
  - Maintenance tracking
    - Majority of this work is performed by personnel organizationally outside of the Accelerator Department
    - Work managed and tracked with ARTEMIS
      - Accelerator Remedy Trouble Entry and Maintenance Information System
  - Facility Management/Strategic Planning
    - Accelerator facilities are constantly upgraded
      - also may involve coordination with LCLS work
    - Weekly project review meeting to consider and review minor modifications
    - Extensive down time planning process with weekly project tracking meetings
      - Later today will see example of how we are planning for major down this fall involving PEP-II, BaBar and LCLS activities

BaBar Strategic Planning

- Long term
  - Collaboration internal self-assessments: Tech board and exec board
    - 2000: look at detector upgrades for up to 10x design luminosity.
    - 2002: physics justification for the program to ~1-2/ab
    - 2002: decision to replace IFR
    - Computing model evaluations have occurred in parallel.
  - External reviews (e.g. Butler review for CM2; IFC, EPAC for IFR) follow
  - International Finance Committee
    - Track progress, provide financial support for upgrades and continued running
- Short term:
  - daily operations meetings with all subsystems: 7:45 & 3:45
  - weekly BaBar management meetings
  - weekly PEPII-BaBar coordination meetings

BaBar/PPA Management Coordination and Project Tracking

- Upgrade planning and execution
  - Close collaboration between Laboratory and Collaboration
  - Resources from lab and from international partners
  - Safety oversight carefully considered and executed
  - Work appropriately phased with other PPA projects
- Close communication between BaBar management and PPA management
  - Biweekly meetings between BaBar management and PPA director

Summary and Conclusions

Performance

- The scientific productivity of the B-factory is outstanding
- The planned performance of the machine has been impacted by the accident and recent (resolved) technical issue
  - Re-planning has been necessary
- The performance of the detector is excellent
  - The planned IFR upgrade is on track

Resource Planning and Management

- Manpower is tight in several critical areas
- DOE has been helpful in supporting the increase in power costs which was a significant resource concern at the last review
- Resource sharing is a strength of the lab
- We adjust the program elements and their relative priority to ensure the success of the B-factory

Challenges/Risk

- BaBar
  - Competitiveness with Belle
  - IFR Upgrade
- PEP-II
  - Technical risks—high current operations
    - The recent technical problem was anticipated
- Laboratory wide
  - Long term planning and evolution of PPA research program
  - Evolution of support resources
  - Evolving balance of program

Prioritization

- The greatest challenge is the balance of the B-factory priorities with LCLS
- We recognize this challenge and it is being actively and aggressively managed