Goal 1 Efficient and Effective Mission Accomplishment

MAJOR ACCOMPLISHMENTS

- SLAC, in collaboration with Argonne National Laboratory and the Technological Institute for Superhard and Novel Carbon Materials (TISNCM), demonstrated FEL self-seeding at x-ray wavelengths on the LCLS with a factor of 30-40 bandwidth reduction observed with respect to self-amplified spontaneous emission (SASE) operation.
- In parallel, laser-based FEL seeding using echo-enabled harmonic generation was explored. The results of the Echo-7 experiment were reported in *Physical Review Letters* 108, 2012.
- FACET became a National User Facility in January 2012.
- SSRL received first funding from the Bay Area Photo Voltaic (PV) consortium, a step in growing industrial research at SSRL.
- Publication of:
    - EXO measurement of the two-neutrino double beta decay of Xenon-136.
    - Fermi GST results on searches for dark matter with satellite dwarf galaxies and measurement of the positron-to-electron ratio for energies from 20-200 GeV.
    - *BABAR* evidence for direct *CP* violation in charged *B* decays to three kaon final states.
- Successfully improved production rate for CDMS sensors to 6 detectors per month.

STATUS OF NOTABLE OUTCOME(S)

- N/A for Goal 1

SIGNIFICANT CONCERNS AND MITIGATIONS

- Efficient continuation of accelerator maintenance and improvement with reduced operations budget in FY2012 will impact LCLS availability long term.
    - Mitigation: Mission readiness assessment of all accelerator infrastructure to be finished by end FY2012 and will communicate the assessment to BES and HEP by the end of CY2012; optimize staff coverage and reprioritize machine maintenance projects.
- There is increased risk to mission execution due to reduced funding which results in negative impact on core competencies that include personnel and technical infrastructure.
    - Mitigation: There is an initiative to mitigate this risk by developing a viable Sponsored Research/Work for Others Program. Developing a proposal for investment in shared computing hardware systems for the HEP program at SLAC as the end-of-life shutdown of *BABAR* computing occurs over the next three years. Developing a proposal for Ba ion capture and transport, and overall conceptual design, for a tonne-scale version of EXO as a contender for the next generation neutrinoless double beta decay experiment.
- The cancellation of ILC funding in FY2013 will endanger completion of the Technical Design Report (TDR) and, longer term, risks loss of core competencies that will be needed for any future linear collider project.
    - Mitigation: SLAC will complete its work on the ILC TDR in CY2012 with a small amount of carry-forward funding in Q1 of FY2013, and no new money in FY2013. Core competencies in linear accelerator design will be partially sustained by continuing participation in other non-ILC design efforts, including LCLS-II and other FEL design and R&D initiatives, and by SLAC's alignment with national accelerator design and R&D programs as defined by the HEP accelerator stewardship program.

Goal 2 Efficient and Effective Design, Fabrication, Construction and Operations of Research Facilities

MAJOR ACCOMPLISHMENTS

- Finished two science instrumentation/facility construction projects receiving CD-4 (FACET and LUSI).
- Developed a unique hybrid operations mode on SPEAR3 which provides short pulses (few ps) which enable SSRL to expand its time-resolved research program.
- The SLAC design for an ultimate storage ring for synchrotron radiation, PEP-X, has received world-wide interest.
- Received supplemental funding from NIH to construct an injector for nano-crystallography user program at LCLS.
- Successfully completed CD-1 review of the LSST camera project, and successfully completed MOU with the Association of Universities for Research in Astronomy (AURA) concerning delivery and integration of the LSST camera into the full project.
- Consistent high photon beam delivery to LCLS users during run V (exceeded goal of 95 % beam availability).

STATUS OF NOTABLE OUTCOME(S)

- BES: Develop the project baseline for the LCLS-II and achieve CD-2. (Objective 2.1)
    - Achieved CD-3A for injector on March 16, CD-2 review planned for August 2012.
- HEP: Provide HEP with a plan to run the FACET user facility in FY2012 and a plan to deliver a successful user run of the facility consistent with the funding provided by HEP and guidance supplied in the approved financial plan. (Objective 2.3)
    - The FACET division provided OHEP with an FWP to operate the facility from March 2012 through June 2012. The proposal for a FACET National User Facility was submitted to DOE OHEP in Q1 FY2012 and FACET was established as a National User Facility in Q2 FY2012. The first user run will start in Q3 FY2012.
        - Held second Advisory committee/proposal selection committee meeting.
        - An acting FACET Division Director is in place while the search for a permanent Director is conducted.

SIGNIFICANT CONCERNS AND MITIGATIONS

- Inadequate LCLS linac operating funding to sustain planned facility maintenance and accelerator improvement projects. Infrastructure and component improvements delayed, increasing the possibility of failure and reduced beam delivery time to users. Such delays in modernization could adversely impact LCLS-II.
    - Mitigations: Most critical component improvements identified and funded, some with extended funding profiles to reduce annual cost. Reduced 24/7 services on site, especially during weekends, to reduce cost. Reduction in force to accommodate restricted budget.
    - Carefully prioritize the LCLS budget, and begin discussions with DOE regarding the operating budget increase to run LCLS-I and II. Target FY2017 for start of operating budget increase.
- Operations budget not sufficient for implementing full FACET user program, and failure rate of components higher than foreseen, shortening FACET run further.
    - Mitigations: The present funding allows two months of user beam time. Discussions with OHEP are being conducted to find means to maximize the FACET running time for FY2013. In FY2012, RF components will be shuffled with spares to keep the linac operational. The maintenance in the linac for operation in FY2013 will concentrate on restoring the spares.
- Operating budget of SSRL is a significant concern. The current budget is insufficient to operate the beamlines optimally for the current user program and the anticipated growth of user community, especially in areas

relevant to core BES mission interests. For FY2012, carry-forward funding from FY2011 will allow SSRL to operate the current suite of instruments sub-optimally.

- Mitigation: SSRL is actively working with BES facility division on out-year budget to establish a long-term sustainable operating budget.

Goal 3 Efficient and Effective Science and Technology Program Management

MAJOR ACCOMPLISHMENTS

- Dr. N. Holtkamp led HEP task force for implementation planning of national Accelerator R&D program.
- Dr. Shoucheng Zhang, a Stanford faculty member participating in SLAC's Photon Sciences research program , and two other researchers, were awarded the 2012 Oliver E. Buckley Prize in Condensed Matter Physics for their prediction and discovery of topological insulators.
- Dr. JoAnne Hewett named co-convener of the DOE Workshop on Fundamental Physics at the Intensity Frontier
- Developed common strategy with Lawrence Berkeley National Laboratory on West Coast initiatives and implemented programmatic elements mutually supporting several programs in both labs (*e.g*. Materials Genome Institute, Bay Area PV Consorium).
- Developing dark energy science collaboration as a means of preparing, characterizing and organizing preparations for science with LSST.

STATUS OF NOTABLE OUTCOME(S)

- BES: Develop a strategic vision for SUNCAT that identifies the areas in catalysis science where SLAC intends to be world leading and that distinguishes SUNCAT research from current BES efforts in catalysis and solar photochemistry conducted in JCAP, EFRCs, and core programs in DOE laboratories. (Objective 3.1)
    - The SUNCAT strategic plan, outlining world leading research, has been developed and submitted to BES, and addresses this strategic vision. The vision includes:
        - Development of first catalysis informatics tool (http://suncat.slac.stanford.edu/catapp/).
        - Extensive focus on syngas reactions and extension of scaling concepts to oxide surfaces.
- BES: Refine the strategic vision to fully utilize LCLS and to expand the Laboratory's photon science program. (Objective 3.2)
    - LCLS held the first of three workshops, bringing together LCLS staff and key scientists from other directorates at the laboratory and around the world, to determine the science drivers for the next generation of LCLS-II instruments for which a new project is anticipated.
    - Further developed LCLS R&D program to increase operational space. Pushed lower end of photon spectrum.
- HEP: Refine and continue to execute a plan to align the size and scope of the HEP accelerator research program with the planned resource constraints for FY2012. (Objective 3.2)
    - An acting Accelerator Research Division Director is in place to manage R&D program realignment.
    - Restructured groups to support programmatic mission (Ultimate storage ring, FACET and FACET-II).
    - The HEP accelerator research program has been tailored to present resource constraints. It will continue to evolve depending on the outcome of the HEP Accelerator Research panel.
    - Kicked off major effort and engagement in SLAC Sponsored Research/WFO program.

SIGNIFICANT CONCERNS AND MITIGATIONS

- Development of complementary experimental program (SUNCAT II) is important for future contributions.

  - Mitigation: A proposal has been submitted and is pending in BES CSGB Catalysis program.
- Fast ramp down of ILC funding leaves little time to redirect program and people.
  - Mitigation: Best effort to redirect ILC accelerator design and R&D staff into LCLS-II and other FEL design and R&D initiatives, LDRD and HEP-funded R&D programs, and the WFO program.
- The small number of early career scientists in high energy physics field is of concern for program health.
  - Mitigation: Developing a 10-year staff hiring plan to address concerns about the age profile for scientific staff, which threatens leadership capability for future programs.
- WFO growth objectives in context of federal budget realities is a challenge and will not be met at current pace.
  - Mitigation: Established the SLAC Growth Board to strategically invest. Initiated support from Stanford Alumni Consultant Team to advise on growth development in non-traditional markets. Developing overall growth strategy across all of the laboratory.

Goal 4 Provide Sound and Competent Leadership and Stewardship of the Laboratory

MAJOR ACCOMPLISHMENTS

- Dr. Tom Devereaux was named the permanent SIMES Director, after acting in the role.
- SLAC has initiated the Level 1 successor leader development program.
- SLAC has recruited experienced leaders in key areas in support of the laboratory's mission:
  - Contract and Partnerships Manager, Jan Tulk
  - Program Development Manager, Mark Hartney
  - SLAC Office of Sponsored Research, Gary Podesta
- A highly qualified Chief Informaiton Officer, James Williams, has been successfully recruited and a start date is being negotiated.

STATUS OF NOTABLE OUTCOME(S)

- SSO: Improve the Stanford University Assurance Contractor System by developing an improvement plan incorporating feedback from the SC CAS peer review. (Objective 4.3)
  - SU conducted a thorough CAS dry run in October 2011 in preparation for the overall successful and very positive peer review that occurred in January 2012.
  - SU and SLAC are improving the assurance system based on feedback from the CAS peer review in the areas of enterprise risk management, management systems, assessments, and key performance indicator development and implementation.
- SC-2, SC-3: Effectively manage contract change (*e.g.*, home office expenses, improved contract terms and conditions). (Objective 4.3)
  - SU has begun evaluating the model contract with an experienced team, in concert with DOE subject matter experts.

SIGNIFICANT CONCERNS AND MITIGATIONS

- The Laboratory Director, Dr. Persis Drell, and Chief Operating Officer, Mr. Alexander Merola, announced that they are stepping down this fiscal year.

- SU has initiated an international search, co-chaired by Drs. William Madia and Roger Blandford, for the next SLAC Laboratory Director. The Committee is finding a verypositive response of exceptional candidates. Dr. Drell intends to stay on until the new Lab Director is appointed.
- Mark Reichanadter, deputy COO under Mr. Merola, was appointed Acting COO and ALD for Operations effective January 1, 2012. It is expected the search for a new COO will not be initiated until the new Lab Director has been appointed.

Goal 5 Sustain Excellence and Enhance Effectiveness of Integrated Safety, Health and Environmental Protection

MAJOR ACCOMPLISHMENTS

- Modified delivery approach of fire department services to better serve lab needs, consequently saving the lab ~240K per month for the latter half of FY.
- Developed the new waste tracking system that will result in a substantially more efficient waste management program. On track for deployment by end of FY2012.
- Released for recycling 4 shipments of PEP-II aluminum cables and copper windings containers and 18 bins of BaBar metals. Completed installation and commissioning of the radiation portal gate monitor.
- Shipped hundreds of thousands of kg of waste safely and with no compliance issues, and Surveyed and disposed of 280 concrete shield blocks from the Boneyard.
- Secretarial Award for Kirk Stoddard: SLAC brought the issue of fugitive emissions to the attention of DOE and other labs, thus contributing to the overall success of the labs in reducing GHG emissions by about 6%.

STATUS OF NOTABLE OUTCOME(S)

- Continue efforts to reduce the frequency and severity of occupational injuries with a focus on ergonomics recognizing that a significant potential for injuries may occur while it relocates a majority of its staff over the next few years. (Objective 5.1):
  - Implemented a comprehensive training program for moves including a training kit for supervisors, online course “Injury-Free Office Moves”, and integrated it into the SLAC moving process. Successfully piloted for staff moving into B028 and within B024, without injury.
  - Developed the SLAC Ergonomic Equipment Reimbursement Program and associated process and tools for ergonomic furniture and equipment.
  - To assist with associated injury management, instituted early reporting of injury to ergo team.
- Complete protocols, procedures and basis documents and start recycling scrap metal from Babar and PEP II dismantling activities that are currently subject to DOE metals recycling suspension. (Objective 5.2):
  - Met or exceeded objectives set for the PEP-II and BaBar in the multi-year strategy for Q1 and Q2 FY2012; completed installation and commissioning of the PEP-II radiation portal gate monitor.
  - The PEP-II D&D program to release suspended materials was completed in concurrence with the Stanford Site office. Six loads of metals weighing 61,000 lbs were released to date. Protocols are being developed to increase the rate of additional loads to be released. A Portal Monitor has been installed and is now working to aid in the release of materials.

SIGNIFICANT CONCERNS AND MITIGATIONS

- Injury rates are trending higher in FY2012 than in the previous two years. The YTD DART rate is 1.51 (11 cases) and the TRC rate is 2.33 (17 cases). The injuries are non-office related, such as strains, sprains, overextensions and trips and falls.
    - Mitigation: Continue and expand the ergonomics injury prevention program to include ergonomic evaluations of work processes following an injury and field evaluations by an ergonomist.
- During a routine inventory, a sealed radioactive source (Po-210) was unaccounted (seven similar sources were found). Source was not found after a thorough search; ORPS report was submitted in February (Category 6A(3)).
    - Mitigation: A thorough investigation was conducted and recently completed. An appropriately broad corrective action plan is under development.

Goal 6 Deliver Efficient, Effective and Responsive Business Systems and Resources and Enable the Successful Achievement of the Laboratory Mission(s)

MAJOR ACCOMPLISHMENTS

- Submitted SLAC Business System Plan to DOE and received approval to proceed with PeopleSoft upgrade for Financial, Human Resources and Procurement systems rather than issuing RFPs for both system(s) and system integrator(s). This option leverages SLAC's current ownership of PeopleSoft software and our current staff's knowledge and reduces risks related to the acquisition process, timeline and change management.
- Completed requirements and business process flows to be included in Scope of Work for system integrators.

STATUS OF NOTABLE OUTCOME(S)

- Implement Enterprise Resource Planning sourcing; establish a multi-year roadmap and identify and implement early phase for a new Lab-wide business system, thereby improving internal controls. (Objectives 6.1, 6.2, 6.3 & 6.5)
    - SLAC continued to make progress on control improvements, including submitting STARS reporting using the core PeopleSoft system and providing the newly required certification to DOE.
    - SLAC's planning is underway for the business preparation phase of its ERP project, to commence in Q3. This phase includes business process re-engineering, data clean up and interface and report design.
- Improve procurement deliverables and performance metrics in targeted areas that support the SLAC scientific objectives. These deliverables and objectives will be determined by SLAC CFO/Procurement and DOE/SSO by October 30, 2011. (Objective 6.2)
    - Procurement metrics have been determined and SLAC is meeting or exceeding all performance objectives except the Socio Economic Subcontracting objective. It is currently at 24% with a year-end performance objective of 50.2%. SCM will hold a Small Business Conference at the end of 3rd quarter to encourage small business subcontracting in order to improve this measurement.
    - Property metrics were also determined and SLAC is on track to meet or exceed them.

SIGNIFICANT CONCERNS AND MITIGATIONS

- ERP project implementation: An unsatisfactory scope of work for a System Integrator was submitted by our consultant. A recovery plan was established and is being implemented. IT experts from Stanford have offered to work with SLAC and Oracle to develop standards and design the needed infrastructure at no cost to SLAC and will then work with the SLAC team to ensure it is trained and capable to implement it in early Q3. The contract will be awarded in early Q4 and the total project cost developed at that time. This is a SLAC agenda-level critical project and a PEMP goal, so it will receive appropriate consideration during the budgeting process.

  - Mitigation: SLAC is working with SU to obtain IT support. Additional project resources are being identified an assigned. A Business System/IT PMOG with membership from SLAC, SU, and other national labs has been established to provide oversight. ERP will continue to be the highest priority for budget considerations.
- Over the next 3-5 years, SLAC has an ambitious set of planned IT improvements to support its multi-program science portfolio. However, its IT infrastructure and organization will need strengthening to meet the lab's IT needs.
  - Mitigation: The CIO is a critical hire for the lab and is expected to be on board in early Q3 FY2012. Further, the IT Project Office needs strengthening. One experience project manager is on board and another has recently been hired. Two-to-three more project managers will need to be hired over the next year to fully meet the demand.

Goal 7 Sustain Excellence in Operating, Maintaining and Renewing the Facility and Infrastructure Portfolio to meet Laboratory Needs

MAJOR ACCOMPLISHMENTS

- The Research Support Building (RSB) project is on cost and on schedule. Building 28 construction was completed in Oct 2011 and fully occupied in January 2012.
- As part of the effort to renew aging systems, some condition assessments of critical systems were completed, including Cooling Towers 1701 and 1702, low conductivity water system for 1801, oil-filled transformers resulting in replacement of one before imminent failure. Predictive maintenance utilizing the latest technologies for vibration, oil, ultrasound, infrared, and Doble test analyses are now regularly scheduled activities.
- New building management plan was reviewed, approved, and released.
- Enhanced subcontractor on-boarding process started based on the Field Construction Manager (FCM) manual for safety awareness; trained FCMs to understand and analyze Contractor's Project Management scheduling to better track and review contractor work.
- Developed Mission readiness document for accelerator infrastructure.

STATUS OF NOTABLE OUTCOME(S)

- Develop 5-year roadmap for renewal of aging conventional facilities, including legacy materials. (Objective 7.1)
  - Completed draft plan for condition assessments and science-needs assessment.
  - Identified gaps for LINAC sectors 10-19 to support LCLS-II.
  - The Accelerator Directorate has formed and launched a task force to identify the accelerator related infrastructure that needs renewal and to make a measured plan to address the high risk items.
- Improve project delivery systems and processes for all projects with a focus to improve performance on smaller projects. (Objective 7.2)
  - The Project Delivery System outline and flow chart were completed for small projects.
  - All 29 approved small projects are in progress per the project plan (on time, in budget).
- Achieve CD1 for SUSB. (Objective 7.2)
  - Milestones on track for successful completion.
  - Received Stanford Board of Trustees' approval of concept and site. Completed DOE CD-1 Director's Review. Completed Lehman Review with "approve CD-1" recommendation to be made to ESAAB.

SIGNIFICANT CONCERNS AND MITIGATIONS

- In Q1, SLAC had a major power outage and several other power anomalies.

  - Mitigation: The mitigation is to reprioritize tasks and propose short and long term solutions to address various power conditions, which may involve outside entities (Stanford University, PG&E, WAPA, etc) in the long-term.
- Improving conduct of facilities operations is one of the elements of the power outage causal analysis corrective action plan and consists of improving controlled procedures. The resources required to develop this improvement plan are limited.
  - Mitigation: The mitigation is to address critical systems first and establish a reasonable schedule for the remaining areas.
- The Cooling Tower 1701 is a significant threat of being a single point of failure, impacting mission.
  - The CT-1701 replacement project is scheduled to finish in two years. This system supports many science programs. The mitigation plan is to closely monitor the system and develop rapid repair solutions in the case of component failure.
- LCLS-II project scope based on assumptions that several SLAC infrastructure upgrades and modifications proceed in a timely fashion. Funding shortfalls in 2012 have delayed the first of these upgrades.
  - Mitigation: Reduce near-term costs of upgrades by value engineering. Spread costs by re-scheduling upgrades. This will come at the expense delaying start of LCLS-II injector early operations.

Goal 8 Sustain and Enhance the Effectiveness of Integrated Safeguards and Security Management (ISSM) and Emergency Management Systems

MAJOR ACCOMPLISHMENTS

- The Cyber Security Task Force developed a plan to improve cyber security at SLAC and implement the Integrated Cyber Security Management program similar to the existing Integrated Safety Management program, including a prioritized list of improvement action items and a suggested approach for implementation. The Lab has started implementation with an unexpected outcome of a noticeable uptick in cyber security-focused analyses for IT requests due to increased communication and awareness regarding the importance of cyber security at SLAC.
- An assessment of SLAC's emergency response model was completed to evaluate the use of an on-site fire station. Transitioning to nearby resources in the surrounding community has the best cost-benefit and SLAC will begin to realize savings of approximately $2.4M per year. SLAC has entered into a Memorandum of Agreement with the Menlo Park Fire Protection District, which will provide preparedness support and will be the primary responder for most incidents with additional support to be provided through the County's automatic aid agreement involving Woodside Fire Protection District and San Mateo County/CalFire.
- SLAC successfully transitioned to a new security contractor (Allied Barton), achieving improved services and lower cost, while providing continuity by retaining over 90% of the security staff.
- For the third year in a row, SLAC conducted a successful site-wide building evacuation and damage assessment exercise. SLAC also exercised its Recovery Management Team and Emergency Operations Center twice due to site-wide power outage events at the beginning of the fiscal year.
- The number of vehicle accidents during the first half of FY2012 has dropped to 7 compared to the first half of FY2011 with 16 due to enhanced training, awareness of responsibility and enforcement of accountability.

STATUS OF NOTABLE OUTCOME(S)

- Complete implementation of security systems to improve physical security and efficiency of security programs, to include security upgrades to SLAC's external gates and improved security at the SLAC Computer Building. (Objective 8.3)
  - The control system for access badging has been successfully integrated with SLAC's PeopleSoft database, badges were issued to all current employees and contractors, and the control software

system is fully functional and working well in B050 Computing Server rooms and the newly remodeled B028. All surveillance camera systems were successfully integrated with the Genetec system. Phase 2 will be completed at the end of this fiscal year.

Significant Concerns and Mitigations

- The Cyber Security Improvement Plan outlined a number of major Laboratory-impacting action items that will require significant support from Laboratory Management, SLAC employees and users and may require additional IT and cyber security resource investments.
    - Mitigation: A cyber security task force has developed a risk based path forward to address key issues.
- The Site Security Infrastructure project has experienced several significant design issues.
    - Mitigation: SLAC is working closely with HSS to resolve these problems and develop contingency solutions. SLAC is also looking at possible modifications to the Sand Hill Gate entrance to mitigate this situation.