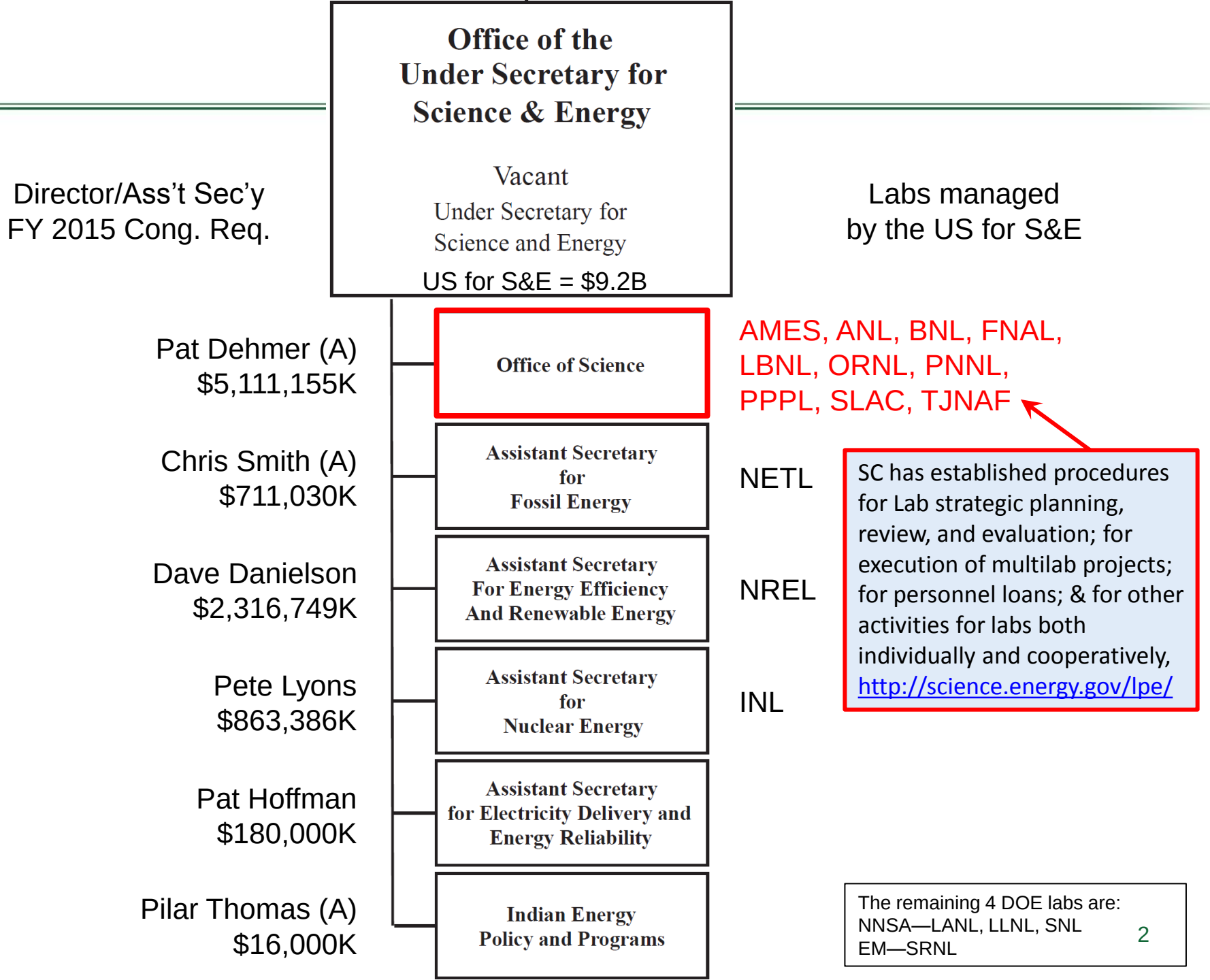
U.S. DEPARTMENT OF ENERGY | Office of Science

DOE's Office of Science

Commission to Review the Effectiveness of
National Energy Laboratories

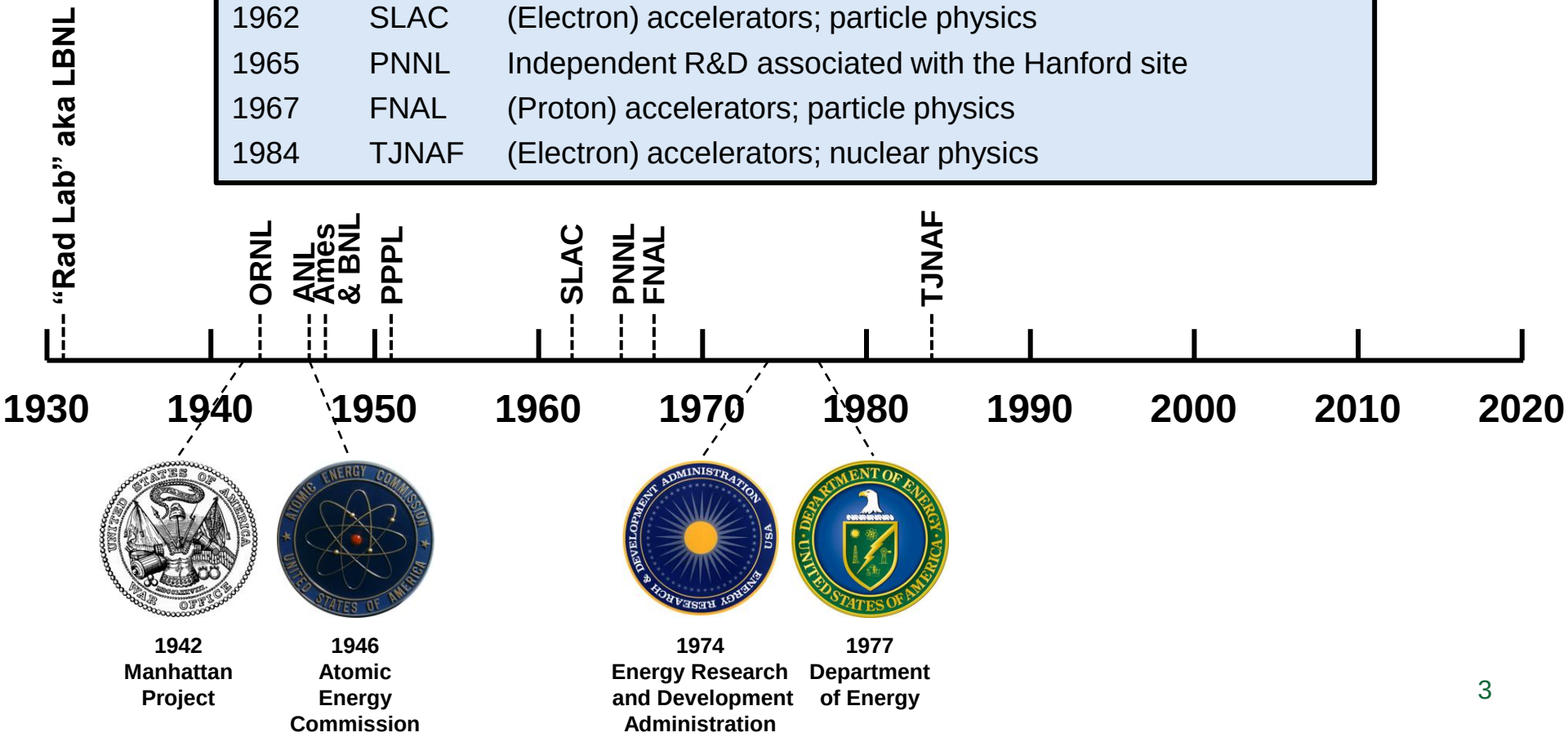
15 September 2014

Patricia M. Dehmer
Acting Director, Office of Science
U.S. Department of Energy

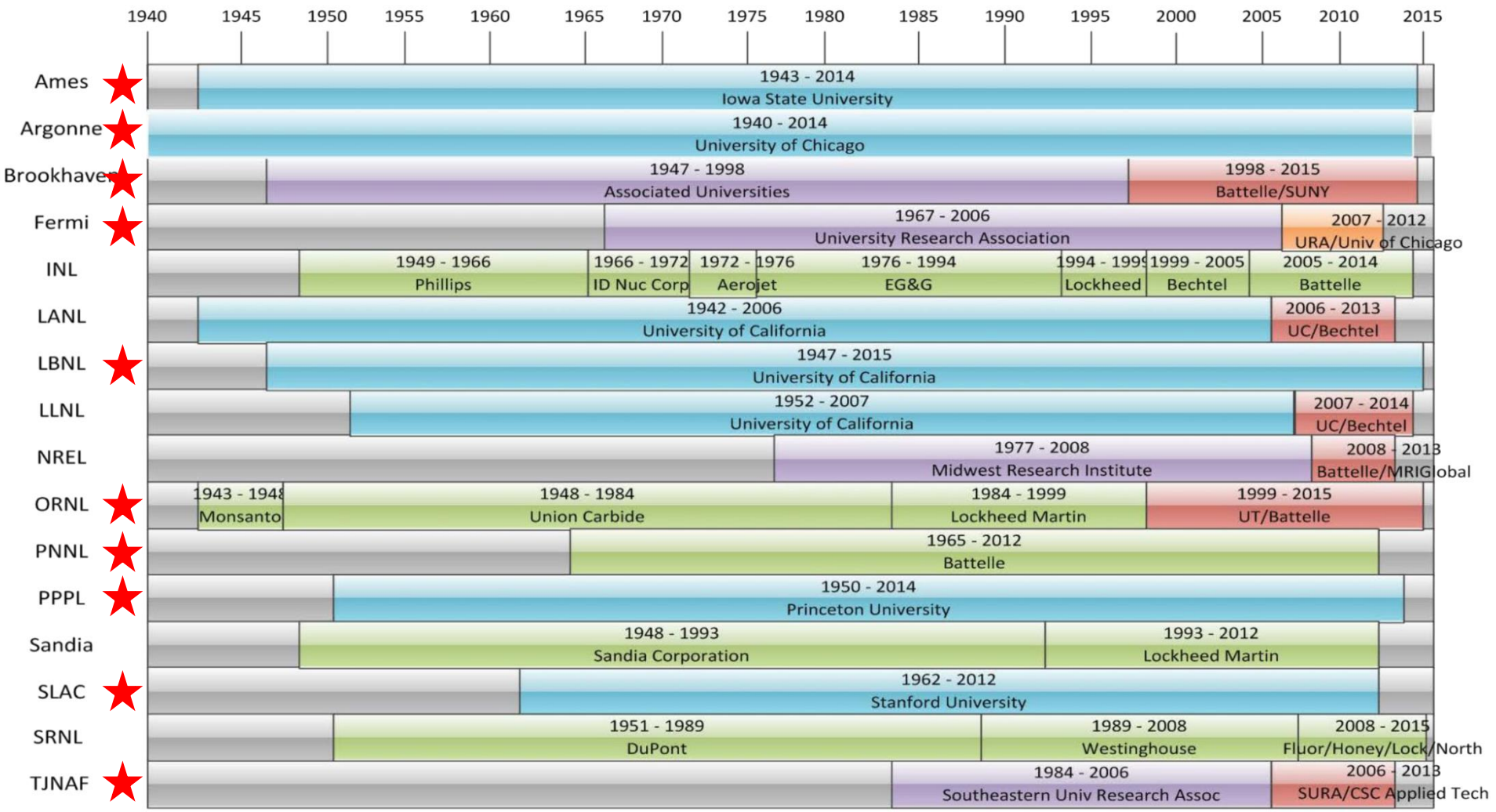

Office of the
Under Secretary for
Science & Energy
Vacant
Under Secretary for
Science and Energy
US for S&E = $9.2B
Director/Ass't Sec'y
FY 2015 Cong. Req.
Labs managed
by the US for S&E
Pat Dehmer (A)
$5,111,155K
Office of Science
AMES, ANL, BNL, FNAL,
LBNL, ORNL, PNNL,
PPPL, SLAC, TJNAF
Chris Smith (A)
$711,030K
Assistant Secretary
for
Fossil Energy
NETL
Dave Danielson
$2,316,749K
Assistant Secretary
For Energy Efficiency
And Renewable Energy
NREL
Pete Lyons
$863,386K
Assistant Secretary
for
Nuclear Energy
INL
Pat Hoffman
$180,000K
Assistant Secretary
for Electricity Delivery and
Energy Reliability
Pilar Thomas (A)
$16,000K
Indian Energy
Policy and Programs
SC has established procedures for Lab strategic planning, review, and evaluation; for execution of multilab projects; for personnel loans; & for other activities for labs both individually and cooperatively, http://science.energy.gov/lpe/
The remaining 4 DOE labs are:
NNSA—LANL, LLNL, SNL
EM—SRNL
2

Origins of the Office of Science Laboratories

1931	LBNL	The “Rad Lab” of E.O. Lawrence and the cyclotron
1943	ORNL	Nuclear reactor technology
1946	ANL	Nuclear reactor technology
1947	AMES	High-purity U production; heavy-element chemistry
1947	BNL	Construction & operation of large facilities for NE universities
1951	PPPL	Magnetic fusion research
1962	SLAC	(Electron) accelerators; particle physics
1965	PNNL	Independent R&D associated with the Hanford site
1967	FNAL	(Proton) accelerators; particle physics
1984	TJNAF	(Electron) accelerators; nuclear physics



Historic GOCO Mangement



Evolution of the Office of Science Laboratories

The four important drivers of change

1. The federal transitions **Manhattan Project →AEC → ERDA → DOE** very significantly broadened the missions of the SC Laboratories, ultimately resulting in the creation of five multiprogram Laboratories.

2. The creation, growth, and extraordinary success of the **open-access scientific user facilities** produced a profound change in the culture, self image, and operation of the SC Laboratories. The far-reaching impact of this change is often overlooked; however, it is the earliest and probably the most important driver in transitioning the SC Laboratories from in-house research institutions behind secure walls to open facilities collaborating with and serving the broad scientific community.

3. **Discoveries and advances in science, technology, engineering**.

4. The execution of "science of scale" – for construction projects and, now, even for disciplinary research resulted in a culture described as **multi-x and inter-x,** where x=disciplines, institutions, sectors, federal agencies, and even nations.

Office of Science
By the numbers

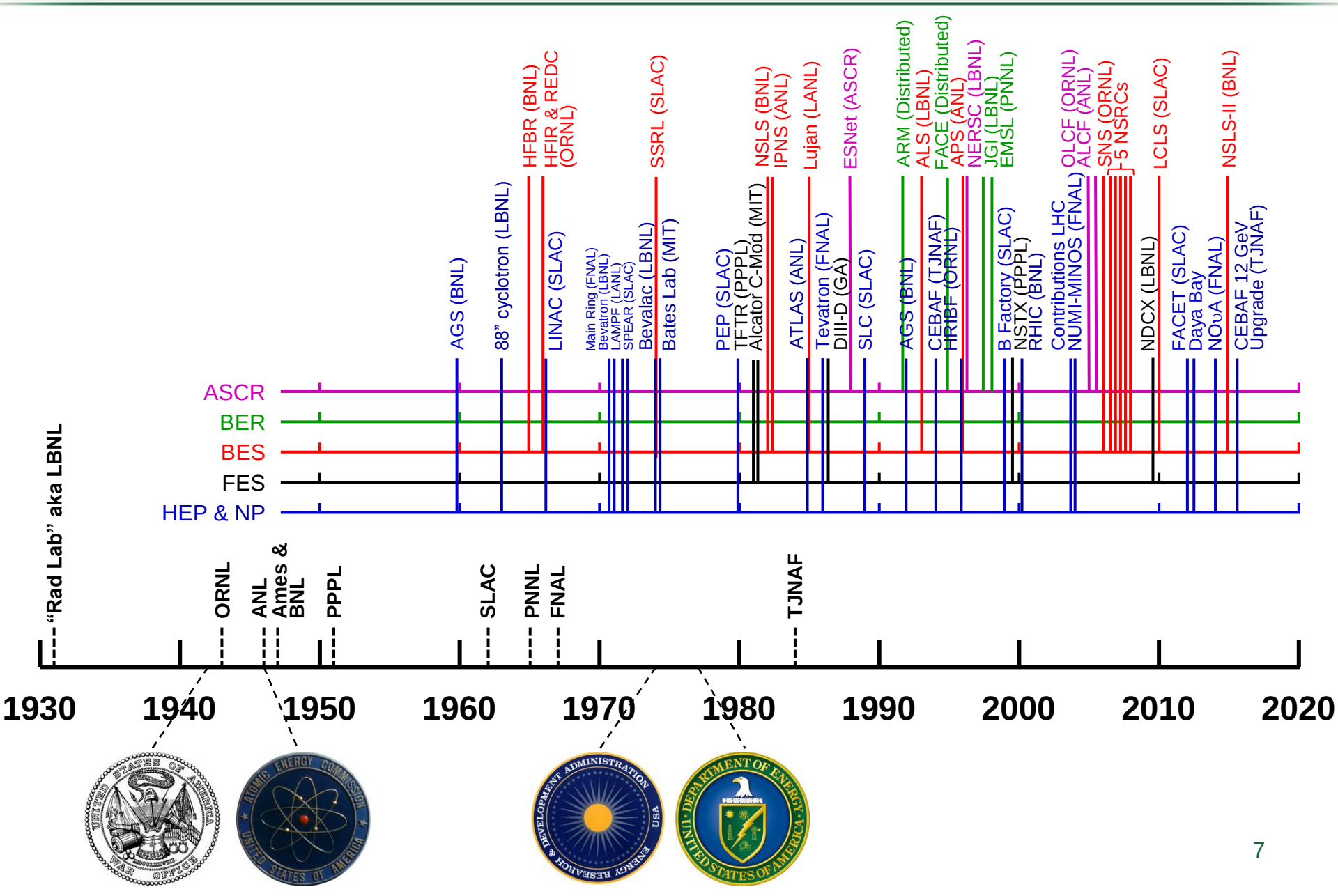
Research

- 22,000 Ph.D. scientists, grad students, engineers, and support staff at more than 300 institutions, including the 17 DOE labs;
- 47% of the Federal support of basic research in the physical sciences;
- U.S. and world leader in high-performance computing and computational sciences;
- Major supporter of physics, chemistry, materials sciences, and biology underpinning energy
- More than 100 Nobel Prizes during the past 6 decades—more than 20 in the past 10 years.

Scientific User Facilities

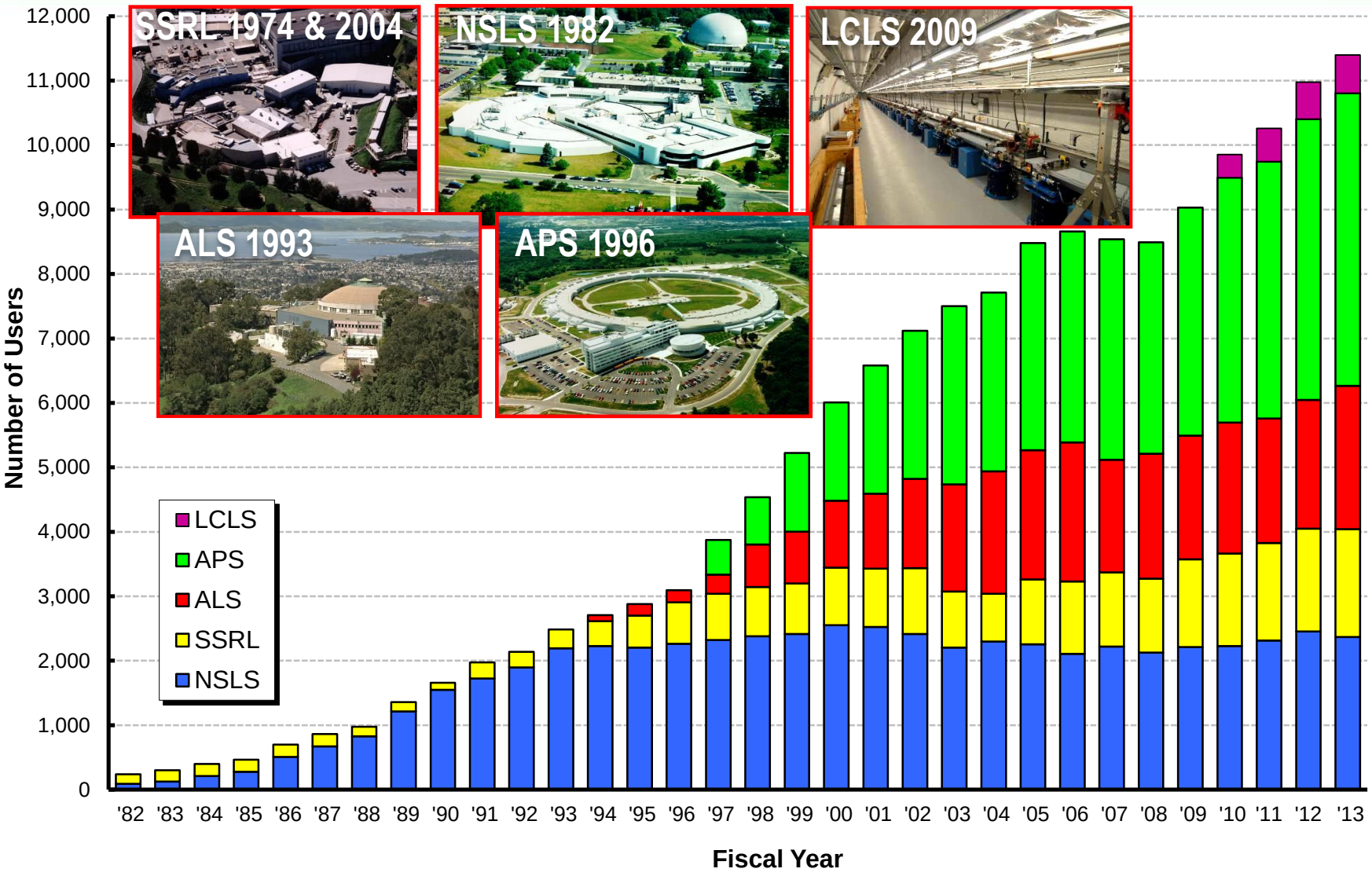
- The world's largest collection of scientific user facilities operated by a single organization in the world (>30); used by nearly 28,000 researchers from academia, industry, and labs each year

Open Access Scientific User Facilities Have Transformed the Labs



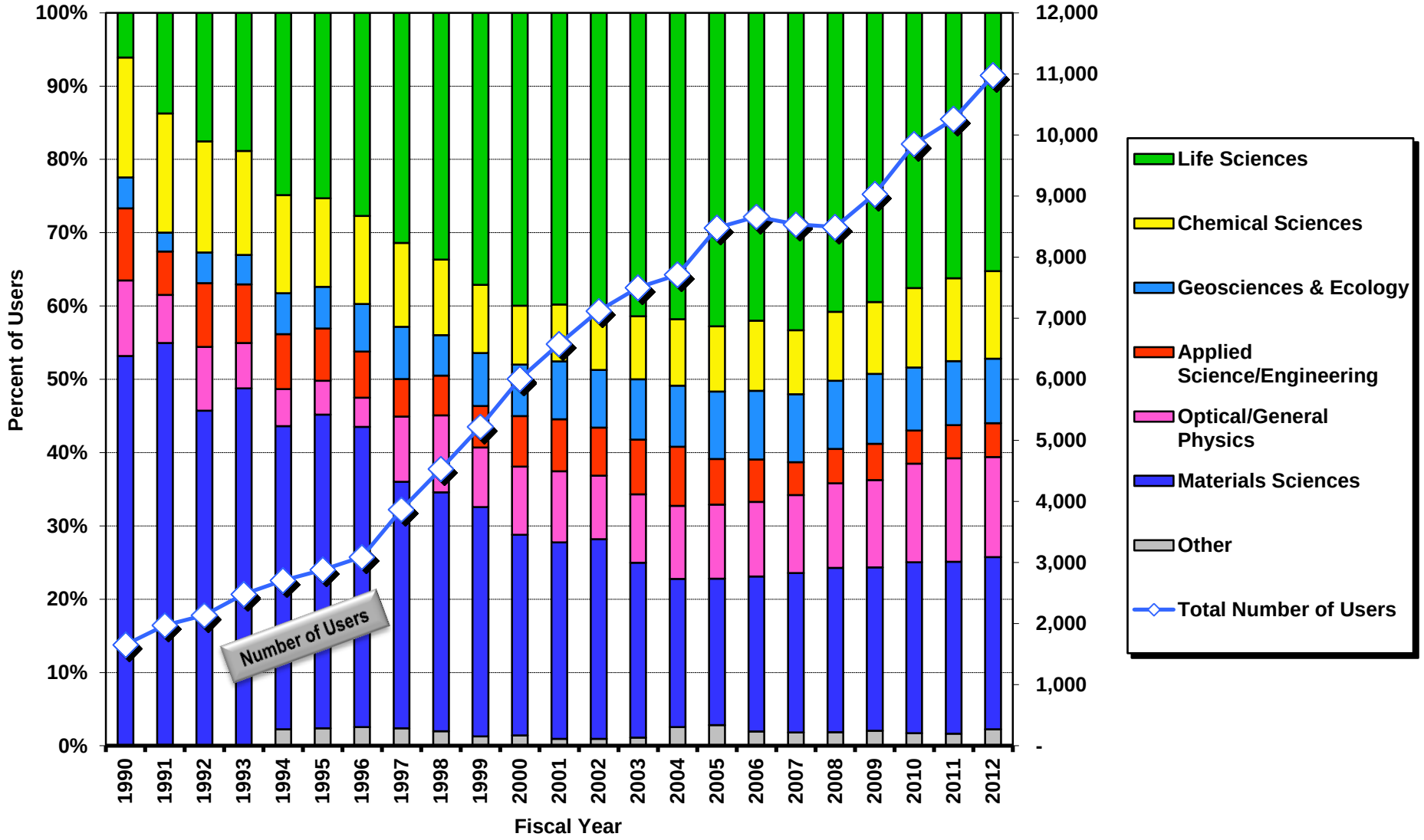
Thousands of Researchers Visit the Facilities Each Year

40% of the 28,000 users of SC facilities visit the light sources



Users by Discipline at the Light Sources

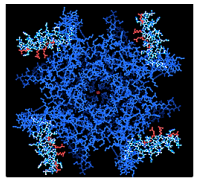
There has been a dramatic expansion in disciplines that use the light sources



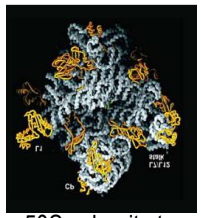
4 Nobel Prizes in Biochemistry with SC Storage Ring Light Sources

Nobel Prizes with SC storage rings in protein structures

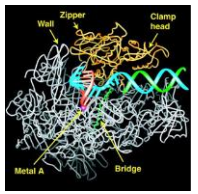
2003	Roderick MacKinnon (Chemistry) for “structural and mechanistic studies of ion channels.”
2006	Roger Kornberg (Chemistry) "for his studies of the molecular basis of eukaryotic transcription.”
2009	Venkatraman Ramakrishnan, Thomas A. Steitz, and Ada E. Yonath (Chemistry) "for studies of the structure and function of the ribosome.”
2012	Robert J. Lefkowitz and Brian K. Kobilka (Chemistry) "for studies of G-protein-coupled receptors.”



The overall view of a voltage-dependent potassium ion channel.



The 50S subunit at 2.4Å resolution.

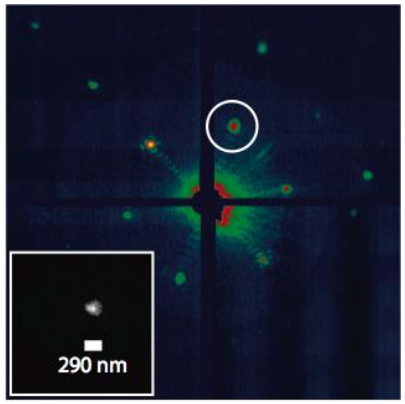


The visualized transcription process.

The structure of the β2AR-Gs complex.

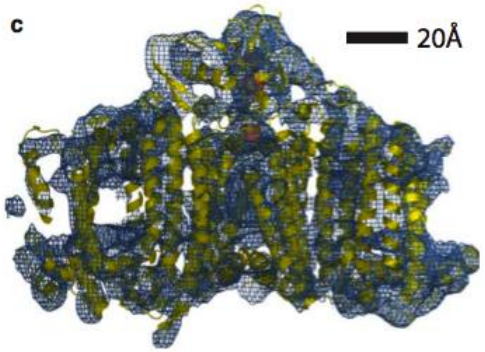
& Prospects of Single-Molecule, Single-Shot Structure Determination with FELs

Early experiments in single-molecule, single-shot imaging at LCLS



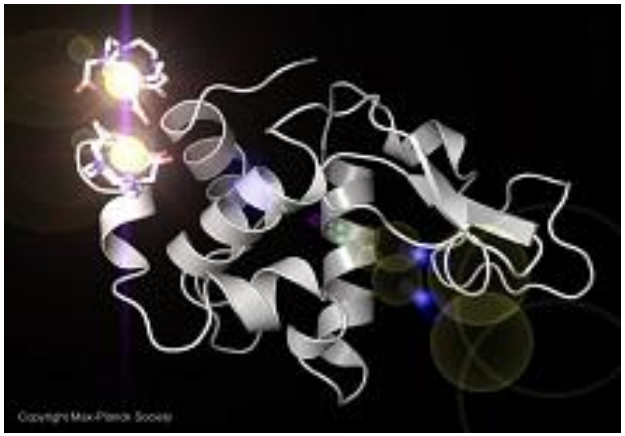
Single Shot Diffraction Pattern

HN Chapman *et al. Nature* **470**, 73-77 (2011)



The structure of the β2AR-Gs complex.

Reconstructed Image



FY14: First de novo 3D structure of lysozyme

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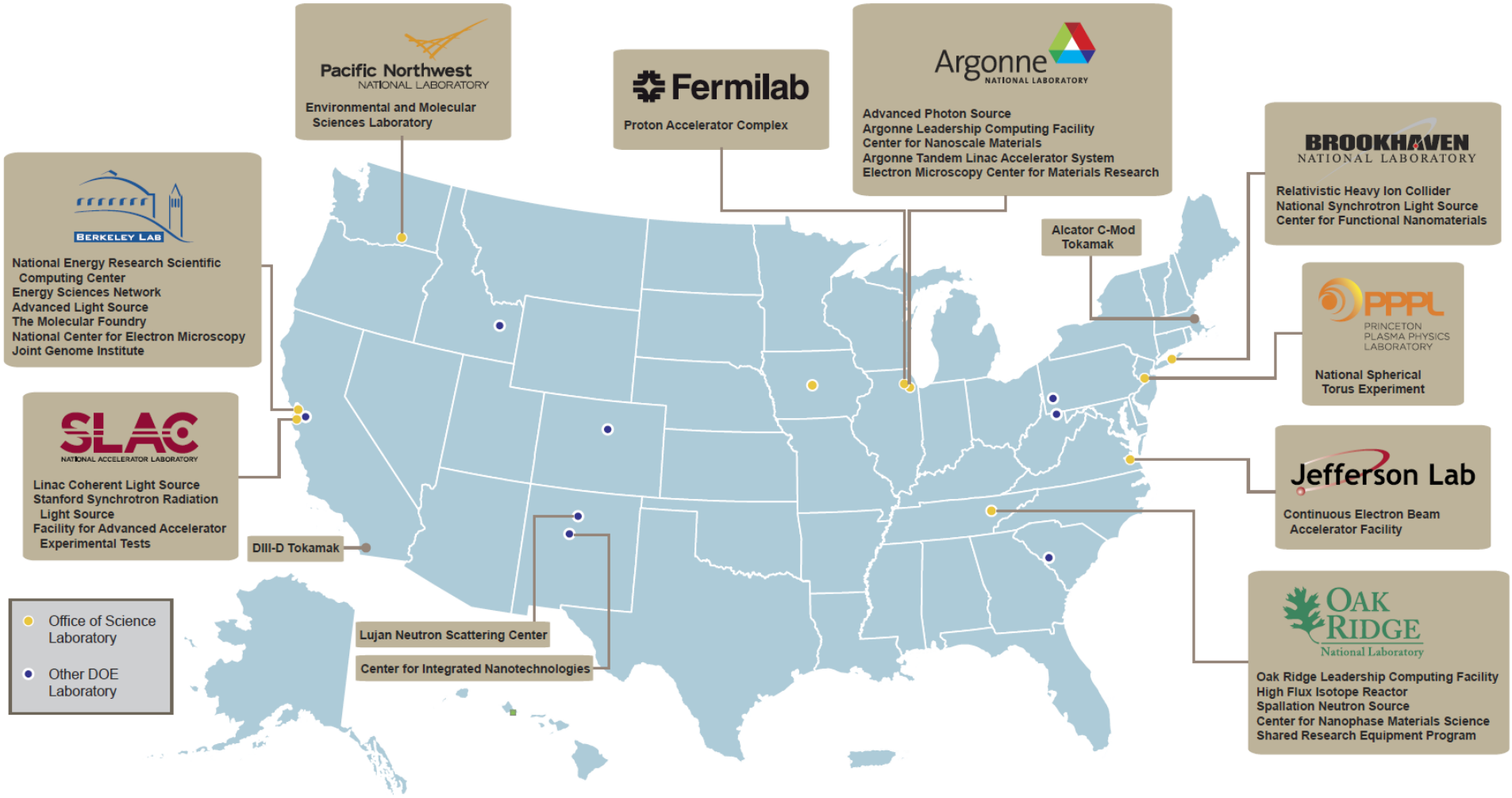
Strong Outreach to Industry

Today, many Fortune 500 industries use the light sources

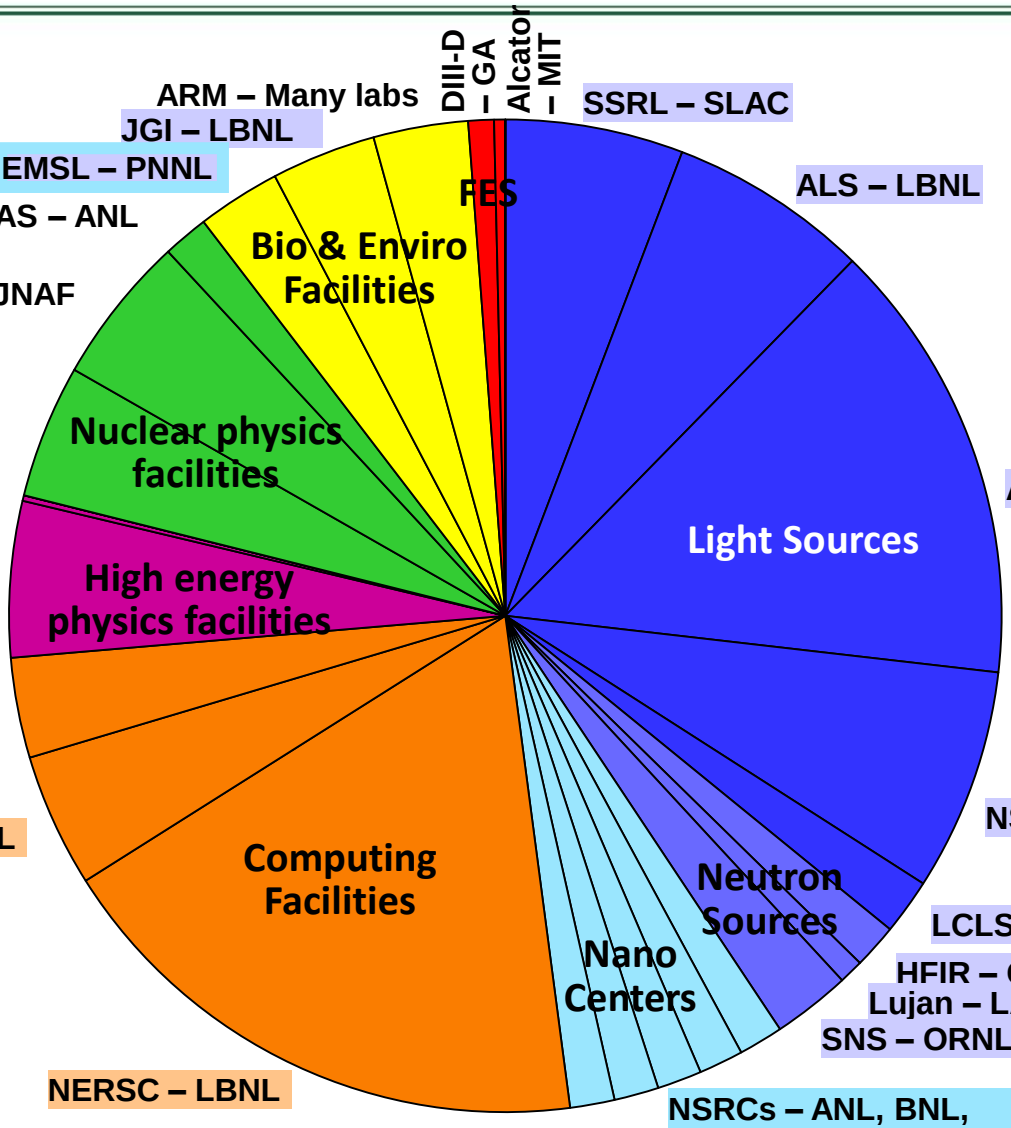
User Facilities are Part of the Fabric of the SC Laboratories



Map reflects FY 2012 status. See http://science.energy.gov/user-facilities/ for more information.

Distribution of Users at the ~30 SC Facilities in 2013

Nearly ¾ of users do their work at ASCR or BES facilities



Characterize materials properties and behaviors at the atomic level

Predict materials properties and behaviors

Make materials

Does not include LHC; HEP supports about 1,700 scientists, technicians, and engineers at the LHC.

Established Processes are in Place for Lab Strategic Planning and Assessment

Programs | Laboratories | User Facilities | Universities | Funding Opportunities | Discovery & Innovation | News | About

You are here: SC Home » Laboratories » **LPE Home**

Laboratory Policy and Evaluation (LPE)

- LPE Home
- Staff
- M&O Contracts
- SC Laboratory Appraisal Process
- Laboratory Planning Process
- Work for Others in the Office of Science
- Laboratory Directed Research and Development (LDRD)
- Technology Transfer
- DOE National Laboratories

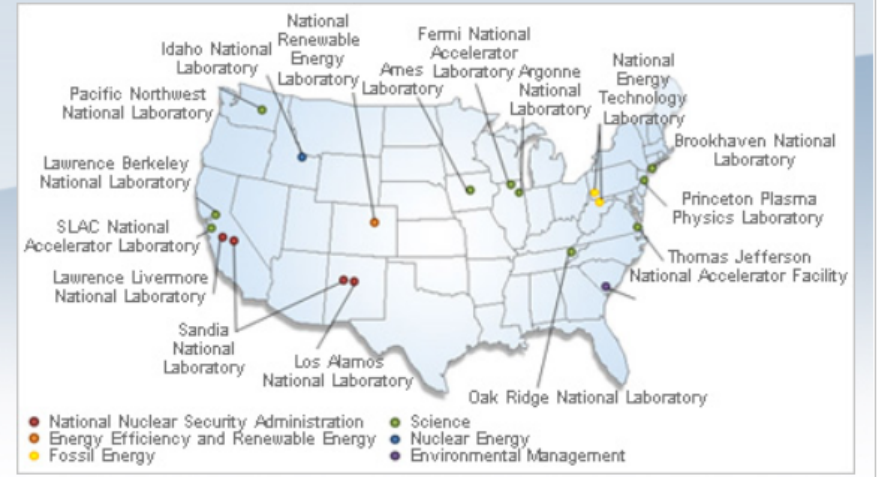
CONTACT INFORMATION
Laboratory Policy and Evaluation
U.S. Department of Energy
SC-32/Forrestal Building

The Department of Energy National Laboratories

The Department of Energy is responsible for the effective stewardship of 17 world-class national laboratories, 10 of which are under the purview of the Office of Science.

Read More »

1 of 3



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Mission:

The Office of Laboratory Policy and Evaluation (LPE) develops uniform Office of Science -specific policies related to the management, operation, and overall well-being of the ten Department of Energy (DOE) Office of Science (SC) national laboratories and ensures their effective and consistent implementation across the SC complex.

Introduction to the National Laboratories:

SC is responsible for the effective stewardship of Federally Funded Research and Development Centers, commonly known as national laboratories, which are operated

Related Links

- FAQs about the DOE National Laboratories (89KB)
- Introduction to the SC Labs 2011 (277KB)
- Distinctive Characteristics of the Department of Energy's National Laboratories (242KB)

Office of Science Laboratory Core Capabilities

Core Capabilities	AMES	ANL	BNL	FNAL	LBNL	ORNL	PNNL	PPPL	SLAC	TJNAF
Accelerator Science		✓	✓	✓	✓	✓			✓	✓
Advanced Computer Science, Visualization, and Data		✓			✓	✓	✓			
Applied Materials Science and Engineering	✓	✓	✓		✓	✓	✓			
Applied Mathematics		✓			✓					
Applied Nuclear Science and Technology		✓	✓		✓	✓	✓			✓
Biological Systems Science			✓		✓	✓	✓			
Chemical and Molecular Science	✓	✓	✓		✓	✓	✓		✓	
Chemical Engineering		✓	✓		✓	✓	✓			
Climate Change Science			✓		✓	✓	✓			
Computational Science					✓	✓				
Condensed Matter Physics and Materials Science	✓	✓	✓		✓	✓			✓	
Environmental Subsurface Science					✓	✓	✓			
Large Scale User Facilities/Advanced Instrumentation		✓	✓	✓	✓	✓	✓	✓	✓	✓
Nuclear Physics		✓	✓		✓	✓				✓
Particle Physics		✓	✓	✓	✓				✓	
Plasma and Fusion Energy Science						✓		✓		
Systems Engineering and Integration		✓	✓		✓	✓	✓			

Common Goals/Objectives for All Ten SC Laboratories
(FY 2015 Performance Evaluation and Measurement Plans)

1. **Mission Accomplishment**
   1. Impact (significance)
   2. Leadership (recognition of S&T accomplishments)

2. **Design, Fabrication, Construction & Operation of Research Facilities**
   1. Design of Facility
   2. Construction of Facility/Fabrication of Components
   3. Operation of Facility (e.g., availability, reliability, and efficiency of facility)
   4. Utilization of Facility to Grow and Support Lab's Research Base and External User Community

3. **Program Management**
   1. Strategic Planning, Stewardship of Scientific Capabilities and Programmatic Vision
   2. S&T Project/Program/Facilities Management
   3. Communications and Responsiveness to HQ

4. **Contractor Leadership/Stewardship**
   1. Leadership and Stewardship of the Laboratory
   2. Management and Operation of the Laboratory
   3. Contractor Value-added

5. **Environment, Safety and Health**
   1. Worker Safety and Health Program
   2. Environmental Management System

6. **Business Systems**
   1. Financial Management System(s)
   2. Acquisition and Property Management System
   3. Human Resource Management System and Diversity Program
   4. Internal Audit, Information Management, Assurance, and Other Administrative Systems
   5. Effective Transfer of Technology and Commercialization of Intellectual Assets

7. **Facilities and Infrastructure**
   1. Manage F&I in a Manner that Optimizes Usage and Minimizes Life Cycle Costs
   2. Plan for and acquire the F&I required to support future lab programs

8. **Security and Emergency Management**
   1. Emergency Management System
   2. Cyber-Security and Protection of Classified and Unclassified Information
   3. System for the Physical Security and Protection of Special Nuclear Materials, Classified Matter, and Property

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Within each Objective, there can be a small number of Notable Outcomes for important features of the laboratory's performance.
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Office of Science Organization

The importance of the labs in the Office of Science is seen in the org structure, which has equivalent, parallel management lines for laboratories and for science programs.