Science
Office of Science
Funding by Site by Program

(dollars in thousands)

	FY 2007	FY 2008	FY 2009
Ames Laboratory			
Basic Energy Sciences	20,268	18,906	20,882
Advanced Scientific Computing Research	1,303	1,326	1,125
Workforce Development for Teachers and Scientists	237	100	446
Safeguards and Security	946	944	974
Total, Ames Laboratory	22,754	21,276	23,427
Ames Site Office			
Science Program Direction	519	555	576
Argonne National Laboratory			
Basic Energy Sciences	184,088	173,295	181,649
Advanced Scientific Computing Research	31,904	36,411	42,591
Biological and Environmental Research	26,903	26,034	26,309
High Energy Physics	12,953	10,448	11,368
Nuclear Physics	24,851	25,339	27,253
Fusion Energy Sciences	1,019	543	40
Science Laboratories Infrastructure	3,500	389	—
Workforce Development for Teachers and Scientists	1,353	395	2,006
Safeguards and Security	8,375	8,527	8,562
Total, Argonne National Laboratory	294,946	281,381	299,778
Argonne Site Office			
Science Program Direction	3,689	4,125	4,289
Berkeley Site Office			
Science Program Direction	4,194	4,394	4,680

	(dollars in thousands)		
	FY 2007	FY 2008	FY 2009
Brookhaven National Laboratory			
Basic Energy Sciences	113,270	133,343	193,883
Advanced Scientific Computing Research	1,009	1,009	730
Biological and Environmental Research	21,233	17,753	16,427
High Energy Physics	40,578	40,029	45,305
Nuclear Physics	170,537	167,838	180,794
Science Laboratories Infrastructure	3,855	8,200	14,882
Workforce Development for Teachers and Scientists	636	410	533
Safeguards and Security	10,710	10,834	11,451
Total, Brookhaven National Laboratory	361,828	379,416	464,005
Brookhaven Site Office			
Science Program Direction	3,747	4,234	4,529
Chicago Office			
Basic Energy Sciences	178,733	149,786	134,601
Advanced Scientific Computing Research	39,368	34,030	47,516
Biological and Environmental Research	140,925	128,319	107,807
High Energy Physics	128,669	123,556	146,149
Nuclear Physics	66,361	67,231	63,854
Fusion Energy Sciences	133,651	143,265	139,741
Science Laboratories Infrastructure	1,282	—	1,385
Science Program Direction	28,187	26,060	31,363
Safeguards and Security	488	1,607	2,150
SBIR/STTR	126,255	—	—
Total, Chicago Office	843,919	673,854	674,566
Fermi National Accelerator Laboratory			
Advanced Scientific Computing Research	120	120	120
High Energy Physics	344,256	319,241	376,799
Nuclear Physics	288	270	—
Workforce Development for Teachers and Scientists	162	80	436
Safeguards and Security	2,908	1,686	1,742
Total, Fermi National Accelerator Laboratory	347,734	321,397	379,097

	(dollars in thousands)		
	FY 2007	FY 2008	FY 2009
Fermi Site Office			
Science Program Direction	2,262	2,496	2,570
Golden Field Office			
Basic Energy Sciences	—	—	4
Workforce Development for Teachers and Scientists	774	250	869
Total, Golden Field Office	774	250	873
Idaho National Laboratory			
Basic Energy Sciences	395	375	375
Biological and Environmental Research	1,364	1,575	647
Fusion Energy Sciences	2,323	2,321	2,321
Workforce Development for Teachers and Scientists	100	86	255
Total, Idaho National Laboratory	4,182	4,357	3,598
Lawrence Berkeley National Laboratory			
Basic Energy Sciences	124,169	123,451	132,528
Advanced Scientific Computing Research	75,663	86,233	94,836
Biological and Environmental Research	90,177	99,091	87,084
High Energy Physics	52,745	49,240	56,007
Nuclear Physics	22,352	22,997	24,965
Fusion Energy Sciences	4,660	4,846	4,846
Science Laboratories Infrastructure	8,961	17,417	29,956
Workforce Development for Teachers and Scientists	713	409	1,087
Safeguards and Security	4,894	4,985	5,006
Total, Lawrence Berkeley National Laboratory	384,334	408,669	436,315

(dollars in thousands)

	FY 2007	FY 2008	FY 2009
Lawrence Livermore National Laboratory			
Basic Energy Sciences	4,375	3,912	4,061
Advanced Scientific Computing Research	12,256	9,640	13,093
Biological and Environmental Research	23,805	22,318	22,492
High Energy Physics	1,570	347	300
Nuclear Physics	1,423	1,369	1,010
Fusion Energy Sciences	12,580	12,639	12,393
Workforce Development for Teachers and Scientists	111	50	289
Total, Lawrence Livermore National Laboratory	56,120	50,275	53,638
Los Alamos National Laboratory			
Basic Energy Sciences	29,372	21,576	22,936
Advanced Scientific Computing Research	4,442	4,342	4,424
Biological and Environmental Research	16,298	15,768	14,840
High Energy Physics	1,172	248	350
Nuclear Physics	10,431	11,479	14,935
Fusion Energy Sciences	3,145	2,932	2,786
Workforce Development for Teachers and Scientists	50	50	364
Total, Los Alamos National Laboratory	64,910	56,395	60,635
National Energy Technology Laboratory			
Basic Energy Sciences	—	300	—
Science Laboratories Infrastructure	115	—	—
Workforce Development for Teachers and Scientists	475	570	633
Total, National Energy Technology Laboratory	590	870	633
National Renewable Energy Laboratory			
Basic Energy Sciences	8,261	6,700	7,630
Advanced Scientific Computing Research	674	696	631
Biological and Environmental Research	1,620	1,338	1,227
Workforce Development for Teachers and Scientists	30	—	—
Total, National Renewable Energy Laboratory	10,585	8,734	9,488

	(dollars in thousands)		
	FY 2007	FY 2008	FY 2009
New Brunswick Laboratory			
Science Program Direction	—	6,644	6,782
Oak Ridge Institute for Science and Education			
Basic Energy Sciences	4,100	91	660
Advanced Scientific Computing Research	2,138	2,054	2,000
Biological and Environmental Research	5,721	3,895	4,101
High Energy Physics	171	156	150
Nuclear Physics	1,133	988	695
Fusion Energy Sciences	1,158	1,287	1,400
Science Laboratories Infrastructure	117	—	—
Science Program Direction	26	—	—
Workforce Development for Teachers and Scientists	1,600	1,592	2,952
Safeguards and Security	1,585	1,579	1,617
Total, Oak Ridge Institute for Science and Education	17,749	11,642	13,575
Oak Ridge National Laboratory			
Basic Energy Sciences	303,179	304,413	316,338
Advanced Scientific Computing Research	92,353	87,119	94,721
Biological and Environmental Research	50,234	62,720	63,643
High Energy Physics	170	30	85
Nuclear Physics	23,656	24,162	33,480
Fusion Energy Sciences	80,427	28,962	231,596
Science Laboratories Infrastructure	3,069	9,535	14,103
Safeguards and Security	7,473	7,897	8,895
Total, Oak Ridge National Laboratory	560,561	524,838	762,861
Oak Ridge Office			
Biological and Environmental Research	85	50	50
Science Laboratories Infrastructure	5,079	5,033	5,079
Science Program Direction	43,584	43,450	45,341
Safeguards and Security	18,476	17,849	18,819
Total, Oak Ridge Office	67,198	66,382	69,289

(dollars in thousands)

	FY 2007	FY 2008	FY 2009
Office of Scientific and Technical Information			
Basic Energy Sciences	80	100	80
Advanced Scientific Computing Research	80	80	80
Biological and Environmental Research	353	367	373
High Energy Physics	80	100	100
Nuclear Physics	80	100	—
Fusion Energy Sciences	80	100	100
Science Program Direction	8,600	8,684	8,916
Workforce Development for Teachers and Scientists	135	120	120
Safeguards and Security	483	470	490
Total, Office of Scientific and Technical Information	9,971	10,121	10,259
Pacific Northwest National Laboratory			
Basic Energy Sciences	18,103	16,716	17,744
Advanced Scientific Computing Research	5,155	3,928	4,362
Biological and Environmental Research	91,491	90,923	92,586
Nuclear Physics	90	—	—
Fusion Energy Sciences	873	900	900
Science Laboratories Infrastructure	10,000	24,773	41,155
Workforce Development for Teachers and Scientists	760	545	1,071
Safeguards and Security	11,318	11,143	11,163
Total, Pacific Northwest National Laboratory	137,790	148,928	168,981
Pacific Northwest Site Office			
Science Program Direction	4,836	5,053	5,618
Princeton Plasma Physics Laboratory			
Advanced Scientific Computing Research	1,227	1,154	954
High Energy Physics	236	—	252
Fusion Energy Sciences	69,084	72,027	73,603
Workforce Development for Teachers and Scientists	155	155	565
Safeguards and Security	2,128	2,128	2,149
Total, Princeton Plasma Physics Laboratory	72,830	75,464	77,523

	(dollars in thousands)		
	FY 2007	FY 2008	FY 2009
Princeton Site Office			
Science Program Direction	1,653	1,759	1,813
Sandia National Laboratories			
Basic Energy Sciences	36,064	40,369	44,213
Advanced Scientific Computing Research	6,524	5,966	6,598
Biological and Environmental Research	2,564	2,000	1,700
Nuclear Physics	294	275	—
Fusion Energy Sciences	2,111	2,270	2,220
Workforce Development for Teachers and Scientists	152	—	676
Total, Sandia National Laboratories	47,709	50,880	55,407
Savannah River National Laboratory			
Basic Energy Sciences	300	200	300
Biological and Environmental Research	951	520	483
Fusion Energy Sciences	40	—	—
Workforce Development for Teachers and Scientists	—	—	314
Total, Savannah River National Laboratory	1,291	720	1,097
Stanford Linear Accelerator Center			
Basic Energy Sciences	194,703	181,887	215,053
Advanced Scientific Computing Research	138	338	338
Biological and Environmental Research	4,741	4,843	3,986
High Energy Physics	145,786	95,491	91,532
Science Laboratories Infrastructure	5,770	—	—
Workforce Development for Teachers and Scientists	150	150	519
Safeguards and Security	2,566	2,566	2,586
Total, Stanford Linear Accelerator Center	353,854	285,275	314,014
Stanford Site Office			
Science Program Direction	2,123	2,551	2,625

	(dollars in thousands)		
	FY 2007	FY 2008	FY 2009
Thomas Jefferson National Accelerator Facility			
Advanced Scientific Computing Research	29	100	100
Biological and Environmental Research	550	600	600
High Energy Physics	1,879	1,148	2,411
Nuclear Physics	89,920	94,332	117,132
Science Laboratories Infrastructure	—	—	3,700
Workforce Development for Teachers and Scientists	359	100	448
Safeguards and Security	1,376	1,376	1,411
Total, Thomas Jefferson National Accelerator Facility	94,113	97,656	125,802
Thomas Jefferson Site Office			
Science Program Direction	1,550	1,872	1,965
Washington Headquarters			
Basic Energy Sciences	1,920	94,482	275,223
Advanced Scientific Computing Research	1,351	76,627	54,601
Biological and Environmental Research	1,089	66,283	124,185
High Energy Physics	2,169	49,297	74,152
Nuclear Physics	914	16,346	45,962
Fusion Energy Sciences	513	14,456	21,104
Science Laboratories Infrastructure	238	1,514	—
Science Program Direction	61,499	65,902	82,846
Workforce Development for Teachers and Scientists	—	2,982	—
Safeguards and Security	2,104	2,355	3,588
Congressionally Directed Projects	—	123,623	—
Total, Washington Headquarters	71,823	513,867	681,661
Total, Science	3,852,138	4,026,330	4,721,969

Major Changes or Shifts by Site

Argonne National Laboratory

Basic Energy Sciences

- The Intense Pulsed Neutron Source, a short-pulsed spallation neutron source that operated as a user facility since 1981, is shut down during FY 2008, and funds are provided in FY 2009 to place the facility in a safe storage condition.

Advanced Scientific Computing Research

- The Leadership Computing Facility will be fully operational at 250-500 teraflops and will provide open high-performance computing capability with low electrical power consumption to enable scientific advances.

Science Laboratories Infrastructure

- The Building Electrical Services Upgrade, Phase II, project will be cancelled.

Brookhaven National Laboratory

Basic Energy Sciences

- The Center for Functional Nanomaterials, one of five DOE Nanoscale Science Research Centers, will be fully operational in FY 2009.
- The National Synchrotron Light Source-II (NSLS-II) will begin construction in FY 2009. NSLS-II will provide the world's finest capabilities for x ray imaging.

Nuclear Physics

- Radioisotope related activities at the Brookhaven Linear Isotope Producer (BLIP) Building 931 and Hot Cell Building 801 are transferred from the Office of Nuclear Energy to SC in FY 2009.

Science Laboratories Infrastructure

- The Interdisciplinary Science Building, Phase I, project at BNL is initiated to replace 100,000 to 120,000 square feet of old, wood and masonry buildings with a new, 87,000 to 93,000 square foot building, with state-of-the-art laboratories, associated offices and support space.

Lawrence Berkeley National Laboratory

Biological and Environmental Research

- The Joint BioEnergy Institute at Lawrence Berkeley National Laboratory will be fully operational in FY 2009.

Science Laboratories Infrastructure

- The Seismic Life-Safety, Modernization, and Replacement of General Purpose Buildings, Phase II, project is initiated to remedy high seismic life-safety risks by replacing three seismically "very poor" and "poor" (University of California classification) buildings and five failing trailers with one new approximately 43,000 square feet general-purpose laboratory/office building.

Los Alamos National Laboratory

Nuclear Physics

- Radioisotope related activities at the Isotope Production Facility (IPF) are transferred from the Office of Nuclear Energy to SC in FY 2009.

Oak Ridge National Laboratory

Advanced Scientific Computing Research

- The Leadership Computing Facility will be fully operational at one petaflop and will provide open high-performance computing capability to enable scientific advances.

Biological and Environmental Research

- The BioEnergy Science Center at the Oak Ridge National Laboratory will be fully operational in FY 2009.

Fusion Energy Sciences

- Funding for the U.S. Contributions to ITER MIE Project is increased in FY 2009 by $203,874,000.

Nuclear Physics

- Radioisotope related activities at hot cells in Buildings 4501 and 7920, and chemical and materials laboratories in Buildings 9204-3 and 5500 are transferred from the Office of Nuclear Energy to SC in FY 2009.

Oak Ridge Office

Science Program Direction

- Funding responsibility of the Department's nation-wide Payments Processing Center (PPC) at the Oak Ridge Financial Service Center (ORFSC) will be transferred from SC to the Department's Working Capital Fund. Each Departmental organization will be assessed an equitable share of the PPC contractor support requirements. As the responsible program for Oak Ridge, SC will continue to fund the salaries, benefits, and related expenses of the federal staff providing oversight to the ORFSC and PPC.

Princeton Plasma Physics Laboratory

Fusion Energy Sciences

- The National Compact Stellarator Experiment (NCSX) MIE project cost and schedule baseline is changing and is under discussion within the DOE. A decision as to the future of the project is expected to be made in the second quarter of FY 2008.

Stanford Linear Accelerator Center

Basic Energy Sciences

- FY 2009 marks the first full year of Basic Energy Sciences funding for SLAC linac operations as B-factory operations completed in FY 2008 and the Linac Coherent Light Source (LCLS) operations start in FY 2009. Support continues for construction and Other Project Costs of the LCLS.

High Energy Physics

- The B-factory an electron-positron collider optimized for the study of heavy quarks and operated as a user facility is shutdown after a successful run of over eight years. This marks the first time since its inception that SLAC has not had a HEP user facility operating or under construction. SLAC will begin decommissioning and decontamination of B-factory accelerator and detector components in FY 2009.

Thomas Jefferson National Accelerator Facility

Nuclear Physics

- Beginning in FY 2009, funding is provided to start construction activities for the 12 GeV Continuous Electron Beam Accelerator Facility (CEBAF) Upgrade project. When completed, the project will

provide electron beams and an additional target hall (Hall D) opening a new energy regime and enhancing capabilities to study the quark structure of the nucleon and nuclei.

Science Laboratories Infrastructure

- The Technology and Engineering Development Facility project is initiated to address infrastructure inadequacies by renovating the 42-year-old Test Lab Building, constructing a new, approximately, 100,000 square foot building, and removing 22,000 square feet of obsolete building and trailer space.

Site Description

Ames Laboratory

The Ames Laboratory is a program dedicated laboratory (Basic Energy Sciences). The laboratory is located on the campus of the Iowa State University, in Ames, Iowa, and consists of 12 buildings (327,664 gross square feet of space) with the average age of the buildings being 39 years. DOE does not own the land. Ames conducts fundamental research in the physical, chemical, and mathematical sciences associated with energy generation and storage; and is a national center for the synthesis, analysis, and engineering of rare-earth metals and their compounds.

Basic Energy Sciences: Ames supports experimental and theoretical research on rare earth elements in novel mechanical, magnetic, and superconducting materials. Ames scientists are experts on magnets, superconductors, and quasicrystals that incorporate rare earth elements. Ames also supports theoretical studies for the prediction of molecular energetics and chemical reaction rates and provides leadership in analytical and separations chemistry. Ames is home to the Materials Preparation Center, which is dedicated to the preparation, purification, and characterization of rare-earth, alkaline-earth, and refractory metal and oxide materials.

Advanced Scientific Computing Research: Ames conducts research in computer science and participates on Scientific Discovery through Advanced Computing (SciDAC) science application teams.

Safeguards and Security: This program coordinates planning, policy, implementation, and oversight in the areas of security systems, protective forces, personnel security, program management, material control and accountability, and cyber security. A protective force is maintained to provide protection of personnel, equipment, and property from acts of theft, vandalism, and sabotage through facility walk-through, monitoring of electronic alarm systems, and emergency communications.

Ames Site Office

The Ames Site Office provides the single federal presence with responsibility for contract performance at the Ames Laboratory. This site office provides an on-site SC presence with authority encompassing contract management, program and project implementation, federal stewardship, and internal operations.

Argonne National Laboratory

The Argonne National Laboratory (ANL) in Argonne, Illinois, is a multiprogram laboratory located on 1,500 acres in suburban Chicago. The laboratory consists of 99 buildings (4.4 million gross square feet of space) with an average building age of 36 years.

Basic Energy Sciences: ANL is home to research activities in broad areas of materials and chemical sciences. It is also the site of three user facilities—the Advanced Photon Source (APS), the Center for Nanoscale Materials (CNM), and the Electron Microscopy Center (EMC) for Materials Research.

- The **Advanced Photon Source** is one of only three third-generation, hard x-ray synchrotron radiation light sources in the world. The 1,104-meter circumference facility—large enough to house a baseball park in its center—includes 34 bending magnets and 34 insertion devices, which generate a capacity of 68 beamlines for experimental research. Instruments on these beamlines attract researchers to study the structure and properties of materials in a variety of disciplines, including condensed matter physics, materials sciences, chemistry, geosciences, structural biology, medical imaging, and environmental sciences.
- The **Electron Microscopy Center for Materials Research** provides *in-situ* high-voltage and intermediate voltage high-spatial resolution electron microscope capabilities for direct observation of ion-solid interactions during irradiation of samples with high-energy ion beams. The EMC employs both a tandem accelerator and an ion implanter in conjunction with a transmission electron microscope for simultaneous ion irradiation and electron beam microcharacterization. The unique combination of two ion accelerators and an electron microscope permits direct, real-time, *in-situ* observation of the effects of ion bombardment of materials. Research at EMC includes microscopy based studies on high-temperature superconducting materials, irradiation effects in metals and semiconductors, phase transformations, and processing related structure and chemistry of interfaces in thin films.
- The **Center for Nanoscale Materials** provides capabilities for developing new methods for self assembly of nanostructures, exploring the nanoscale physics and chemistry of nontraditional electronic materials, and creating new probes for exploring nanoscale phenomena. The CNM is organized around six scientific themes: nanomagnetism, bio-inorganic hybrids, nanocarbon, complex oxides, nanophotonics, and theory and simulation.

Advanced Scientific Computing Research: ANL conducts basic research in mathematics and computer science, as well as research in advanced computing software tools. ANL also participates in scientific application partnerships and contributes to a number of the SciDAC science application teams. Further, it participates in both SciDAC Centers for Enabling Technologies and SciDAC Institutes that focus on specific software challenges confronting users of petascale computers. ANL was selected by DOE, in partnership with ORNL and PNNL, to develop a Leadership Computing Facility (LCF) for science to revitalize the U.S. effort in high end computing. As part of the LCF activity, the ANL facility will operate 250-500 teraflops of open high-performance computing with low electrical power consumption to advance science and will continue to focus on testing and evaluating leading edge computers under development.

Biological and Environmental Research: ANL conducts research on the molecular control of genes and gene pathways in microbes in addition to biological and geochemical research that supports environmental remediation. ANL operates beamlines for protein crystallography at the APS and also supports a growing community of users in environmental sciences.

In support of climate change research, ANL has oversight responsibility for coordinating the overall infrastructure operations of all three stationary Atmospheric Radiation Measure (ARM) sites to ensure consistency, data quality, and site security and safety. This includes infrastructure coordination of: communications, data transfer, and instrument calibration. ANL also provides the site manager for the Southern Great Plains site who is responsible for coordinating the day-to-day operations at that site. ANL also conducts research on aerosol processes and properties, and develops and applies software to enable efficient long-term climate simulations on distributed-memory multiprocessor computing platforms. In conjunction with ORNL, PNNL, and six universities, ANL is a participating laboratory in the Carbon Sequestration in Terrestrial Ecosystems (CSiTE) consortium, focusing on research to understand the processes controlling the rate of soil carbon accretion.

High Energy Physics: HEP supports physics research in theoretical and experimental physics and accelerator technology R&D at ANL, using unique capabilities of the laboratory in the areas of engineering, detector technology, and advanced accelerator and computing techniques. The program had a significant presence at the recently concluded collider program at the Deutsches Elektronen-Synchrotron (DESY) laboratory in Hamburg, Germany and continues to participate in the Tevatron and neutrino research programs at Fermi National Accelerator Laboratory ("Fermilab"); analysis of data from these experimental programs will continue for several years. Other major ANL activities include work on the ATLAS (A Large Toroidal LHC Apparatus) experiment at the Large Hadron Collider, advanced accelerator R&D using the Argonne Wakefield Accelerator, and an important role in collaboration with Fermilab in the development of superconducting radio frequency technology for future accelerators, and develop of new detector technologies.

- The **Argonne Wakefield Accelerator** is an R&D testbed that focuses on the physics and technology of high-gradient, dielectric-loaded structures for accelerating electrons. Two approaches are being pursued: a collinear, e-beam driven dielectric-loaded wakefield accelerator; and a two-beam accelerator. The goal is to identify and develop techniques which may lead to more efficient, compact, and inexpensive particle accelerators for future HEP applications. Research activities at this facility include: the development of materials/coatings for high gradient research; dielectric-loaded and photonic band gap accelerating structures; left-handed meta-materials; high-power/high-brightness electron beams; and advanced beam diagnostics.

Nuclear Physics: The major ANL activity is the operation and R&D program at the Argonne Tandem Linac Accelerator System (ATLAS) National User Facility. Other activities include an on-site program of research using laser techniques (Atom Trap Trace Analysis); research programs at the Thomas Jefferson National Accelerator Facility (TJNAF), Fermi National Laboratory (Fermilab), Relativistic Heavy Ion Collider (RHIC), and Deutsches Elektronen-Synchrotron (DESY) in Germany investigating the structure of the nucleon; generic R&D in rare isotope beam development relevant for a next generation facility in nuclear structure and astrophysics; theoretical calculations and investigations in subjects supporting the experimental research programs in Medium Energy and Low Energy physics; and data compilation and evaluation activities as part of the National Nuclear Data Program.

- The **Argonne Tandem Linac Accelerator System** National User Facility provides variable energy, precision beams of stable ions from protons through uranium, at energies near the Coulomb barrier (up to 10 MeV per nucleon) using a superconducting linear accelerator. Most work is performed with stable heavy-ion beams; however, about 10 to 20% of the beams are rare isotope beams. The ATLAS facility features a wide array of experimental instrumentation, including a world-leading ion-trap apparatus, the Advanced Penning Trap. The Gammasphere detector, coupled with the Fragment Mass Analyzer, is a unique world facility for measurement of nuclei at the limits of angular momentum (high-spin states). ATLAS staff are world leaders in superconducting linear accelerator technology, with particular application in rare isotope beam facilities. The combination of versatile beams and powerful instruments enables about 400 users annually at ATLAS to conduct research in a broad program in nuclear structure and dynamics, nuclear astrophysics, and fundamental interaction studies. The capabilities of ATLAS are being augmented by the fabrication of the CAlifornium Rare Ion Beam Upgrade (CARIBU) as a source to provide new capabilities in neutron-rich radioactive beams.

Fusion Energy Sciences: Argonne contributes a small effort in basic plasma science.

Science Laboratories Infrastructure: SLI enables Departmental research missions at Argonne by funding line item construction to maintain the general purpose infrastructure, and the cleanup and removal of excess facilities.

Safeguards and Security: This program provides protection of nuclear materials, classified matter, government property, and other vital assets from unauthorized access, theft, diversion, sabotage, espionage, and other hostile acts that may cause risks to national security, the health and safety of DOE and contractor employees, the public, or the environment. Program activities include security systems, material control and accountability, information and cyber security, program management, and personnel security. In addition, a protective force is maintained. These activities ensure that the facility, personnel, and assets remain safe from potential threats.

Argonne Site Office

The Argonne Site Office provides the single federal presence with responsibility for contract performance at ANL. This site office provides an on-site SC presence with authority encompassing contract management, program and project implementation, federal stewardship, and internal operations.

Berkeley Site Office

The Berkeley Site Office provides the single federal presence with responsibility for contract performance at the Lawrence Berkeley National Laboratory. This site office provides an on-site SC presence with authority encompassing contract management, program and project implementation, federal stewardship, and internal operations.

Brookhaven National Laboratory

The Brookhaven National Laboratory (BNL) is a multiprogram laboratory located on 5,300 acres in Upton, New York. The laboratory consists of 336 SC buildings (3.8 million gross square feet of space) with an average building age of 37 years. BNL creates and operates major facilities available to university, industrial, and government personnel for basic and applied research in the physical, biomedical, and environmental sciences, and in selected energy technologies.

Basic Energy Sciences: BNL conducts research efforts in materials and chemical sciences as well as to efforts in geosciences and biosciences. It is also the site of one BES supported user facilities—the National Synchrotron Light Source (NSLS).

- The **National Synchrotron Light Source** consists of two distinct electron storage rings. The x-ray storage ring is 170 meters in circumference and can accommodate 60 beamlines or experimental stations, and the vacuum-ultraviolet (VUV) storage ring can provide 25 additional beamlines around its circumference of 51 meters. Synchrotron light from the x-ray ring is used to determine the atomic structure of materials using diffraction, absorption, and imaging techniques. Experiments at the VUV ring help solve the atomic and electronic structure as well as the magnetic properties of a wide array of materials.
- The **Center for Functional Nanomaterials** focuses on understanding the chemical and physical response of nanomaterials to make functional materials such as sensors, activators, and energy-conversion devices. It also provides clean rooms, general laboratories, and wet and dry laboratories for sample preparation, fabrication, and analysis. Equipment includes that needed for laboratory and fabrication facilities for e-beam lithography, transmission electron microscopy, scanning probes and surface characterization, material synthesis and fabrication, and spectroscopy.

Advanced Scientific Computing Research: BNL conducts basic research in applied mathematics and participates on SciDAC science application teams. It also participates in SciDAC Centers for Enabling Technologies that focus on specific software challenges confronting users of petascale computers.

Biological and Environmental Research: BNL operates beam lines for protein crystallography at the NSLS for use by the national biological research community, research in biological structure determination, and research into new instrumentation for detecting x-rays and neutrons. Research is also conducted in support of the Genomics: GTL program and on the molecular mechanisms of cell responses to low doses of radiation. BNL conducts molecular radiochemistry and imaging and instrumentation research, developing advanced technologies for biological imaging. The 2005 BER Distinguished Scientist for Medical Sciences is at BNL. BNL scientists support the environmental remediation sciences research program in the area of subsurface contaminant fate and transport.

- Climate change research includes the operation of the **Atmospheric Radiation Measurement (ARM)** External Data resource that provides ARM investigators with data from non-ARM sources, including satellite and ground-based systems. BNL scientists form an important part of the science team in the Atmospheric Sciences program (ASP), including providing special expertise in conducting atmospheric field campaigns and aerosol research. The ASP chief scientist is at BNL.
- BNL scientists play a leadership role in the operation of the **Free-Air Carbon Dioxide Enrichment (FACE)** experiment at the Duke Forest which seeks to understand how plants respond to elevated carbon dioxide concentrations in the atmosphere.

High Energy Physics: HEP supports physics research in theoretical and experimental physics and accelerator technology research and development (R&D) at BNL, using unique resources of the laboratory, including engineering and technology for future accelerators and detectors, advanced computational resources, and the Accelerator Test Facility. BNL serves as the host lab for the U.S. ATLAS collaboration, which participates in the research of the ATLAS detector at the Large Hadron Collider. BNL manages the program of maintenance and operations for the ATLAS detector, operates the primary U.S. analysis facility for ATLAS data, and is developing an analysis support center for U.S. based users. The group also contributes to the leadership and management of the U.S. ILC effort

BNL researchers have a leadership role in the Reactor Neutrino experiment in Daya Bay, China. BNL physicists are also involved in other neutrino physics efforts including research at the NuMI facility with the MINOS experiment at Fermilab, and R&D and planning for possible future accelerator-based neutrino experiments.

- The BNL **Accelerator Test Facility** is a user facility that supports a broad range of advanced accelerator R&D. The core capabilities include a high-brightness photoinjector electron gun, a 70 MeV linac, high power lasers synchronized to the electron beam to a picosecond level, four beam lines, and a sophisticated computer control system. Participating researchers come from universities, national laboratories, and industries. Experiments carried out in this facility are proposal-driven, and are typically in the areas involving interactions of high power electromagnetic radiation and high brightness electron beams, including laser acceleration of electrons and free-electron lasers. Other topics include the development of electron beams with extremely high brightness, photo-injectors, electron beam and radiation diagnostics and computer controls.

Nuclear Physics: Research activities include use of relativistic heavy ion beams and polarized protons in the Relativistic Heavy Ion Collider (RHIC) to investigate hot, dense nuclear matter and to understand the internal “spin” structure of the proton, respectively—parts of which are coordinated with the RIKEN BNL Research Center funded by Japan; development of future detectors for RHIC; R&D of beam-cooling accelerator technology aimed at increasing the RHIC beam luminosity; a small exploratory research activity directed towards the heavy ion program at the Large Hadron Collider (LHC); analysis of data from the Sudbury Neutrino Observatory (SNO) and reporting results obtained from SNO on the properties of neutrinos; and conducting R&D directed towards the reactor neutrino oscillation

experiment at Daya Bay; a theory program emphasizing RHIC heavy ion and "spin" physics; and data compilation and evaluation at the National Nuclear Data Center (NNDC) that is the central U.S. site for these national and international efforts.

- The **Relativistic Heavy Ion Collider** Facility, completed in 1999, is a major unique international facility currently used by about 1,200 scientists from 19 countries. RHIC uses Tandem Van de Graaff, Booster Synchrotron, and Alternating Gradient Synchrotron (AGS) accelerators in combination to inject beams into two rings of superconducting magnets of almost 4 kilometers circumference with 6 intersection regions where the beams can collide. RHIC can accelerate and collide a variety of heavy ions, including gold beams, up to an energy of 100 GeV per nucleon. RHIC is being used to search for and characterize hot, dense nuclear matter such as the predicted "quark-gluon plasma," a form of nuclear matter thought to have existed microseconds after the "Big Bang." It can also collide polarized protons with beams of energy up to 250 GeV per nucleon—a unique capability. Four detectors were fabricated to provide complementary measurements, with some overlap in order to cross-calibrate the measurements; the first two are still operating. The core of the Solenoidal Tracker at RHIC (STAR) detector is a large Time Projection Chamber (TPC) located inside a solenoidal magnet that tracks thousands of charged particles emanating from a single head-on gold-gold collision. A large modular barrel Electro-Magnetic Calorimeter (EMCal) and end-cap calorimeter measure deposited energy for high-energy charged and neutral particles and contain particle-photon discrimination capability. Other ancillary detector systems include a Silicon Vertex Tracker and forward particle tracking capabilities. A barrel Time of Flight detector upgrade (STAR TOF) is being added to significantly extend the particle identification capability of STAR detector. The Pioneering High-Energy Nuclear Interacting Experiment (PHENIX) detector has a particular focus on the measurement of rare probes at high event detection rate. It consists of two transverse spectrometer arms that can track charged particles within a magnetic field, especially to higher momentum: it provides excellent discrimination among photons, electrons, and hadrons. There are also two large muon tracking and identification systems in the forward and backward directions as well as ancillary tracker systems. Additional detector subsystems are being added to PHENIX to enhance its capabilities. Scientists that used the other two smaller detectors, Phobos and Broad Range Hadron Magnetic Spectrometer (BRAHMS), have completed their data acquisition programs and are focused on data analysis. International participation was essential in the implementation of all four detector systems.
- The **Alternating Gradient Synchrotron** provides high intensity pulsed proton beams up to 33 GeV on fixed targets and secondary beams of kaons, muons, pions, and anti-protons. The AGS is the injector of (polarized) proton and heavy-ion beams into RHIC, and its operations are supported by the Heavy Ion subprogram as part of the RHIC facility. The AGS is also utilized for radiation damage studies of electronic systems for NASA supported work, among a variety of uses, with the support for these activities being provided by the relevant agencies.
- The **Booster Synchrotron**, part of the RHIC injector, is providing heavy-ion beams to a dedicated beam line (NASA Space Radiation Laboratory) for biological and electronic systems radiation studies funded by NASA. The incremental costs for these studies are provided by NASA.
- The **Tandem Van de Graaff** accelerators which serve as injectors for the Booster Synchrotron are being replaced by a modern, compact Electron Beam Ion Source (EBIS) and linac system which promises greater efficiency, greater reliability, and lower maintenance costs as well as the potential for future upgrades. The EBIS is a joint DOE/NASA project.
- The **National Nuclear Data Center** is the central U.S. site for national and international nuclear data and compilation efforts. The U.S. Nuclear Data program is the United States' repository for

information generated in low- and intermediate-energy nuclear physics research worldwide. This information consists of both bibliographic and numeric data. The NNDC is a resource for a very broad user community in all aspects of nuclear technology, with relevance to homeland security and advanced fuel cycles for nuclear reactors. Nuclear Data program-funded scientists at U.S. national laboratories and universities contribute to the activities and responsibilities of the NNDC.

- The **Brookhaven Linear Isotope Producer (BLIP)** at BNL uses a linear accelerator that injects 200 million-electron-volt protons into the 33 giga-electron-volt Alternating Gradient Synchrotron. Produced isotopes, such as strontium-82, germanium-68, copper-67, and others, are used in medical diagnostic and therapeutic applications and other scientific research. The Radioisotopes Program is transferred from the Office of Nuclear Energy to the Office of Science in FY 2009.

Science Laboratories Infrastructure: SLI enables Departmental research missions at Brookhaven by funding line item construction to maintain the general purpose infrastructure, and the cleanup and removal of excess facilities.

Safeguards and Security: S&S activities at BNL are focused on protective forces, cyber security, personnel security, security systems, information security, program management, and material control and accountability. BNL operates a transportation division to move special nuclear materials around the site. Material control and accountability efforts focus on accurately accounting for and protecting the site's special nuclear materials.

Brookhaven Site Office

The Brookhaven Site Office provides the single federal presence with responsibility for contract performance at BNL. This site office provides an on-site SC presence with authority encompassing contract management, program and project implementation, federal stewardship, and internal operations.

Chicago Office

The Chicago (CH) Office supports the Department's programmatic missions in Science and Technology, National Nuclear Security, Energy Resources, and Environmental Quality by providing expertise and assistance in such areas as contract management, procurement, project management, engineering, facilities and infrastructure, property management, construction, human resources, financial management, general and patent law, environmental protection, quality assurance, integrated safety management, integrated safeguards and security management, nuclear material control and accountability, and emergency management. CH directly supports site offices responsible for program management oversight of six major management and operating laboratories—Ames Laboratory, Argonne National Laboratory, Lawrence Berkeley National Laboratory, Brookhaven National Laboratory, Fermi National Accelerator Laboratory, and Princeton Plasma Physics Laboratory—and one government-owned and government-operated Federal laboratory, New Brunswick Laboratory. Additionally, the administrative, business, and technical expertise of CH is shared SC-wide through the Integrated Support Center concept. CH serves as SC's grant center, administering grants to 272 colleges/universities in all 50 states, Washington, D.C., and Puerto Rico, as determined by the DOE-SC program offices as well as non-SC offices.

Basic Energy Sciences: BES funds research at 173 academic institutions located in 48 states.

Advanced Scientific Computing Research: ASCR funds research at over 70 colleges/universities supporting over 130 principal investigators.

Biological and Environmental Research: BER funds research at over 200 institutions, including colleges/universities, private industry, and other federal and private research institutions located in 45 states, Washington, DC, and Puerto Rico.

High Energy Physics: HEP supports about 300 research groups at more than 100 colleges and universities located in 36 states, Washington, D.C., and Puerto Rico. The strength and effectiveness of the university-based program is critically important to the success of the program as a whole.

Nuclear Physics: NP funds 190 research grants at 85 colleges/universities located in 34 states and the District of Columbia. Among these are grants with the Triangle Universities Nuclear Laboratory (TUNL) which includes the High Intensity Gamma Source (HIGS) at the Duke Free Electron Laser Laboratory; the Texas A&M (TAMU) Cyclotron Institute; the Yale Wright Nuclear Science Laboratory; the University of Washington Center for Experimental Nuclear and Particle Astrophysics (CENPA) and the Institute for Nuclear Theory (INT); and the Research and Engineering (R&E) Center at the Massachusetts Institute for Technology. The first three of these include accelerator facilities which offer niche capabilities and opportunities not available at the National User Facilities, or many foreign low-energy laboratories, such as specialized sources and targets, opportunities for extended experiments, and specialized instrumentation. The CENPA and R&E Center have unique infrastructure ideal for pursuing instrumentation projects important to the NP mission. The Institute for Nuclear Theory (INT) is a premier international center for new initiatives and collaborations in nuclear theory research.

Fusion Energy Sciences: The Chicago Office supports FES by implementing grants and cooperative agreements for research at more than 50 colleges and universities located in approximately 30 states. It also supports the FES program by implementing a cooperative agreement and grants for the DIII-D tokamak experiment and related programs at General Atomics, an industrial firm located in San Diego, California.

Safeguards and Security: S&S at CH provides for contractor protective forces for the Fermi National Accelerator Laboratory and Homeland Security Presidential Directive-12 implementation cost and maintenance.

Fermi National Accelerator Laboratory

Fermi National Accelerator Laboratory is a program-dedicated laboratory (High Energy Physics) located on a 6,800-acre site in Batavia, Illinois. The laboratory consists of 346 buildings (2.3 million gross square feet of space) with an average building age of 40 years. Fermilab is the largest U.S. laboratory for research in high-energy physics and is second only to CERN, the European Laboratory for Particle Physics. About 2,200 scientific users, scientists from universities and laboratories throughout the U.S. and around the world, use Fermilab for their research. Fermilab's mission is the goal of high-energy physics: to understand matter at its deepest level, to identify its fundamental building blocks, and to understand how the laws of nature determine their interactions.

Advanced Scientific Computing Research: Fermilab participates in some SciDAC science application teams relevant to physics research, accelerator modeling, and distributed data. Fermilab also participates in SciDAC Centers for Enabling Technologies that focus on specific software challenges confronting users of petascale computers.

High Energy Physics: Fermilab is the principal experimental facility for HEP. Fermilab operates the **Tevatron** accelerator and colliding beam facility, which consists of a four-mile ring of superconducting magnets and two large multi-purpose detectors, and is capable of accelerating protons and antiprotons to an energy of one trillion electron volts (1 TeV). The Tevatron Collider is the highest energy proton accelerator in the world, and will remain so until the Large Hadron Collider (LHC) begins operation at

CERN in 2008. The laboratory supports two Tevatron experiments, CDF and DZero, together home to about 1,500 physicists from Fermilab and other national labs, U.S. universities, and foreign universities and research institutes.

- The Tevatron complex includes the **Neutrinos at the Main Injector (NuMI)** beamline, the world's highest intensity neutrino beam facility, which started operation in 2005. NuMI provides a controlled beam of neutrinos to the Main Injector Neutrino Oscillation (MINOS) experiment located in the Soudan Mine in Minnesota. New experiments that will make further use of the NuMI beam are planned to begin fabrication in FY 2008.
- Fermilab is host laboratory for the U.S. CMS collaboration, which conducts research using the CMS detector at the LHC. Fermilab manages the program of maintenance and operations for the CMS detector and operates the primary U.S. data analysis center for CMS. Fermilab is also the host laboratory for the LHC Accelerator Research Program which manages U.S. accelerator physicists' efforts on the commissioning, operations, and upgrades of the LHC.
- Fermilab is a leading national laboratory for research and development of future particle accelerator technologies. For example, the large scale infrastructure needed for the fabrication, processing, and testing of superconducting radio frequency (RF) cavities and cryomodules is being built at Fermilab. This includes horizontal and vertical test stands for cavity testing, high quality clean rooms and well-equipped rigging areas for assembly of cryomodules. Fermilab is the lead U.S. laboratory coordinating the national R&D program in this area.
- The laboratory is involved in R&D associated with global systems, accelerator physics, and value engineering for the ILC. Fermilab also has a significant program for R&D on advanced detector components for a variety of physics applications. The laboratory maintains and operates a fixed target beam for testing of detector elements. The facility hosts both university and international groups.

Safeguards and Security: S&S program efforts are directed at maintaining protective force staffing and operations to protect personnel and the facility, and toward continuing the cyber security, program management, security systems, and material control and accountability programs to accurately account for and protect the facility's special nuclear materials.

Fermi Site Office

The Fermi Site Office provides the single federal presence with responsibility for contract performance at Fermilab. This site office provides an on-site SC presence with authority encompassing contract management, program and project implementation, federal stewardship, and internal operations.

Idaho National Laboratory

Idaho National Laboratory (INL) is a multiprogram laboratory located on 572,000 acres in Idaho Falls, Idaho. Within the laboratory complex are nine major applied engineering, interim storage, and research and development facilities.

Basic Energy Sciences: INL supports studies to understand and improve the life expectancy of material systems used in engineering.

Biological and Environmental Research: INL is conducting research in subsurface science relating to clean up of the nuclear weapons complex with an emphasis on understanding coupled processes affecting contaminant transport.

Fusion Energy Sciences: Since 1978, INL has been the lead laboratory for fusion safety. As such, it has helped to develop the fusion safety database that will demonstrate the environmental and safety characteristics of both nearer term fusion devices and future fusion power plants. Research at INL focuses on the safety aspects of magnetic fusion concepts for existing and future machines, such as a burning plasma experiment, and further developing our domestic safety database using existing collaborative arrangements to conduct work on international facilities. In addition, INL has expanded their research and facilities capabilities to include tritium science activities. INL has initiated operation of the Safety and Tritium Applied Research (STAR) Facility; a small tritium laboratory where the fusion program can conduct tritium material science, chemistry, and safety experiments. The STAR Facility has been declared a National User Facility. INL also coordinates safety codes and standards within the ITER program.

Lawrence Berkeley National Laboratory

The Lawrence Berkeley National Laboratory is a multiprogram laboratory located in Berkeley, California, on a 200-acre site adjacent to the Berkeley campus of the University of California. The laboratory consists of 107 buildings (1.5 million gross square feet of space) with an average building age of 38 years. LBNL is dedicated to performing leading-edge research in the biological, physical, materials, chemical, energy, and computer sciences. The land is leased from the University of California.

Basic Energy Sciences: LBNL is home to major research efforts in materials and chemical sciences as well as to efforts in geosciences, engineering, and biosciences. It is also the site of three Basic Energy Sciences supported user facilities—the Advanced Light Source (ALS), the Molecular Foundry, and the National Center for Electron Microscopy (NCEM).

- The **Advanced Light Source** provides vacuum-ultraviolet light and x-rays for probing the electronic and magnetic structure of atoms, molecules, and solids, such as those for high-temperature superconductors. The high brightness and coherence of the ALS light are particularly suited for soft x-ray imaging of biological structures, environmental samples, polymers, magnetic nanostructures, and other inhomogeneous materials. Other uses of the ALS include holography, interferometry, and the study of molecules adsorbed on solid surfaces. The pulsed nature of the ALS light offers special opportunities for time resolved research, such as the dynamics of chemical reactions. Shorter wavelength x-rays are also used at structural biology experimental stations for x-ray crystallography and x-ray spectroscopy of proteins and other important biological macromolecules. The ALS is a growing facility with a lengthening portfolio of beamlines that has already been applied to make important discoveries in a wide variety of scientific disciplines. An ALS User Support Building (USB) will finish construction in FY 2012. The USB will provide high-quality user support space in sufficient quantity to accommodate the very rapid growth in the number of ALS users and to accommodate projected future expansion. The USB will contain staging areas for ALS experiments, space for a long beamline that will extend from the floor of the ALS into the USB, and temporary office space for visiting users.
- The **National Center for Electron Microscopy** provides instrumentation for high-resolution, electron-optical microcharacterization of atomic structure and composition of metals, ceramics, semiconductors, superconductors, and magnetic materials. This facility contains one of the highest resolution electron microscopes in the U.S. The Transmission Electron Aberration Corrected Microscope will be completed in FY 2009.
- The **Molecular Foundry** provides users with instruments, techniques, and collaborators to enhance the study of the synthesis, characterization, and theory of nanoscale materials. Its focus is on the multidisciplinary development and understanding of both “soft” (biological and polymer) and “hard”

(inorganic and microfabricated) nanostructured building blocks and the integration of these building blocks into complex functional assemblies. Scientific themes include inorganic nanostructures; nanofabrication; organic, polymer, and biopolymer nanostructures; biological nanostructures; imaging and manipulation of nanostructures; and theory of nanostructures. The facility offers expertise in a variety of techniques for the study of nanostructures, including electronic structure and excited-state methods, *ab initio* and classical molecular dynamics, quantum transport, and classical and quantum Monte Carlo approaches.

Advanced Scientific Computing Research: LBNL conducts basic research in mathematics and computer science, as well as research in advanced computing software tools. LBNL also participates in several SciDAC science application teams, and both SciDAC Centers for Enabling Technologies and SciDAC Institutes that focus on specific software challenges confronting users of petascale computers. LBNL manages the ESnet. ESnet is one of the worlds most effective and progressive science-related computer networks that provides worldwide access and communications to Department of Energy facilities. LBNL is also the site of the National Energy Research Scientific Computing Center (NERSC), which provides a range of high-performance, state-of-the-art computing resources that are a critical element in the success of many SC research programs.

Biological and Environmental Research: LBNL is one of the major national laboratory partners forming the **Joint Genome Institute (JGI)**, the principal goal of which is high-throughput DNA sequencing techniques. The laboratory also conducts research on the molecular mechanisms of cell responses to low doses of radiation and on microbial systems biology research as part of Genomics: GTL program. The Chief Scientist for the Low Dose Radiation Research program and the 2005 BER Distinguished Scientists for Environmental Remediation and for Life Sciences are at LBNL. LBNL operates beamlines for determination of protein structure at the ALS for use by the national and international biological research community. The ALS also supports and is used by a growing environmental science community.

LBNL supports environmental remediation sciences research and provides geophysical, biophysical, and biochemical research capabilities for field sites in that program and is participating in the NSF/DOE Environmental Molecular Sciences Institute at Pennsylvania State University.

LBNL conducts research on carbon cycling and carbon sequestration on terrestrial ecosystems to understand the processes controlling the exchange of CO_2 between terrestrial ecosystems and the atmosphere. It also conducts research on biological and ecological responses to climatic and atmospheric changes.

It also develops scalable implementation technologies that allow widely used climate models to run effectively and efficiently on massively parallel processing supercomputers.

- The **Joint BioEnergy Institute (JBEI)** at LBNL, one of three Genomics:GTL Bioenergy Research Centers, will focus attention on model plant systems (*Arabidopsis* and rice) for which the laboratory capabilities are well developed. Early results on their more tractable genomics will be shifted to potential bioenergy feedstock plants. The JBEI will experiment with *E. Coli* and yeast, two workhorse microbes for conversion, as well as *Sulfolobus solfataricus*, an organism that has undergone much less historical research. JBEI will also consider biological production of alternatives to ethanol, such as butanol.

High Energy Physics: HEP supports physics research in experimental and theoretical physics and technology R&D at LBNL, using unique capabilities of the laboratory in the areas of superconducting magnet R&D, engineering and detector technology, world-forefront expertise in laser driven particle acceleration, expertise in design of advanced electronic devices, computational resources, and design of

modern, complex software codes for HEP experiments. LBNL participates in the research of the ATLAS detector at the Large Hadron Collider, and has a leading role in providing the software and computing infrastructure for ATLAS. LBNL physicists are also involved in neutrino physics research using reactor-produced neutrinos, and provide management expertise to the Reactor Neutrino experiment at Daya Bay, China.

LBNL also has an active program in particle astrophysics and cosmology, providing leadership in the development of innovative detectors and in the application of high energy physics analysis methods to astronomical observations. LBNL physicists lead ongoing studies of dark energy using supernovae, including providing a catalog of data on supernova as distance indicators. The SuperNova Acceleration Probe (SNAP) science team continues R&D for a space-based dark energy mission. LBNL operates the Microsystems Lab where new detector technologies have been developed for collider physics research, as well as devices to study dark energy and the cosmic microwave background. LBNL also is host to the Particle Data Group, which coordinates compilation and synthesis of high-energy physics experimental data into compendia which summarize the status of all major subfields of HEP and are updated annually.

Nuclear Physics: LBNL supports a variety of activities focused primarily in the low energy and heavy ion NP subprograms. These include fabrication of a next-generation gamma-ray detector system, GRETINA; research with the STAR detector located at Brookhaven's RHIC facility; development of future detector systems for RHIC; operation of the Parallel Distributed Systems Facility aimed at heavy ion and low energy physics computation; fabrication of a detector upgrade for the ALICE detector heavy ion program at the Large Hadron Collider (LHC) at the European Organization for Nuclear Research (CERN); analysis of data from the Sudbury Neutrino Observatory (SNO) detector in Canada and reporting results on the properties of neutrinos; research at the KamLAND detector in Japan that is performing neutrino studies; development of next generation neutrino detectors, including participation in the Cryogenic Underground Observatory for Rare events (CUORE) experiment in Italy; a theory program with an emphasis on relativistic heavy ion physics; data compilation and evaluation activities supporting the National Nuclear Data Center at BNL; and a technical effort in generic R&D of rare isotope beam development with the development of electron-cyclotron resonance (ECR) ion sources. The 88-Inch Cyclotron at the LBNL is a facility for testing electronic circuit components for radiation "hardness" to cosmic rays, supported by the National Reconnaissance Office (NRO) and the U.S. Air Force (USAF), and for a small in-house research program supported by NP.

Fusion Energy Sciences: LBNL has been conducting research in developing ion beams for applications to high energy density laboratory plasmas (HEDLP) in the near term (4 to 10 years) and inertial fusion energy in the long term. Currently the laboratory has two major experimental systems for doing this research: the Neutralized Drift Compression Experiment and the High Current Experiment. Both experiments are directed at answering the question of how ion beams can be produced with the intensity required for research in HEDLP and inertial fusion energy sciences. LBNL conducts this research together with the Lawrence Livermore National Laboratory and Princeton Plasma Physics Laboratory through the Heavy Ion Fusion Science Virtual National Laboratory.

Science Laboratories Infrastructure: SLI enables Departmental research missions at LBNL by funding line item construction to maintain the general purpose infrastructure, and the cleanup and removal of excess facilities.

Safeguards and Security: S&S at LBNL provides physical protection of personnel and laboratory facilities. This is accomplished with protective forces, security systems, cyber security, program management, personnel security, and material control and accountability of special nuclear material.

Lawrence Livermore National Laboratory

Lawrence Livermore National Laboratory (LLNL) is a multiprogram laboratory located on 821 acres in Livermore, California. This laboratory was built in Livermore as a weapons laboratory 42 miles from the campus of the University of California at Berkeley to take advantage of the expertise of the university in the physical sciences.

Basic Energy Sciences: LLNL supports research in materials sciences and in geosciences research on the sources of electromagnetic responses in crustal rocks, seismology theory and modeling, the mechanisms and kinetics of low-temperature geochemical processes and the relationships among reactive fluid flow, geochemical transport, and fracture permeability.

Advanced Scientific Computing Research: LLNL participates in base applied mathematics and computer science research. LLNL also participates in several SciDAC science application teams and both SciDAC Centers for Enabling Technologies and SciDAC Institutes that focus on specific software challenges confronting users of petascale computers.

Biological and Environmental Research: LLNL is one of the major national laboratory partners that comprise the Joint Genome Institute (JGI), the principal goal of which is high-throughput DNA sequencing. LLNL is developing new biocompatible materials and microelectronics for the artificial retina project. It also conducts research on the molecular mechanisms of cell responses to low doses of radiation.

Through the program for Climate Model Diagnosis and Intercomparison, LLNL provides the international leadership to develop and apply diagnostic tools to evaluate the performance of climate models and to improve them. Virtually every climate modeling center in the world participates in this unique program. It also conducts research to improve understanding of the climate system, particularly the climate effect of clouds and aerosol properties and processes and climate change feedbacks on carbon cycling. The 2005 BER Distinguished Scientist for Climate Change Research is at LLNL.

High Energy Physics: HEP supports experimental physics research and technology R&D at LLNL, using unique capabilities of the laboratory primarily in the areas of engineering and detector technology and advanced accelerator R&D.

Nuclear Physics: The LLNL program supports research in relativistic heavy ion physics as part of the PHENIX collaboration at RHIC and the ALICE experiment at the CERN LHC, in nuclear data and compilation activities, in R&D of neutrinoless double beta decay experiments, on theoretical nuclear structure studies, and a technical effort involved in generic R&D of rare isotope beam development.

Fusion Energy Sciences: LLNL works with LBNL and PPPL through the Heavy-Ion Fusion Virtual National Laboratory in advancing the physics of heavy ion beams as a driver for inertial fusion energy in the long term and high energy density laboratory plasmas in the near term. It also conducts research on Fast Ignition concepts for applications in research on high energy density physics and inertial fusion energy. The LLNL program also includes collaborations with General Atomics on the DIII-D tokamak and benchmarking of fusion physics computer models with experiments such as DIII-D. LLNL carries out research in the simulation of turbulence and its effect on transport of heat and particles in magnetically confined plasmas. In addition, LLNL carries out research in support of plasma chamber and plasma-material interactions.

Los Alamos National Laboratory

Los Alamos National Laboratory (LANL) is a multiprogram laboratory located on 30,413 acres in Los Alamos, New Mexico.

Basic Energy Sciences: LANL is home to a few efforts in materials sciences, chemical sciences, geosciences, and engineering. LANL supports research on strongly correlated electronic materials, high-magnetic fields, microstructures, deformation, alloys, bulk ferromagnetic glasses, mechanical properties, ion enhanced synthesis of materials, metastable phases and microstructures, and mixtures of particles in liquids.

Research is also supported to understand the electronic structure and reactivity of actinides through the study of organometallic compounds. Also supported is work to understand the chemistry of plutonium and other light actinides in both near-neutral pH conditions and under strongly alkaline conditions relevant to radioactive wastes and research in physical electrochemistry fundamental to energy storage systems. In the areas of geosciences, experimental and theoretical research is supported on rock physics, seismic imaging, the physics of the earth's magnetic field, fundamental geochemical studies of isotopic equilibrium/disequilibrium, and mineral-fluid-microbial interactions.

LANL is also the site of two BES supported user facilities: the Manuel Lujan Jr. Neutron Scattering Center (Lujan Center) and the Center for Integrated Nanotechnologies (CINT).

- The **Manuel Lujan Jr. Neutron Scattering Center** provides an intense pulsed source of neutrons to a variety of spectrometers for neutron scattering studies. The Lujan Center features instruments for measurement of high-pressure and high-temperature samples, strain measurement, liquid studies, and texture measurement. The facility has a long history and extensive experience in handling actinide samples. The Lujan Center is part of the Los Alamos Neutron Science Center (LANSCE), which is comprised of a high-power 800-MeV proton linear accelerator, a proton storage ring, production targets to the Lujan Center and the Weapons Neutron Research facility, and a variety of associated experiment areas and spectrometers for national security research and civilian research.
- The **Center for Integrated Nanotechnologies** provides tools and expertise to explore the continuum from scientific discovery to the integration of nanostructures into the microworld and the macroworld. CINT is devoted to establishing the scientific principles that govern the design, performance, and integration of nanoscale materials. Through its core facility in Albuquerque, New Mexico, and its gateways to both Sandia National Laboratories and Los Alamos National Laboratory, CINT provides access to tools and expertise to explore the continuum from scientific discovery to the integration of nanostructures into the microworld and the macroworld. CINT supports five scientific thrusts that serve as synergistic building blocks for integration research: nano-bio-micro interfaces, nanophotonics and nanoelectronics, complex functional nanomaterials, nanomechanics, and theory and simulation.

Advanced Scientific Computing Research: LANL conducts basic research in mathematics and computer science and in advanced computing software tools. LANL also participates in several SciDAC science application teams and both SciDAC Centers for Enabling Technologies and SciDAC Institutes, which focus on specific software challenges confronting users of petascale computers.

Biological and Environmental Research: LANL is one of the major national laboratory partners that comprise the JGI, the principal goal of which is high-throughput DNA sequencing and studies on the biological functions associated with newly sequenced human DNA. One of LANL's roles in the JGI involves the production of high quality "finished" DNA sequence. It also conducts research on the molecular mechanisms of cell responses to low doses of radiation and on research to understand the molecular control of genes and gene pathways in microbes. Activities in structural biology include the operation of an experimental station for protein crystallography at the LANSCE for use by the national biological research community. LANL conducts research in optical imaging as part of the artificial retina project

In support of BER's climate change research, LANL manages the day-to-day operations at the Tropical Western Pacific ARM site. In addition, LANL manages the deployment and operation of the ARM mobile facility. LANL also has a crucial role in the development, optimization, and validation of coupled sea ice and oceanic general circulation models and coupling them to atmospheric general circulation models for implementation on massively parallel computers.

LANL also conducts research under environmental remediation sciences with an emphasis on biological processes associated with plutonium mobility in the environment. LANL is participating in the NSF/DOE Environmental Molecular Sciences Institute at Pennsylvania State University.

High Energy Physics: HEP supports theoretical physics research and technology R&D at LANL.

Nuclear Physics: NP supports a broad program of research including: a program of neutron beam research that utilized beams from the LANSCE facility to make fundamental physics measurements; the fabrication of an experiment to search for the electric dipole moment of the neutron to be located at the Fundamental Neutron Physics Beamline at the Spallation Neutron Source (SNS); a research and development effort in relativistic heavy ions using the PHENIX detector at the RHIC and development of next generation instrumentation for RHIC; research directed at the study of the quark substructure of the nucleon in experiments at Fermilab, and the "spin" structure of nucleons at RHIC using polarized proton beams; analysis of data from the Sudbury Neutrino Observatory (SNO) and Mini Booster Neutrino Experiment (MiniBooNE) experiments and reporting results on the properties of neutrinos, and research and development directed at future studies of the properties of neutrinos; a broad program of theoretical research; nuclear data and compilation activities as part of the U.S. Nuclear Data program; and a technical effort involved in rare isotope beam development.

- At LANL, the 100 MeV Isotope Production Facility (IPF) produces major isotopes, such as germanium-68, a calibration source for Positron Emission Tomography (PET) scanners; strontium-82, the parent of rubidium-82, used in cardiac PET imaging; and arsenic-73, used as a biomedical tracer. The Radioisotopes Program is transferred from the Office of Nuclear Energy to the Office of Science in FY 2009.

Fusion Energy Sciences: LANL has developed a substantial experimental system for research in Magnetized Target Fusion, one of the major innovative confinement concepts and a thrust area in magnetized high energy density laboratory plasmas. The laboratory leads research in a high-density, compact plasma configuration called Field Reversed Configuration. LANL supports the creation of computer codes for modeling the stability of magnetically confined plasmas, including tokamaks and innovative confinement concepts. The work also provides theoretical and computational support for the Madison Symmetric Torus experiment, a proof-of-principle experiment in reversed field pinch at the University of Wisconsin in Madison. LANL develops advanced diagnostics for the National Spherical Torus Experiment (NSTX) at PPPL and other fusion experiments, such as the Rotating Magnetic Field as a current drive mechanism for the Field Reversed Configuration Experiment at the University of Washington in Seattle. The laboratory is also doing research in Inertial Electrostatic Confinement, another innovative confinement concept. LANL also supports the tritium processing activities needed for ITER.

National Renewable Energy Laboratory

The National Renewable Energy Laboratory (NREL) is a program-dedicated laboratory (Solar) located on 632 acres in Golden, Colorado. NREL was built to emphasize renewable energy technologies such as photovoltaics and other means of exploiting solar energy. It is the world leader in renewable energy technology development. Since its inception in 1977, NREL's sole mission has been to develop

renewable energy and energy efficiency technologies and transfer these technologies to the private sector.

Basic Energy Sciences: NREL supports basic research efforts that underpin this technological emphasis at the laboratory, e.g., on overcoming semiconductor doping limits, novel and ordered semiconductor alloys, and theoretical and experimental studies of properties of advanced semiconductor alloys for prototype solar cells. It also supports research addressing the fundamental understanding of solid-state, artificial photosynthetic systems. This research includes the preparation and study of novel dye-sensitized semiconductor electrodes, characterization of the photophysical and chemical properties of quantum dots, and study of charge carrier dynamics in semiconductors.

Advanced Scientific Computing Research: NREL participates in SciDAC science application teams including efforts focused on computational nanoscience and computational biology.

New Brunswick Laboratory

The New Brunswick Laboratory (NBL) is a government-owned, government-operated center for analytical chemistry and measurement science of nuclear materials. In this role, NBL performs measurements of the elemental and isotopic compositions for a wide range of nuclear materials. The NBL is the U.S. Government's Nuclear Materials Measurements and Reference Materials Laboratory and the National Certifying Authority for nuclear reference materials and measurement calibration standards. NBL provides reference materials, measurement and interlaboratory measurement evaluation services, and technical expertise for evaluating measurement methods and safeguards measures in use at other facilities for a variety of Federal program sponsors and customers. The NBL also functions as a Network Laboratory for the International Atomic Energy Agency. The NBL is administered through and is a part of the Chicago Office.

Oak Ridge Institute for Science and Education

The Oak Ridge Institute for Science and Education (ORISE), operated by Oak Ridge Associated Universities (ORAU), is located on a 150-acre site in Oak Ridge, Tennessee. Established in 1946, ORAU is a university consortium leveraging the scientific strength of major research institutions to advance science and education by partnering with national laboratories, government agencies, and private industry. ORISE focuses on scientific initiatives to research health risks from occupational hazards, assess environmental cleanup, respond to radiation medical emergencies, support national security and emergency preparedness, and educate the next generation of scientists.

Basic Energy Sciences: ORISE supports a consortium of university and industry scientists to share the ORNL research station at NSLS to study the atomic and molecular structure of matter (known as ORSOAR, the Oak Ridge Synchrotron Organization for Advanced Research). ORISE provides administrative support for panel reviews and site reviews. It also assists with the administration of topical scientific workshops and provides administrative support for other activities such as for the reviews of construction projects. ORISE manages the **Shared Research Equipment (SHaRE)** program at ORNL. The SHaRE program makes available state-of-the-art electron beam microcharacterization facilities for collaboration with researchers from universities, industry, and other government laboratories.

Advanced Scientific Computing Research: ORISE provides administrative support for panel reviews, site reviews, and Advanced Scientific Computing Advisory Committee meetings. It also assists with the administration of topical scientific workshops.

Biological and Environmental Research: ORISE coordinates research fellowship programs and manages the DOE-NSF program supporting graduate students to attend the Lindau Meeting of Nobel Laureates. It also coordinates activities associated with the peer review of the research proposals and applications submitted to BER.

High Energy Physics: ORISE provides support to the HEP program in the area of program planning and review.

Nuclear Physics: ORISE supports the Holifield Radioactive Ion Beam Facility (HRIBF) and its research program through a close collaboration with university researchers using HRIBF.

Fusion Energy Sciences: ORISE supports the operation of the Fusion Energy Sciences Advisory Committee and administrative aspects of some FES program peer reviews. It also acts as an independent and unbiased agent to administer the FES Graduate and Postgraduate Fellowship programs in conjunction with FES, Oak Ridge Office, participating universities, DOE laboratories, and industries.

Science Laboratories Infrastructure: SLI enables the cleanup and removal of excess facilities at ORISE.

Safeguards and Security: S&S at ORISE provides physical protection/protective force services by employing unarmed security officers. The facilities are designated as property protection areas for the purpose of protecting government-owned assets. In addition to the government-owned facilities and personal property, ORISE possesses small quantities of nuclear materials that must be protected. The program includes information security, program management, personnel security, protective forces, security systems, and cyber security.

Oak Ridge National Laboratory

The Oak Ridge National Laboratory is a multiprogram laboratory located on the 24,000 acre reservation at Oak Ridge, Tennessee. The laboratory's 1,100 acre main site on Bethel Valley Road contains 248 buildings (3.4 million gross square feet of space) with an average building age of 37 years. Scientists and engineers at ORNL conduct basic and applied research and development to create scientific knowledge and technological solutions that strengthen the nation's leadership in key areas of science; increase the availability of clean, abundant energy; restore and protect the environment; and contribute to national security. The laboratory supports almost every major Departmental mission in science, defense, energy resources, and environmental quality. It provides world-class scientific research capability while advancing scientific knowledge through such major Departmental initiatives as the Spallation Neutron Source (SNS), the Supercomputing Program, Nanoscience Research, complex biological systems, and ITER. In the defense mission arena, programs include those which protect our Homeland and National Security by applying advanced science and nuclear technology to the Nation's defense. Through the Nuclear Nonproliferation Program, Oak Ridge supports the development and coordination of the implementation of domestic and international policy aimed at reducing threats, both internal and external, to the U.S. from weapons of mass destruction. The Laboratory also supports various Energy Efficiency and Renewable Energy programs and facilitates the R&D of energy efficiency and renewable energy technologies.

Basic Energy Sciences: ORNL is home to major research efforts in materials and chemical sciences with additional programs in engineering and geosciences. ORNL has perhaps the most comprehensive materials research program in the country. It is also the site of three BES supported user facilities—the Spallation Neutron Source (SNS); the High Flux Isotope Reactor (HFIR); and the Center for Nanophase Materials Sciences (CNMS).

- The **Spallation Neutron Source** is a next-generation short-pulse spallation neutron source for neutron scattering that is significantly more powerful (by about a factor of 10) than any other spallation neutron source in existence. The SNS consists of a linac-ring accelerator system that delivers short (microsecond) proton pulses to a target/moderator system where neutrons are produced by a process called spallation. The neutrons so produced are then used for neutron scattering experiments. Specially designed scientific instruments use these pulsed neutron beams for a wide variety of investigations. There is initially one target station that can accommodate 24 instruments; the potential exists for adding more instruments and a second target station later.
- The **High Flux Isotope Reactor** is a light-water cooled and moderated reactor that operates at 85 megawatts to provide state-of-the-art facilities for neutron scattering, materials irradiation, and neutron activation analysis and is the world's leading source of elements heavier than plutonium for research, medicine, and industrial applications. The neutron scattering experiments at HFIR reveal the structure and dynamics of a very wide range of materials. The neutron-scattering instruments installed on the four horizontal beam tubes are used in fundamental studies of materials of interest to solid-state physicists, chemists, biologists, polymer scientists, metallurgists, and colloid scientists. A number of improvements at HFIR have increased its neutron scattering capabilities to 14 state-of-the-art neutron scattering instruments on the world's brightest beams of steady-state neutrons.
- The **Center for Nanophase Materials Sciences** integrates nanoscale science with neutron science; synthesis science; and theory, modeling, and simulation. Scientific themes include macromolecular complex systems, functional nanomaterials such as carbon nanotubes, nanoscale magnetism and transport, catalysis and nano building blocks, and nanofabrication.

Advanced Scientific Computing Research: ORNL conducts basic research in mathematics and computer science, as well as research in advanced computing software tools. ORNL also participates in several SciDAC science application teams, and both SciDAC Centers for Enabling Technologies and SciDAC Institutes that focus on specific software challenges confronting users of petascale computers. The Center for Computational Sciences (CCS), located at ORNL, provides high-end capability computing services to SciDAC teams and other DOE users. ORNL was selected by DOE to develop Leadership Computing Facility (LCF) for science to revitalize the U.S. effort in high end computing. As part of the LCF activity, the ORNL facility will be operate one petaflops of open high-performance computing to advance science.

Biological and Environmental Research: ORNL has a leadership role in research focused on the ecological aspects of global environmental change. It supports basic research through ecosystem-scale manipulative experiments in the field, through laboratory experiments involving model ecosystems exposed to global change factors, and through development and testing of computer simulation models designed to explain and predict effects of climatic change on the structure and functioning of terrestrial ecosystems. ORNL is the home of a FACE experiment which facilitates research on terrestrial carbon processes and the development of terrestrial carbon cycle models. It also houses the ARM archive, providing data to ARM scientists and to the general scientific community. ORNL, in conjunction with ANL and PNNL and six universities, plays a principle role in the Carbon Sequestration in Terrestrial Ecosystems (CSiTE) consortium which is focusing on research to enhance the capacity, rates, and longevity of carbon sequestration in terrestrial ecosystems. ORNL scientists provide improvement in formulations and numerical methods necessary to improve climate models.

ORNL scientists make important contributions to the environmental remediation sciences research programs, providing special leadership in microbiology applied in the field. ORNL also manages environmental remediation sciences research, including a field site for research on advancing the understanding and predictive capability of coupled hydrologic, geochemical, and microbiological

processes that control the *in situ* transport, remediation, and natural attenuation of metals, radionuclides, and co-contaminants at multiple scales ranging from the molecular to the watershed.

ORNL is one of the major national laboratory partners that comprise the JGI, the principal goal of which is high-throughput DNA sequencing. One of ORNL's roles in the JGI involves the annotation (assigning biological functions to genes) of completed genomic sequences and mouse genetics. ORNL conducts research on widely used data analysis tools and information resources that can be automated to provide information on the biological function of newly discovered genes identified in high-throughput DNA sequencing projects. ORNL conducts microbial systems biology research as part of Genomics: GTL. The laboratory also operates the Laboratory for Comparative and Functional Genomics, or "Mouse House."

- The **BioEnergy Science Center (BESC)** at ORNL, one of three Genomics: GTL Bioenergy Research Centers, will focus attention on two prime candidate feedstock plants, the poplar tree and switchgrass.

High Energy Physics: HEP supports a small research effort using unique capabilities of ORNL in the area of advanced accelerator R&D.

Nuclear Physics: The major effort at ORNL is the research, development, and operations of the Holifield Radioactive Ion Beam Facility (HRIBF) that is operated as a National User Facility. Also supported are a relativistic heavy ion group that is involved in a research program using the PHENIX detector at RHIC and ALICE at the LHC; the development of the Fundamental Neutron Physics Beamline (FNPB) at the Spallation Neutron Source (SNS); a theoretical nuclear physics effort that emphasizes investigations of nuclear structure and astrophysics; nuclear data and compilation activities that support the national nuclear data effort; and a technical effort involved in rare isotope beam development. The FNPB will provide cold and ultra-cold neutron beams for a user research program in fundamental interactions and symmetries.

- The **Holifield Radioactive Ion Beam Facility** is the only radioactive nuclear beam facility in the U.S. to use the isotope separator on-line (ISOL) method and is used annually by about 235 scientists for studies in nuclear structure, dynamics, and astrophysics using radioactive beams. HRIBF accelerates secondary radioactive beams to higher energies (up to 10 MeV per nucleon) than any other facility in the world with a broad selection of ions. HRIBF conducts R&D on targets and ion sources and low energy ion transport for radioactive beams. The capabilities of HRIBF were augmented by the fabrication of the High Power Test Laboratory (HPTL) which provides capabilities unique in the world for the development and testing of new ion source techniques. The fabrication of a second source and transport beam-line (IRIS2) for radioactive ions will improve efficiency and reliability.
- Enriched stable isotopes are processed at materials and chemical laboratories (Building 5500 and Building 9204-3). The materials laboratory performs a wide variety of metallurgical, ceramic, and high vacuum processing techniques; the chemical laboratory performs scraping, leaching, dissolving, oxidizing processes to remove unwanted materials and place the isotope into a "chemically stable" form. Radioactive isotopes are chemically processed and packaged in hot cells in Buildings 4501 and 7920. The Radioisotopes Program is transferred from the Office of Nuclear Energy to the Office of Science in FY 2009.

Fusion Energy Sciences: ORNL develops a broad range of components that are critical for improving the research capability of fusion experiments located at other institutions and that are essential for developing fusion as an environmentally acceptable energy source. The laboratory is a leader in fusion materials science, in the theory of heating of plasmas by electromagnetic waves, antenna design, and

design and modeling of pellet injectors to fuel the plasma and control the density of plasma particles. The laboratory is also the site of the Controlled Fusion Atomic Data Center and its supporting research programs. While some ORNL scientists are located full-time at off-site locations, others carry out their collaborations with short visits to the host institutions, followed by extensive computer communications from ORNL for data analysis and interpretation, and theoretical studies. ORNL is also a leader in stellarator theory and design and is a major partner with PPPL on the NCSX MIE project being built at PPPL. ORNL hosts the U.S. ITER Project Office and is the lead laboratory managing the U.S. Contributions to ITER MIE project.

Science Laboratories Infrastructure: SLI enables Departmental research missions at Oak Ridge by funding line item construction to maintain the general purpose infrastructure, and the cleanup and removal of excess facilities.

Safeguards and Security: S&S at Oak Ridge includes security systems, information security, cyber security, personnel security, material control and accountability, and program management. Program planning functions at the laboratory provide for short- and long-range strategic planning, and special safeguards plans associated with both day-to-day protection of site-wide security interests and preparation for contingency operations. Additionally, ORNL is responsible for providing overall laboratory policy direction and oversight in the security arena; for conducting recurring programmatic self-assessments; for assuring a viable ORNL Foreign Ownership, Control or Influence (FOCI) program is in place; and for identifying, tracking, and obtaining closure on findings or deficiencies noted during inspections, surveys, or assessments of S&S programs.

Oak Ridge Office

The Oak Ridge (OR) Office directly provides corporate support (i.e., procurement, legal, finance, budget, human resources, and facilities and infrastructure) to site offices responsible for program management oversight of three major management and operating laboratories: Pacific Northwest National Laboratory, Stanford Linear Accelerator Center, and Thomas Jefferson National Accelerator Facility. OR also oversees the OR Reservation and other DOE facilities in the City of Oak Ridge. Together on the Reservation and in the City of Oak Ridge there are 32 buildings (184,317 square feet) with an average age of 46 years and a total replacement plant value (RPV) of $29.0 million. The RPV of the roads and other structures on the Reservation is $47.5 million. The administrative, business, and technical expertise of OR is shared SC-wide through the Integrated Support Center concept. The OR Manager is also the single federal official with responsibility for contract performance at ORNL and the Oak Ridge Institute for Science and Education (ORISE). The Manager provides on-site presence for ORNL and ORISE with authority encompassing contract management, program and project implementation, federal stewardship, and internal operations.

Science Laboratories Infrastructure: The Oak Ridge Landlord subprogram maintains Oak Ridge Reservation infrastructure such as roads outside plant fences as well as DOE facilities in the town of Oak Ridge, PILT, and other needs related to landlord responsibilities.

Safeguards and Security: S&S provides for contractor protective forces for the Federal office building and ORNL. This includes protection of a category 1 Special Nuclear Material Facility, Building 3019. Other small activities include security systems, information security, and personnel security.

Office of Scientific and Technical Information

The Office of Scientific and Technical Information (OSTI) collects, preserves, and disseminates R&D information produced by DOE-sponsored research for use by DOE, the scientific community, academia,

U.S. industry, and the public to expand the knowledge base of science and technology. OSTI's mission is to advance science and sustain technological creativity by making R&D findings available and useful to DOE researchers and the American people. OSTI is responsible for the development and operation of DOE's leading e-Gov systems such as the Information Bridge, Energy Citations Database, and the E-Print Network. OSTI also developed and hosts the interagency e-Gov system Science.gov, which uses breakthrough technology for simultaneously searching across more than 50 million pages in 30 federal databases involving 13 different federal agencies. Internationally, DOE (representing the United States), through OSTI's partnership with the British Library, used the same federated searching technology to open a web-based global gateway, WorldWideScience.org, to science information, covering 24 portals and databases from 17 countries. Although the majority of DOE's R&D output is open to the scientific community, a sizable share is classified or sensitive, and OSTI's responsibilities are to ensure protection and limited, appropriate access.

Pacific Northwest National Laboratory

Pacific Northwest National Laboratory is a DOE multiprogram laboratory located in Richland, Washington that supports DOE's science, national security, energy, and homeland security missions. PNNL operates the William R. Wiley Environmental Molecular Sciences Laboratory (EMSL)—a 208,775 square feet national scientific user facility constructed by DOE that houses 375 people. PNNL also utilizes 23 Federal facilities in the 300 Area of the Hanford Reservation (543,000 square feet of space that house nearly 600 people). These facilities provide nearly 50% of the PNNL's laboratory space and 100% of its nuclear and radiological facilities. In addition, PNNL operates facilities on land owned by its parent organization, Battelle Memorial Institute (494,000 square feet), and leases an additional 775,500 square feet of office space in the Richland area occupied by approximately 2,100 staff.

Basic Energy Sciences: PNNL supports research in interfacial and surface chemistry, inorganic molecular clusters, analytical chemistry, and applications of theoretical chemistry to understanding surface. Geosciences research includes theoretical and experimental studies to improve our understanding of phase change phenomena in microchannels. Also supported is research on stress corrosion and corrosion fatigue, interfacial dynamics during heterogeneous deformation, irradiation assisted stress corrosion cracking, bulk defect and defect processing in ceramics, chemistry and physics of ceramic surfaces, and interfacial deformation mechanisms in aluminum alloys.

Advanced Scientific Computing Research: PNNL conducts basic research in mathematics and computer science, as well as research in advanced computing software tools. PNNL also participates in several SciDAC science application teams and both SciDAC Centers for Enabling Technologies and SciDAC Institutes that focus on specific software challenges confronting users of petascale computers. PNNL, in partnership with ANL and ORNL, was selected by DOE to develop Leadership Computing for science to revitalize the U.S. effort in high end computing.

Biological and Environmental Research: PNNL is home to the William R. Wiley **Environmental Molecular Sciences Laboratory (EMSL),** a national scientific user facility that is an integrated experimental and computational resource for discovery and technological innovation in the environmental molecular sciences to support the needs of DOE and the nation. EMSL provides unique ultra high field mass spectrometry and nuclear magnetic resonance spectrometry instruments, a high performance computer, and a wide variety of other cutting edge analytical capabilities for use by the national research community.

PNNL conducts a wide variety of research in subsurface environmental remediation science, with emphases on biogeochemistry and fate and transport of radionuclides. PNNL is participating in the National Science Foundation (NSF)/DOE Environmental Molecular Sciences Institutes at Pennsylvania

State University and Stanford University. It also conducts research into new instrumentation for microscopic imaging of biological systems.

PNNL provides expertise in research on aerosol properties and processes and in field campaigns for atmospheric sampling and analysis of aerosols. PNNL also conducts climate modeling research to improve the simulations of both precipitation through representation of sub-grid orography and the effect of aerosols on climate at regional to global scales. The Atmospheric Radiation Measurement (ARM) program office is located at PNNL, as is the project manager for the ARM engineering activity; this provides invaluable logistical, technical, and scientific expertise for the program. PNNL manages the ARM Aerial Vehicles Program (AAVP) as well. PNNL also conducts research on improving methods and models for assessing the costs and benefits of climate change and of various different options for mitigating and/or adapting to such changes. PNNL, in conjunction with ANL and ORNL and six universities, plays an important role in the CSiTE consortium, focusing on the role of soil microbial processes in carbon sequestration. PNNL also conducts research on the integrated assessment of global climate change.

PNNL is one of the major national laboratory partners that comprise the JGI, the principal goal of which is high-throughput DNA sequencing. One of PNNL's roles in the JGI involves proteomics research (identifying all the proteins found in cells). PNNL conducts research on the molecular mechanisms of cell responses to low doses of radiation and on the development of high throughput approaches for characterizing all of the proteins (the proteome) being expressed by cells under specific environmental conditions. PNNL conducts microbial systems biology research as part of Genomics: GTL. The Chief Scientist for the Genomics: GTL program is at PNNL.

Fusion Energy Sciences: PNNL has focused on research on materials that can survive in a fusion neutron environment. Experienced scientists and engineers at PNNL provide leadership in the evaluation of ceramic matrix composites for fusion applications and support work on vanadium, copper, and ferrite steels as part of the U.S. fusion materials team.

Science Laboratories Infrastructure: SLI enables Departmental research missions at PNNL by funding line item construction to maintain the general purpose infrastructure, and the cleanup and removal of excess facilities.

Safeguards and Security: The PNNL S&S program consists of program management, physical security systems, protection operations, information security, cyber security, personnel security and material control and accountability.

Pacific Northwest Site Office

The Pacific Northwest Site Office provides the single federal presence with responsibility for contract performance at PNNL. This site office provides an on-site SC presence with authority encompassing contract management, program and project implementation, federal stewardship, and internal operations.

Princeton Plasma Physics Laboratory

Princeton Plasma Physics Laboratory (PPPL) is a program-dedicated laboratory (Fusion Energy Sciences) located on 88 acres in Plainsboro, New Jersey. The laboratory consists of 36 buildings (721,000 gross square feet of space) with an average building age of 33 years. DOE does not own the land.

Advanced Scientific Computing Research: PPPL participates in SciDAC science application teams related to fusion science.

High Energy Physics: HEP supports a small theoretical research effort at PPPL using unique capabilities of the laboratory in the area of advanced accelerator R&D.

Fusion Energy Sciences: PPPL is the only DOE laboratory devoted primarily to plasma and fusion science. The laboratory hosts experimental facilities used by multi-institutional research teams and also sends researchers and specialized equipment to other fusion facilities in the United States and abroad. PPPL is the host for the National Spherical Torus Experiment (NSTX), which is an innovative toroidal confinement device, closely related to the tokamak, and is fabricating the National Compact Stellarator Experiment (NCSX), another innovative confinement device. PPPL scientists and engineers have significant involvement in the DIII-D and Alcator C-Mod tokamaks and the NSF Center for Magnetic Self-Organization in Laboratory and Astrophysical Plasmas in the U.S., as well as several large tokamak facilities abroad, including Joint European Torus in the United Kingdom, JT-60U in Japan, and Korean Superconducting Tokamak Reactor Advanced Research in Korea. This research is focused on developing the scientific understanding and innovations required for an attractive fusion energy source. PPPL scientists are also involved in several basic plasma science experiments, ranging from magnetic reconnection to plasma processing. PPPL also has a large theory group that does research in the areas of turbulence and transport, equilibrium and stability, wave-plasma interaction, and heavy ion accelerator physics. PPPL, LBNL, and LLNL currently work together in advancing the physics of heavy ion drivers for research in high energy density laboratory plasmas through Heavy Ion Fusion Science Virtual National Laboratory. Through its association with Princeton University, PPPL provides high quality education in fusion-related sciences, having produced more than 200 Ph.D. graduates since its founding in 1951.

Safeguards and Security: S&S at PPPL provides for protection of nuclear materials, government property, and other vital assets from unauthorized access, theft, diversion, sabotage, or other hostile acts. These activities result in reduced risk to national security and the health and safety of DOE and contractor employees, the public, and the environment. The program consists of protective forces, security systems, cyber security, and program management.

Princeton Site Office

The Princeton Site Office provides the single federal presence with responsibility for contract performance at PPPL. This site office provides an on-site SC presence with authority encompassing contract management, program and project implementation, federal stewardship, and internal operations.

Sandia National Laboratories

Sandia National Laboratories (SNL) is a multiprogram laboratory located on 3,700 acres in Albuquerque, New Mexico (SNL/NM), with sites in Livermore, California (SNL/CA), and Tonopah, Nevada.

Basic Energy Sciences: SNL is home to significant research efforts in materials and chemical sciences with additional programs in engineering and geosciences. SNL has a historic emphasis on electronic components needed for Defense Programs. The laboratory has very modern facilities in which unusual microcircuits and structures can be fabricated out of various semiconductors. It is also the site of the Center for Integrated Nanotechnologies (CINT).

- The **Center for Integrated Nanotechnologies** provides tools and expertise to explore the continuum from scientific discovery to the integration of nanostructures into the microworld and the macroworld. CINT is devoted to establishing the scientific principles that govern the design, performance, and integration of nanoscale materials. Through its core facility in Albuquerque, New

Mexico, and its gateways to both Sandia National Laboratories and Los Alamos National Laboratory, CINT provides access to tools and expertise to explore the continuum from scientific discovery to the integration of nanostructures into the microworld and the macroworld. CINT supports five scientific thrusts that serve as synergistic building blocks for integration research: nano-bio-micro interfaces, nanophotonics and nanoelectronics, complex functional nanomaterials, nanomechanics, and theory and simulation.

Advanced Scientific Computing Research: SNL conducts basic research in mathematics and computer science, as well as research in advanced computing software tools. SNL also participates in several SciDAC science application teams and both SciDAC Centers for Enabling Technologies and SciDAC Institutes, which focus on specific software challenges confronting users of petascale computers.

Biological and Environmental Research: In support of BER's climate change research, SNL provides the site manager for the North Slope of Alaska ARM site who is responsible for day-to-day operations at that site. In addition, SNL conducts climate modeling research on modifying the Community Atmospheric Model (CAM) to support new dynamical cores and improve its scalability for implementation on high-system computing systems. The laboratory conducts advanced research and technology development in robotics, smart medical instruments, microelectronic fabrication of the artificial retina, and computational modeling of biological systems.

Fusion Energy Sciences: Sandia plays a lead role in developing components for fusion devices through the study of plasma interactions with materials, the behavior of materials exposed to high heat fluxes, and the interface of plasmas and the walls of fusion devices. Material samples and prototypes are tested in Sandia's Plasma Materials Test Facility, which uses high-power electron beams to simulate the high heat fluxes expected in fusion environments. Materials and components are exposed to tritium-containing plasmas in the Tritium Plasma Experiment located in the STAR facility at INL. Sandia supports a wide variety of domestic and international experiments in the areas of tritium inventory removal, materials postmortem analysis, diagnostics development, and component design and testing. Sandia serves an important role in the design and analysis activities related to the ITER first wall components, including related R&D.

Savannah River National Laboratory

The Savannah River National Laboratory (SRNL) is a multiprogram laboratory located on approximately 34 acres in Aiken, South Carolina. SRNL provides scientific and technical support for the site's missions, working in partnership with the site's operating divisions.

Biological and Environmental Research: SRNL scientists support environmental remediation sciences research program in the area of subsurface contaminant fate and transport.

Stanford Linear Accelerator Center

The Stanford Linear Accelerator Center (SLAC) is located on 426 acres of Stanford University land in Menlo Park, California. SLAC is a laboratory dedicated to the design, construction, and operation of state-of-the-art electron accelerators and related experimental facilities for use in high-energy physics and photon science and has operated the 2 mile long Stanford Linear Accelerator (linac) since 1966. SLAC consists of 115 buildings (1.7 million gross square feet of space) with the average age of 30 years. In addition, SLAC will become the site of the world's first x-ray laser, the Linac Coherent Light Source (LCLS) in 2009. Funding for operations of the SLAC linac is transitioning from High Energy Physics to Basic Energy Sciences, with full funding by Basic Energy Sciences starting in FY 2009.

SLAC houses the Kavli Institute for Particle Astrophysics and Cosmology (KIPAC), which is an independent laboratory of Stanford University.

Basic Energy Sciences: SLAC is the home of the **Stanford Synchrotron Radiation Laboratory** and peer-reviewed research projects associated with SSRL. The facility is used by astronomers, biologists, chemical engineers, chemists, electrical engineers, environmental scientists, geologists, materials scientists, and physicists. A research program is conducted at SSRL with emphasis in both the x-ray and ultraviolet regions of the spectrum. SSRL scientists are experts in photoemission studies of high-temperature superconductors and in x-ray scattering. The SPEAR 3 upgrade at SSRL provided major improvements that increase the brightness of the ring for all experimental stations.

Advanced Scientific Computing Research: SLAC participates in SciDAC science application teams relevant to physics research, accelerator modeling, and distributed data.

Biological and Environmental Research: SLAC operates nine SSRL beamlines for structural molecular biology. This program involves synchrotron radiation-based research and technology developments in structural molecular biology that focus on protein crystallography, x-ray small angle scattering diffraction, and x-ray absorption spectroscopy for determining the structures of complex proteins of many biological consequences. Beamlines at SSRL also support a growing environmental science user community.

High Energy Physics: SLAC operates the **B-factory,** which consists of PEP-II, a high energy asymmetric electron-positron collider, and a multi-purpose detector, BaBar. The B-factory was constructed to support a search for and high-precision study of CP symmetry violation in the B meson system, and began operations in 1999. The last year of B-factory operations for HEP will be FY 2008. The BaBar detector collaboration includes about 600 physicists from SLAC and other national laboratories, U.S. universities, and foreign universities and research institutes. A small group at SLAC also participates in the research program of the ATLAS detector at the Large Hadron Collider.

SLAC researchers are also working at the frontier of particle astrophysics. In 2006, SLAC completed construction of the detector for the Gamma Ray Large Array Telescope (GLAST) which will be launched into earth orbit in 2007. SLAC physicists and a user community will analyze the GLAST data through 2012. SLAC and Stanford University are also home to the Kavli Institute for Particle Astrophysics and Cosmology, which brings together researchers studying a broad range of fundamental questions about the universe, from theoretical astrophysics to dark matter and dark energy.

SLAC is a major contributor to the leadership and development of the proposed International Linear Collider, applying their expertise to nearly all aspects of the project. The laboratory is at the forefront of damping ring and beam delivery designs, required to ensure the beam brightness and precision control needed for the experimental program. SLAC also represents the center of expertise for design, fabrication, and testing of radio frequency power systems used to energize the accelerator components. The laboratory also participates in R&D for advanced detector technologies, with emphasis on software, simulation, and electronics.

Science Laboratories Infrastructure: SLI enables Departmental research missions at SLAC by funding line item construction to maintain the general purpose infrastructure, and the cleanup and removal of excess facilities.

Safeguards and Security: S&S at SLAC focuses on reducing the risk to DOE national facilities and assets. The program consists primarily of protective forces, security systems, program management, and cyber security program elements.

Stanford Site Office

The Stanford Site Office provides the single federal presence with responsibility for contract performance at SLAC. This site office provides an on-site SC presence with authority encompassing contract management, program and project implementation, federal stewardship, and internal operations.

Thomas Jefferson National Accelerator Facility

Thomas Jefferson National Accelerator Facility is an Office of Science laboratory (Nuclear Physics) located on 206 acres (DOE-owned) in Newport News, Virginia focused on the exploration of nuclear and nucleon structure. The laboratory consists of 64 buildings (477,000 gross square feet of space) with an average building age of 15 years, 2 state-leased buildings, 23 real property trailers, and 10 other structures and facilities. The laboratory was constructed over the period FY 1987–1995.

Advanced Scientific Computing Research: TJNAF participates in SciDAC science application teams relevant to physics research, accelerator modeling, and distributed data.

Biological and Environmental Research: BER supports the development of advanced imaging instrumentation at TJNAF that will ultimately be used in the next generation medical imaging systems.

High Energy Physics: HEP supports an R&D effort at TJNAF on accelerator technology, using the unique expertise of the laboratory in the area of superconducting radiofrequency systems for particle acceleration.

Nuclear Physics: The centerpiece of TJNAF is the **Continuous Electron Beam Accelerator Facility (CEBAF)**, a unique international electron-beam user facility for the investigation of nuclear and nucleon structure based on the underlying quark substructure. The facility has an international user community of about 1,200 researchers. Polarized electron beams up to 5.7 GeV can be provided by CEBAF simultaneously to 3 different experimental halls. Hall A is designed for spectroscopy and few-body measurements. Hall B has a large acceptance detector, CLAS, for detecting multiple charged particles coming from a scattering reaction. Hall C is designed for flexibility to incorporate a wide variety of different experiments. Its core equipment consists of two medium resolution spectrometers for detecting high momentum or unstable particles. The G0 detector in Hall C allows a detailed mapping of the strange quark contribution to nucleon structure. Also in Hall C, a new detector, Q-weak, is being developed to measure the weak charge of the proton by a collaboration of laboratory and university groups, in partnership with the NSF. TJNAF supports a group that does theoretical calculations and investigations in subjects supporting the experimental research programs in Medium Energy Physics. TJNAF research and engineering staff are world experts in superconducting radio frequency (SRF) accelerator technology; their expertise is being used in the development of the 12 GeV Upgrade for CEBAF and the proposed International Linear Collider, and was utilized for the completed the Spallation Neutron Source. The 12 GeV CEBAF Upgrade initiates construction activities in FY 2009 and will provide researchers with the opportunity to study quark confinement, one of the greatest mysteries of modern physics.

Science Laboratories Infrastructure: SLI enables Departmental research missions at TJNAF by funding line item construction to maintain the general purpose infrastructure, and the cleanup and removal of excess facilities.

The Technology and Engineering Development Facility project is initiated to renovate about 89,000 square feet in the Test Lab Building and remove over 10,000 square feet of inadequate and obsolete work space. The project will also construct a new building which will provide approximately 100,000

square feet of space to eliminate severe overcrowding and improve workflow and productivity by co-locating the engineering and technical functions currently spread across the Laboratory.

Safeguards and Security: TJNAF has a guard force (protective force) that provides 24-hour services for the accelerator site and after-hours property protection security for the entire site. Other security programs include cyber security, program management, material control and accountability, and security systems.

Thomas Jefferson Site Office

The Thomas Jefferson Site Office provides the single federal presence with responsibility for contract performance at TJNAF. This site office provides an on-site SC presence with authority encompassing contract management, program and project implementation, federal stewardship, and internal operations.

Washington Headquarters

SC Headquarters, located in the Washington, D.C. area, supports the SC mission by funding Federal staff responsible for SC-wide issues, operational policy, scientific program development, and management functions supporting a broad spectrum of scientific disciplines and program offices. These disciplines include ASCR, BES, BER, FES, HEP, and NP, and also include activities conducted by the Workforce Development for Teachers and Scientists program. Additionally, support is included for management of workforce program direction and infrastructure through policy, technical, and administrative support staff responsible for budget and planning; general administration; information technology; infrastructure management; construction management; safeguards and security; and environment, safety, and health within the framework set by the Department. Funded expenses include salaries, benefits, travel, general administrative support services and technical expertise, as well as other costs funded through interdepartmental transfers and interagency transfers.