Office of Science
Financial Assistance
Funding Opportunity Announcement
DE-PS02-07ER07-01

Annual Notice
Continuation of Solicitation for the Office of Science Financial Assistance Program

The Office of Science of the Department of Energy hereby announces its continuing interest in receiving grant applications for support of work in the following program areas: Basic Energy Sciences, High Energy Physics, Nuclear Physics, Advanced Scientific Computing, Fusion Energy Sciences, Biological and Environmental Research, and Energy Research Analyses. On September 3, 1992, DOE published in the Federal Register the Office of Energy Research Financial Assistance Program (now called the Office of Science Financial Assistance Program), 10 CFR Part 605, Final Rule, which contained a solicitation for this program. Information about submission of applications, eligibility, limitations, evaluation and selection processes and other policies and procedures are specified in 10 CFR Part 605.

APPLICATION DUE DATE: October 1, 2007, 8:00 PM Eastern Time

Applications must be submitted using Grants.gov, the Funding Opportunity Announcement can be found using the CFDA Number, 81.049 or the Funding Opportunity Announcement number, DE-PS02-07ER07-01. Applicants must follow the instructions and use the forms provided on Grants.gov.

PROGRAM MANAGER CONTACTS: Questions regarding the specific program areas/technical requirements should be directed to the points of contact listed for each program office within the Notice and not to the Notice Administrative Contact.

SUPPLEMENTARY INFORMATION:
This Notice is published annually and remains in effect until it is succeeded by another issuance by the Office of Science, usually posted after the beginning of the fiscal year. This annual Notice DE-PS02-07ER07-01 succeeds Notice DE-FG01-06ER06-01, which was published September 30, 2005.

It is anticipated that approximately $400 million will be available for grant and cooperative agreement awards in FY 2007. The DOE is under no obligation to pay for any costs associated with the preparation or submission of an application. DOE reserves the right to fund, in whole or in part, any, all, or none of the applications submitted in response to this Notice.

The following program descriptions are offered to provide more in-depth information on scientific and technical areas of interest to the Office of Science.

1. Basic Energy Sciences

The Basic Energy Sciences (BES) program supports fundamental research in the natural sciences and engineering leading to new and improved energy technologies and to understanding and mitigating the environmental impacts of energy technologies. The four long-term measures of the program are:

- Design, model, fabricate, characterize, analyze, assemble, and use a variety of new materials and structures, including metals, alloys, ceramics, polymers, biomaterials and more - particularly at the nanoscale - for energy-related applications.
- Understand, model, and control chemical reactivity and energy transfer processes in the gas phase, in solutions, at interfaces, and on surfaces for energy-related applications, employing lessons from inorganic, organic, self-assembling, and biological systems.
- Develop new concepts and improve existing methods for solar energy conversion and other major energy research needs identified in the 2003 Basic Energy Sciences Advisory Committee workshop report, Basic Research Needs to Assure a Secure Energy Future.
- Conceive, design, fabricate, and use new instruments to characterize and ultimately control materials.

The science areas and their objectives are as follows:

(a) Materials Sciences and Engineering

The objective of this program is to support fundamental experimental and theoretical research in materials sciences and engineering that provides the foundations for the discovery and design of new materials with novel functions and properties. Major emphasis is placed on the design and synthesis of materials, the characterization and the understanding of their structure, defect state, physical, chemical and electrochemical, mechanical and irradiation induced behavior over multiple length and time scales. The program also supports the development and advancement of the computational tools and techniques that in turn enable the understanding of the behaviors of materials. The ultimate goal is to establish the scientific basis to predict, synthesize, and design new materials for energy relevant applications. Disciplinary areas where basic research is supported include materials physics, condensed matter physics, materials chemistry, biomolecular materials, x-ray, neutron, and electron scattering sciences, and related disciplines where the emphasis is on the science of materials. Product development, demonstration, surveys and process optimization studies for existing commercial materials are not within the scope of this solicitation. **Program Contact: Phone (301) 903-3427**
Website - http://www.science.doe.gov/bes/dms/index.htm

(b) Chemical Sciences

The objective of this set of programs is to develop and enhance fundamental understanding in the chemical sciences that contributes to the overall goal of optimizing and controlling molecular transformations. Emphasis is placed on basic discovery in the chemical sciences, and on the scientific underpinning of new sources of energy and

improved processes for using existing energy resources. Disciplinary areas where experimental and theoretical/computational basic research are supported include atomic, molecular, and optical sciences; chemical physics; photochemistry; radiation chemistry; analytical chemistry; separations science; actinide chemistry; and catalysis sciences.
Program Contact: Phone (301) 903-5804
Website - http://www.science.doe.gov/bes/chm/chmhome.html

(c) Geosciences

The objective of this program is to develop a quantitative and predictive understanding of geologic processes related to energy and environmental quality. The program emphasizes cross-cutting basic research that will improve understanding of reactive geochemical transport and other subsurface processes and properties and how to image them using techniques ranging from electrons, x-rays or neutrons to electromagnetic and seismic waves. Applications of this fundamental understanding might include transport of contaminant fluids, hydrocarbons, sequestered carbon dioxide, or performance prediction for repository sites. The emphasis is on the disciplinary areas of geochemistry, geophysics, geomechanics, and hydrogeology with a focus on the upper levels of the earth's crust. Particular emphasis is on processes taking place at the atomic and molecular scale. Specific topical areas receiving emphasis include: high resolution geophysical imaging; rock physics, physics of fluid transport, and fundamental properties and interactions of rocks, minerals, and fluids.
Program Contact: Phone (301) 903-4061
Website - http://www.science.doe.gov/bes/geo/geohome.html

(d) Energy Biosciences

The objective of this program is to generate fundamental knowledge pertaining to physical, chemical and molecular mechanisms that govern biological energy transduction. Emphasis is on understanding processes that will be the foundation for technological developments related to DOE's mission to efficiently capture and utilize solar energy, as well as to convert renewable resources into fuels, chemicals and other energy enriched products. This program has special requirements for the submission of preapplications, when to submit, and the length of the applications. Applicants are encouraged to contact the program regarding these requirements. Program Contact:
Program Contact: Phone - (301) 903-2873
E-mail - energy.biosciences@science.doe.gov Website - http://www.science.doe.gov/bes/eb/ebhome.html

2. High Energy Physics

The primary objectives of the High Energy Physics (HEP) program are to explore the fundamental interactions of matter and energy, including the unseen forms of matter and energy that dominate the universe; to understand the ultimate unification of fundamental forces and particles; to search for possible new dimensions of space; and to investigate the nature of time itself.

In support of these broad scientific objectives, the HEP program has established specific long-term goals that correspond very roughly to current research priorities, and are representative of the program:

- Measure the properties and interactions of the heaviest known particle (the top quark) in order to understand its particular role in the Standard Model.
- Measure the matter-antimatter asymmetry in many particle decay modes with high precision.
- Discover or rule out the Standard Model Higgs particle, thought to be responsible for generating mass of elementary particles.
- Determine the pattern of the neutrino masses and the details of their mixing parameters.
- Confirm the existence of new supersymmetric (SUSY) particles, or rule out the minimal SUSY "Standard Model" of new physics.
- Directly discover, or rule out, new particles which could explain the cosmological "dark matter".

All grant applications should address one or more of these goals, or else explain how the proposed research supports the broad scientific objectives outlined above.

There are two subprograms within the Office of High Energy Physics that support research aimed at these objectives.

a) High Energy Physics Research

This research falls into three broad categories: experimental research, theoretical research, and advanced R&D in particle detector science and technology. The goal of the last category is to enable the design and fabrication of the instrumentation needed for the physics research.

The Physics Research subprogram supports research aimed at the long term scientific goals outlined above, especially those that have the potential to advance the field of HEP. The subprogram has also provided graduate and postdoctoral research training for HEP scientists in pursuit of these goals, and equipment for experiments and related computational efforts. Topics studied include (but are not limited to) studies aimed at the long term scientific goals outlined above, and other related studies such as studies of "dark energy", astrophysical studies and cosmology, particle properties and mutual interactions, and theoretical studies that provide or extend the framework of understanding for HEP.
Program Contact: Phone (301) 903-4829;
Website - http://www.science.doe.gov/hep/physics_research.shtm

b) Advanced Accelerator Research and Development

The goal of this subprogram is to enable forefront research and development in those aspects of accelerator science and technology that have a strong potential to advance the capabilities of HEP research. The subprogram has also provided training for new

accelerator scientists and had significant impact on other sciences, the economy, health, and other sectors. The AARD subprogram supports long-range, exploratory research aimed at developing new concepts. Topics studied include (but are not limited to) analytic and computational techniques for modeling particle beams, advanced magnet and acceleration technologies, ultra-intense beam sources, cutting edge diagnostic techniques, and new materials utilizing new core technologies. Examples of recent progress include the achievement of extremely high accelerating gradients utilizing plasma wake fields, the application of new materials and techniques to reach extremely high magnetic fields in superconducting magnets or high gradients in superconducting cavities, and the understanding of the complex dynamics of beams in extreme conditions.
Program Contact: Phone (301) 903-5228;
Website - http://www.science.doe.gov/hep/advanced_technology.shtm

3. Nuclear Physics

PLEASE NOTE THE SPECIAL INSTRUCTIONS BELOW.
Office of Science Financial Assistance Program Notice DE-PS02-06ER06-23, Annual Notice for Continuation of Availability of Grants and Cooperative Agreements for Nuclear Physics, was posted to the Office of Science Grants and Contracts Website on August 4, 2006. It may be accessed at the following web address: http://www.science.doe.gov/grants/FAPN06-23.html. The purpose of that Notice is to request that all applications for new grants be submitted prior to November 1, 2006, to permit consideration for award in Fiscal Year 2007. If the Applicant is unable to meet this deadline, the application will most likely not be considered for funding until the following Fiscal Year. Any new applications submitted after November 1 may be submitted in response to this Notice - Continuation of Solicitation for the Office of Science Financial Assistance Program. Additional requirements for applicants to the Office of Nuclear Physics can be found at http://www.science.doe.gov/np/grants/grants.html.

The Nuclear Physics program supports basic research, technical developments and world- class accelerator facilities to expand our fundamental understanding of the interactions and structures of atomic nuclei and nuclear matter, and an understanding of the forces of nature as manifested in nuclear matter. Today, the reach of nuclear physics extends from the quarks and gluons that form the substructure of the once-elementary protons and neutrons, to the most dramatic of cosmic events-supernovae. These and many other diverse activities are driven by five broad questions articulated recently by the Nuclear Science Advisory Committee (NSAC) in the Opportunities in Nuclear Science: A Long- Range Plan for the Next Decade. The four subprogram areas and their objectives are organized around answering these five key questions. Research activities supported by the Office of Nuclear Physics are aligned with and contribute to the overall progress of the following long term performance measures:

Make precision measurements of fundamental properties of the proton, neutron and simple nuclei for comparison with theoretical calculations to provide a quantitative understanding of their quark substructure.

Recreate brief, tiny samples of hot, dense nuclear matter to search for the quark-gluon plasma and characterize its properties.

Investigate new regions of nuclear structure, study interactions in nuclear matter like those occurring in neutron stars, and determine the reactions that created the nuclei of atomic elements inside stars and supernovae.

Measure fundamental properties of neutrinos and fundamental symmetries by using neutrinos from the sun and nuclear reactors and by using radioactive decay measurements.

Contribute to the theoretical understanding of any of the above.

The program is organized into the following four subprograms:

a) Medium Energy Nuclear Physics

This subprogram supports experimental research primarily at the Thomas Jefferson National Accelerator Facility and with the polarized proton collision program at the Relativistic Heavy Ion Collider (RHIC-Spin), directed at answering the first key question: What is the structure of the nucleon? Detailed investigations of the structure of the nucleon are aimed at understanding how these basic building blocks of matter are constructed from the elementary quarks and gluons of Quantum Chromo-Dynamics (QCD) and how complex interactions among them generate all the properties of the nucleon, including it's electromagnetic and spin properties. New knowledge in this area would also allow the nuclear binding force to be described in terms of QCD, thus providing a path for understanding the structure of atomic nuclei from first principles.
Program Contact: Dr. Brad Tippens (301) 903-3904

b) Heavy Ion Nuclear Physics

This subprogram supports experimental research primarily at the Relativistic Heavy Ion Collider (RHIC) directed at answering the second question: What are the properties of hot nuclear matter? At extremely high temperatures, such as those that existed in the early universe immediately after the "Big Bang," normal nuclear matter is believed to revert to its primeval state called the quark-gluon plasma. This research program aims to recreate extremely small and brief samples of this high energy density phase of matter in the laboratory by colliding heavy nuclei at relativistic energies. At much lower temperatures, nuclear matter passes through another phase transition from a Fermi liquid to a Fermi gas of free roaming nucleons; understanding this phase transition is also a goal of the subprogram.
Program Contact: Dr. Gulshan Rai (301) 903-4702

c) Low Energy Nuclear Physics

This subprogram supports experimental research directed at understanding the remaining three questions: What is the structure of nucleonic matter? Forefront nuclear structure research lies in studies of nuclei at the limits of excitation energy, deformation, angular momentum, and isotopic stability. The properties of nuclei at these extremes are not known and such knowledge is needed to test and drive improvement in nuclear models

and theories about the nuclear many-body system. What is the nuclear microphysics of the universe? Knowledge of the detailed nuclear structure, nuclear reaction rates, half-lives of specific nuclei, and the limits of nuclear existence at both the proton and neutron drip lines is crucial for understanding the nuclear astrophysics processes responsible for the production of the chemical elements in the universe, and the explosive dynamics of supernovae. Is there new physics beyond the Standard Model? Studies of fundamental interactions and symmetries, including those of neutrino oscillations, are indicating that our current "Standard Model" theory which explains what the universe is and what holds it together is incomplete, opening up possibilities for new discoveries by precision experiments.

Program Contact: Dr. Gene Henry (301) 903-6093

d) Nuclear Theory (including the Nuclear Data subprogram)

Progress in nuclear physics, as in any science, depends critically on improvements in the theoretical techniques and on new insights that will lead to new models and theories that can be applied to interpret experimental data and predict new behavior. The Nuclear Theory program supports theoretical research directed at understanding all five of the central questions identified in the NSAC 2002 Long Range Plan. Included in the theory program are the activities that are aimed at providing information services on critical nuclear data and have as a goal the compilation and dissemination of an accurate and complete nuclear data information base that is readily accessible and user oriented.

Program Contact: Dr. Sid Coon (301) 903-7878

4. Advanced Scientific Computing Research (ASCR)

The mission of the Advanced Scientific Computing Research Program is to deliver forefront computational and networking capabilities to scientists nationwide that enable them to extend the frontiers of science, answering critical questions that range from nanoscience to astrophysics and include nuclear structure, the function of living cells and the power of fusion energy. Two long term measures for the program are:

1. Demonstrate progress toward developing the mathematics, algorithms, and software that enable effective scientifically critical models of complex systems, including highly nonlinear or uncertain phenomena, or processes that interact on vastly different scales or contain both discrete and continuous elements.

2. Demonstrate progress toward developing, through the Genomes to Life partnership with the Biological and Environmental Research program, the computational science capability to model a complete microbe and a simple microbial community. In order to accomplish this mission, this program fosters and supports fundamental research in advanced computing research (applied mathematics, computer science and networking), and operates supercomputer, networking, and related facilities to enable the analysis, modeling, simulation, and prediction of complex phenomena important to the Department of Energy.

The Mathematical, Information, and Computational Sciences Subprogram

This subprogram is responsible for carrying out the primary mission of the ASCR program: discovering, developing, and deploying advanced scientific computing and communications tools and operating the high performance computing and network facilities that researchers need to analyze, model, simulate, and -- most importantly -- predict the behavior of complex natural and engineered systems of importance to the Office of Science and to the Department of Energy.

The computing and advanced networks required to meet Office of Science needs exceed the state-of- the-art by a wide margin. Furthermore, the algorithms, software tools, the software libraries and the distributed software environments needed to accelerate scientific discovery through modeling and simulation are beyond the realm of commercial interest. To establish and maintain DOE's modeling and simulation leadership in scientific areas that are important to its mission, the MICS subprogram employs a broad, but integrated research strategy. The basic research portfolio in applied mathematics and computer science provides the foundation for enabling research activities, which includes efforts to advance high-performance networking, to develop software tools, software libraries and software environments. Results from enabling research supported by the MICS subprogram are used by computational scientists supported by other Office of Science and other DOE programs. Research areas include:

a) Applied Mathematics

Research on the underlying mathematical understanding and numerical algorithms to enable effective description and prediction of physical systems such as fluids, magnetized plasmas, or protein molecules. This includes, for example, methods for solving large systems of partial differential equations on parallel computers, techniques for choosing optimal values for parameters in large systems with hundreds to hundreds of thousands of parameters, improving our understanding of fluid turbulence, and developing techniques for reliably estimating the errors in simulations of complex physical phenomena.

b) Computer Science

Research in computer science to enable large scientific applications through advances in massively parallel computing such as scalable and fault tolerant operating systems for parallel computers, programming models, performance modeling and assessment tools, interoperability and infrastructure methodology, and large scale data management and visualization. The development of new computer and computational science techniques will allow scientists to use the most advanced computers without being overwhelmed by the complexity of rewriting their codes with each new generation of high performance architectures.

c) Network Environment Research

Research to develop and deploy a high-performance network and collaborative technologies to support distributed high-end science applications and large-scale scientific collaborations. The current focus areas include but are not limited to cyber

security systems, dynamic bandwidth allocation services, network measurement and analysis, ultra high-speed transport protocols, and advanced application layer services that make it easy for scientists to effectively and efficiently access and use distributed resources, such as advanced services for group collaboration, secure services for remote access of distributed resources, and innovative technologies for sharing, controlling, and managing distributed computing resources.

Program Contact: (301) 903-5800

5. Fusion Energy Sciences

The Fusion Energy Sciences (FES) program supports the Department's Energy Security and World-Class Scientific Research Capacity goals. The FES program goal is to advance plasma science, fusion science, and fusion technology -- the knowledge base needed for an economically and environmentally attractive fusion energy source. FES supports basic and applied research, encourages technical cross-fertilization with the broader U.S. science community, and uses international collaboration to accomplish this goal.

The FES program contributes to the Energy Security goal through participation in ITER, an experiment to study and demonstrate the sustained burning of fusion fuel. ITER will provide an unparalleled scientific research opportunity and will test the scientific and technical feasibility of fusion power, will also be the penultimate step before a demonstration fusion power plant. The ITER negotiations have been successfully completed in FY 2006 and the ITER Agreement has been initialed. Assuming the final signing of the Agreement and its ratification by the ITER parties in FY 2007, FES scientists and engineers have started supporting the technical R&D and preparations to start project construction in Fiscal Year 2006.

The FES program contributes to the World-Class Scientific Research Capacity goal by managing a program of fundamental research into the nature of fusion plasmas and the means for confining plasma to yield energy. This includes: 1) exploring basic issues in plasma science; 2) developing the scientific basis and computational tools to predict the behavior of magnetically confined plasmas; 3) using the advances in tokamak research to enhance the initiation of the burning plasma physics phase of the FES program; 4) exploring innovative confinement options that offer the potential of more attractive fusion energy sources in the long term; 5) advancing our understanding of high energy density physics and exploring attractive pathways to attaining states of high energy density matter, (in collaboration with NNSA and NSF); 6) developing the cutting edge technologies that enable fusion facilities to achieve their scientific goals; and 7) advancing the science base for innovative materials to establish the economic feasibility and environmental quality of fusion energy.

The overall effort requires operation of a set of unique and diversified experimental facilities, ranging from smaller-scale university experiments to large national facilities that involve extensive collaborations. These facilities provide scientists with the experimental data to validate theoretical understanding and computer models-leading ultimately to an improved predictive capability for fusion science. Scientists from the U.S. also participate in leading edge

experiments on fusion facilities abroad and conduct comparative studies to supplement the scientific understanding they can obtain from domestic facilities.

Operation of the major fusion facilities will be focused on science issues relevant to ITER design and operation. The United States is an active participant in the International Tokamak Physics Activity (ITPA), which facilitates identification of high priority research for burning plasmas in general, and for ITER specifically, through workshops and assigned tasks. Fabrication of the National Compact Stellarator Experiment, an innovative new confinement system that is the product of advances in physics understanding and computer modeling, will continue with a target for the initial operation in Fiscal Year 2009. In addition, there will be continuing efforts to investigate simulations of fusion plasmas in collaboration with the Office of Advanced Scientific Computing Research.

There are three measures that will be used to demonstrate that progress is being made towards meeting the overall program goal over the next ten years. These performance measures are:

1. Predictive Capability for Burning Plasmas: Develop a predictive capability for key aspects of burning plasmas using advances in theory and simulation benchmarked against a comprehensive experimental database of stability, transport, wave-particle interaction, and edge effects.

2. Configuration Optimization: Demonstrate enhanced fundamental understanding of magnetic confinement and improved basis for future burning plasma experiments through research on magnetic confinement configuration optimization.

3. High Energy Density Physics: Develop the fundamental understanding and predictability of high energy density plasmas for potential energy applications.

The Science and Facility Operations Subprograms

The Science subprogram seeks to develop the physics knowledge base needed to advance the FES program. Research is conducted on small to large-scale confinement devices to study physics issues relevant to fusion and plasma physics and to the production of fusion energy. Experiments on these devices are used to explore the limits of specific confinement concepts, as well as study associated physical phenomena. Specific topics of interest to ITER include: (1) reducing plasma energy and particle transport at high densities and temperatures; (2) understanding the physical laws governing stability of high pressure plasmas; (3) investigating plasma wave interactions; (4) studying and controlling impurity particle transport and exhaust in plasmas; and (5) understanding the interaction and coupling among these four issues in a fusion experiment.

Research is also carried out in the following areas: (1) basic plasma science directed at furthering the understanding of fundamental processes in plasmas; (2) theory and modeling to provide the understanding of fusion plasmas necessary for interpreting results from present experiments, planning future experiments, and designing future confinement devices; (3) atomic physics and the development of new diagnostic techniques for support of confinement experiments; (4)

innovative confinement concepts; and (5) high energy density physics and issues that support the development of Inertial Fusion Energy (IFE). The high energy density physics necessary for IFE target development is carried out by the Office of Defense Programs in the Department of Energy's National Nuclear Security Administration.

The Enabling R&D Subprogram

The Enabling R&D subprogram supports the advancement of fusion science in the nearer-term by carrying out research on technological topics that: (1) enable domestic experiments to achieve their full performance potential and scientific research goals; (2) permit scientific exploitation of the performance gains being sought from physics concept improvements; (3) allow the U.S. to enter into international collaborations gaining access to experimental conditions not available domestically; and (4) explore the science underlying these technological advances.

Research is also carried out in the following areas: (1) plasma facing components, (2) structural and special purpose materials, (3) heating and fueling technologies, (4) breeding blankets and fuel cycle and (6) safety and neutronics.

In addition, the Enabling R&D subprogram also supports pursuit of fusion energy science for the longer-term by conducting research aimed at innovative technologies, designs and materials to point toward an attractive fusion energy vision and affordable pathways for optimized fusion development.

Program Contact: (301) 903-4095

6. Biological and Environmental Research Program

For over 50 years the Biological and Environmental Research (BER) Program has been investing in the biological and environmental sciences related to energy production. The BER program provides fundamental science to underpin the business thrusts of the Department's strategic plan. Through its support of peer-reviewed research at national laboratories, universities, and private institutions, the program develops the basic knowledge needed (1) to identify, understand, and anticipate the long-term health and environmental consequences of energy production, development, and use; (2) to develop biology based solutions that address DOE and National needs and, (3) to understand and clean up legacy environmental contamination related to nuclear weapons and nuclear power production.

The following indicators establish specific long term goals in Scientific Advancement that the BER program is committed to, and progress can be measured against.

- Life Sciences: Characterize the multi protein complexes (or the lack thereof) involving a scientifically significant fraction of a microbe's proteins. Develop computational models to direct the use and design of microbial communities to clean up waste, sequester carbon, or produce hydrogen.
- Climate Change Research: Deliver improved climate data & models for policy makers to determine safe levels of greenhouse gases for the Earth system. By 2013, substantially

reduce differences between observed temperature and model simulations at subcontinental scales using several decades of recent data.

- Environmental Remediation: By 2015, provide sufficient scientific understanding to allow a significant fraction of DOE sites to incorporate coupled biological, chemical and physical processes for decision making for environmental remediation and long-term stewardship.
- Medical Applications and Measurement Science: Develop intelligent biomimetic electronics that can both sense and correctly stimulate the nervous system and new radiopharmaceuticals for disease diagnosis.

All grant applications should address one or more of these measures and/or explain how the proposed research supports the broad scientific objectives outlined above. More information on the program and the scientific research it supports can be found at our website http://www.science.doe.gov/ober/.

a) Life Sciences Research

Research is focused on using DOE's unique resources and facilities to develop fundamental knowledge of biological systems that can be used to address DOE needs in clean energy, carbon sequestration, and environmental cleanup and that will underpin biotechnology based solutions to energy challenges. The objectives are: (1) to develop the experimental and, together with the Advanced Scientific Computing Research program, the computational resources, tools, and technologies needed to understand and predict the complex behavior of complete biological systems, principally microbes and microbial communities; (2) to take advantage of the remarkable high throughput and cost-effective DNA sequencing capacity at the Joint Genome Institute to meet the DNA sequencing needs of the scientific community through competitive, peer-reviewed nominations for DNA sequencing; (3) to understand and characterize the risks to human health from exposures to low levels of radiation; (4) to understand human genome organization, human gene function and control, and the functional relationships between human genes and proteins at a genomic scale with an emphasis on human chromosomes 5, 16 and 19; (5) to develop and support DOE national user facilities for structural biology at synchrotron and neutron sources; and (6) to anticipate and address ethical, legal, and social implications arising from Office of Science-supported biological research especially synthetic biology and nano technology.

Program Contact: (301) 903-5468

b) Climate Change Research

The program seeks to understand the basic physical, chemical, and biological processes of the Earth's atmosphere, land, and oceans and how these processes may be affected by energy production and use. The research is designed to provide data that will enable an objective , scientifically-based assessment of the potential for, and the consequences of, human-induced climate change at global and regional scales. It also provides data and models to enable assessments of mitigation options to prevent such a change. The program is comprehensive with an emphasis on: (1) understanding and simulating the

radiation balance from the surface of the Earth to the top of the atmosphere (including the effect of clouds, water vapor, trace gases, and aerosols); (2) enhancing and evaluating the quantitative models necessary to predict natural climatic variability and possible human-caused climate change at global and regional scales; (3) understanding and simulating both the net exchange of carbon dioxide between the atmosphere, terrestrial systems, and the effects of climate change on the global carbon cycle; (4) understanding ecological effects of climate change; (5) improving approaches to integrated assessments of effects of, and options to mitigate, climatic change; and (6) basic research directed at understanding options for sequestering excess atmospheric carbon dioxide in terrestrial ecosystems and the ocean, including potential environmental implications of such sequestration.

Program Contact: (301) 903-3281

c) Environmental Remediation Research

The program supports research to understand the processes controlling DOE-relevant contaminant mobility in the subsurface; to exploit that understanding in ways that ameliorate the impacts of subsurface contamination; and to develop the tools needed to accomplish these goals. The aim of the program is to provide the scientific knowledge, tools, and enabling discoveries needed to reduce the costs, risks, and schedules associated with the cleanup and stewardship of the DOE complex. The basic scientific knowledge and tools (e.g., molecular biology, numerical models) developed through this program will also extend the frontiers of biological, chemical and physical methods for subsurface remediation and elucidate the fundamental mechanisms of contaminant transport in the environment. Research priorities include subsurface remediation (e.g., bioremediation), contaminant fate and transport assessment and simulation, and the development of tools and techniques to evaluate and/or validate conceptual models of contaminant mobility in the subsurface. This program also supports the operation of the William R. Wiley Environmental Molecular Sciences Laboratory (EMSL) a national scientific user facility in Richland, Washington. The research performed for this program will provide fundamental knowledge on a broad range of DOE-specific environmental remediation problems.

Program Contact: (301) 903-4902

d) Medical Applications and Measurement Sciences

The research related to medical sciences is designed to develop the beneficial applications of nuclear and other energy-related technologies for bio-medical research, medical diagnosis and treatment. The objectives are: (1) to utilize innovative radiochemistry to develop new radiotracers for medical research, clinical diagnosis and treatment, (2) to develop the next generation of non-invasive nuclear medicine instrumentation technologies, such as positron emission tomography, (3) to develop advanced imaging detection instrumentation capable of high resolution from the sub-cellular to the whole body level, (4) to utilize the unique resources of the DOE in engineering, physics, chemistry and computer sciences to develop the basic tools to be used in biology and medicine, particularly in imaging sciences, photo-optics and

biosensors.
Program Contact: (301) 903-3213

7. Planning & Analysis

This program develops methodologies and tools designed to improve program management and evaluation. Specific objectives include assessments to identify the outcomes of basic research, impartial and independent evaluations of scientific and technical research efforts, and analyses designed to improve management efficiency and effectiveness. Consistent with these overall objectives, this program conducts numerous research studies to assess directions in science and to identify new policy/programmatic directions that improve the overall management of basic research programs.
Program Contact: (202) 586-7203

8. Experimental Program to Stimulate Competitive Research (EPSCoR)

The objective of the EPSCoR program is to enhance the capabilities of EPSCoR states to conduct nationally competitive energy-related research and to develop science and engineering manpower to meet current and future needs in energy-related fields. This program addresses basic research needs across all of the Department of Energy research interests. Research supported by the EPSCoR program is concerned with the same broad research areas addressed by the Office of Science programs that are described in this notice. The EPSCoR program is restricted to applications, which originate in 21 states (Alabama, Alaska, Arkansas, Hawaii, Idaho, Kansas, Kentucky, Louisiana, Maine, Mississippi, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, South Carolina, South Dakota, Vermont, West Virginia, and Wyoming) and the commonwealth of Puerto Rico. It is anticipated that only a limited number of new competitive research grants will be awarded under this program subject to the availability of funds.
Program Contact: (301) 903-3427
Website - http://www.science.doe.gov/bes/EPSCoR/index.htm

Posted on the Office of Science Grants and Contracts Web Site
October 5, 2006.