U.S. DEPARTMENT OF ENERGY | Office of Science

An Introduction to Office of Science Funding Opportunities

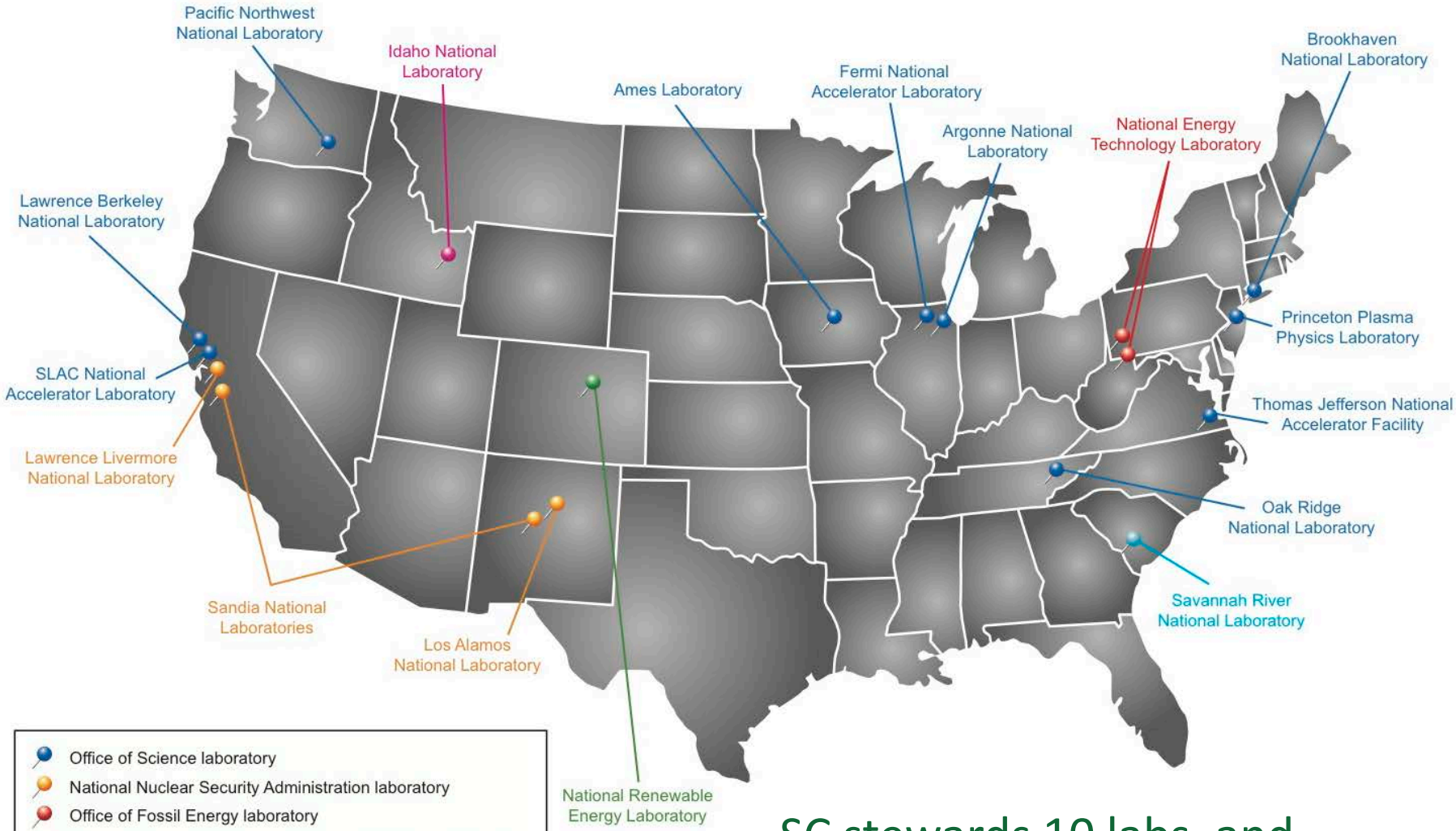
Webinar on:

An introduction to Office of Science funding opportunities, with presentations made by representatives from the Offices of Advanced Scientific Computing Research (ASCR), Biological and Environmental Research (BER), Basic Energy Sciences (BES), Fusion Energy Sciences (FES), High Energy Physics (HEP), Nuclear Physics (NP), and Small Business Innovation Research (SBIR) / Small Business Technology Transfer (STTR).

August 8, 2013

On behalf of the Visiting Faculty Program (VFP)
Office of Workforce Development for Teachers and Scientists (WDTS)
Office of Science, U.S. Department of Energy

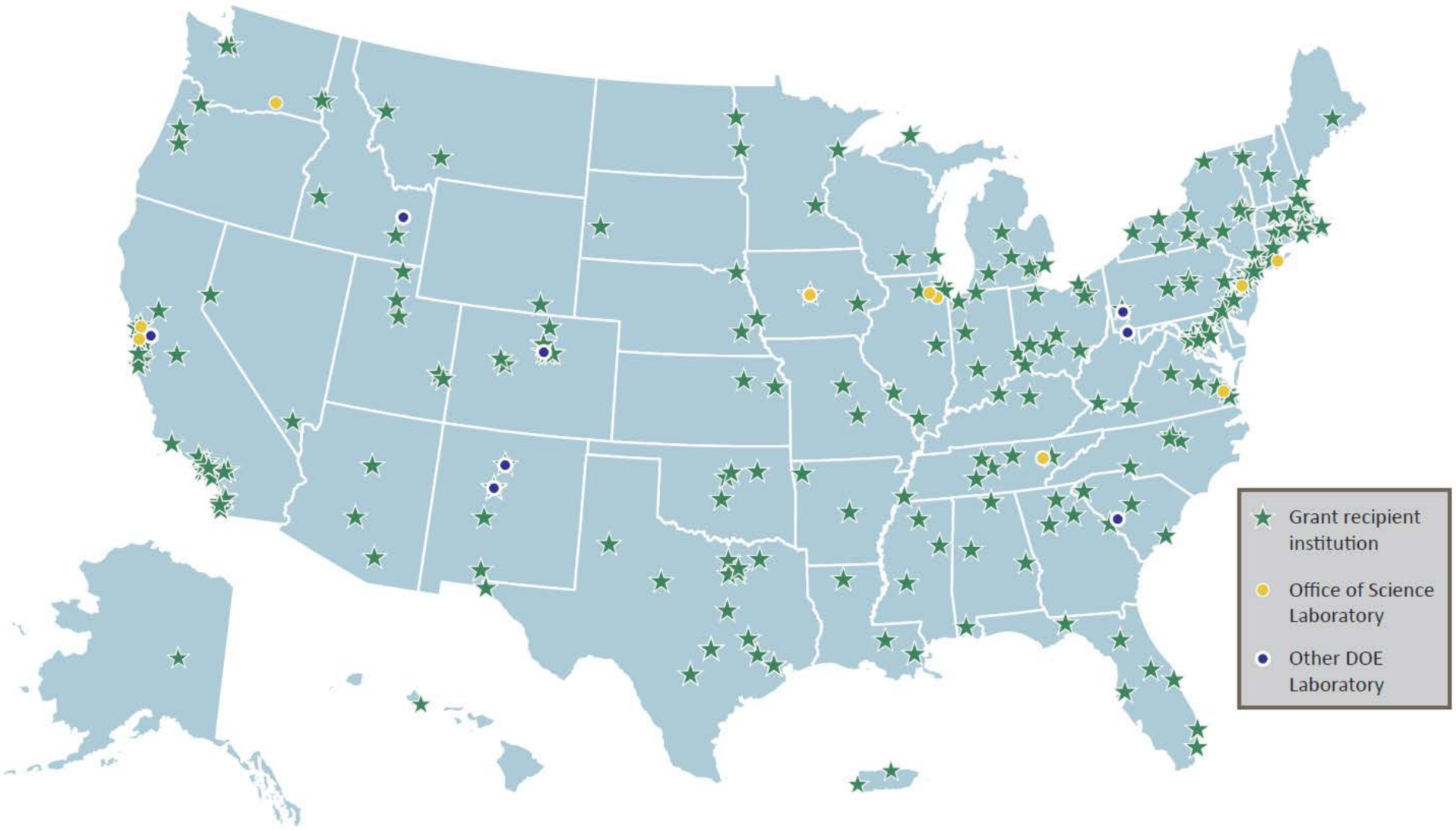
DOE Laboratory Complex



U.S. DEPARTMENT OF ENERGY | Office of Science

SC stewards 10 labs, and also builds/operates a broad portfolio of facilities

FY 2011 Funding Recipient Institutions

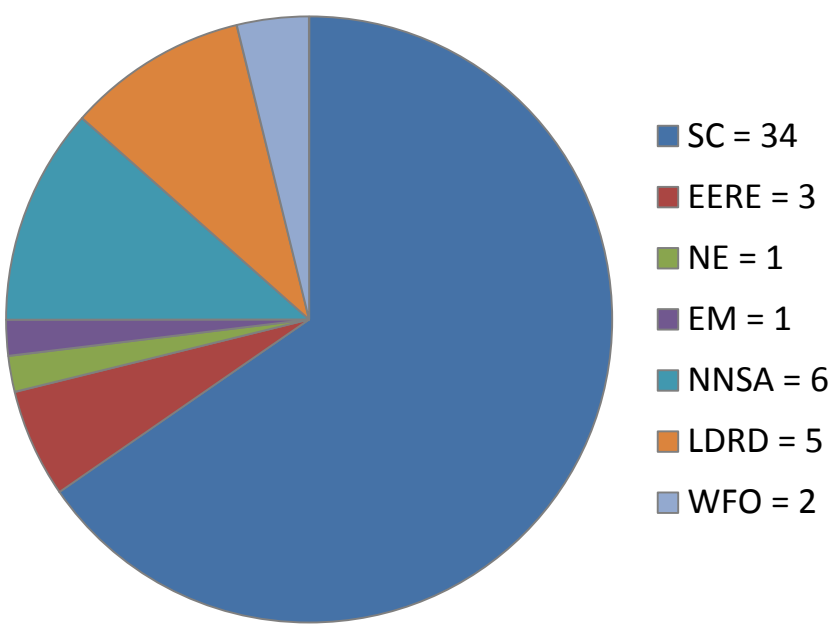


Visiting Faculty Program Profile – 2013

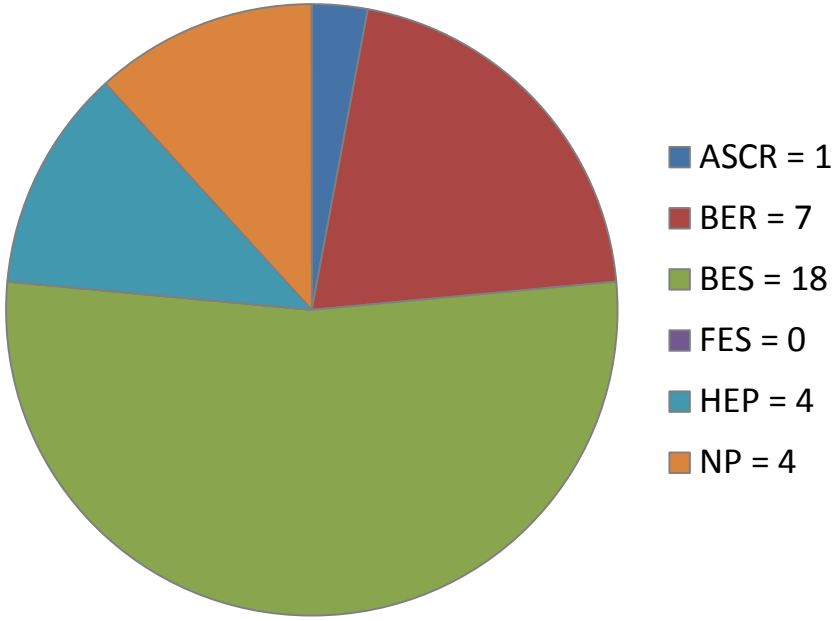
Summer 2013 Term:

Project funding and connection to the six SC Research Program Offices:

Total = 52 Faculty



Total on SC Projects = 34 (65%)



A few details…

Today's webinar will be content rich, and fast paced. The presentation materials will be made available for download, with the webinar recorded a available for viewing.

To conserve time, we are not taking live questions –

- Please send general and VFP-specific questions/comments to Jim Glownia, james.glownia@science.doe.gov.

- Please also note the web-links and contact information provided by representatives from the program offices, and direct program-specific inquiries to them.

U.S. DEPARTMENT OF ENERGY | Office of Science

Advanced Scientific Computing Research at the Department of Energy

Christine Chalk
Advanced Scientific Computing Research
Office of Science
Department of Energy

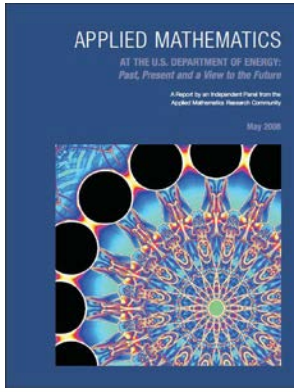
August 8, 2013

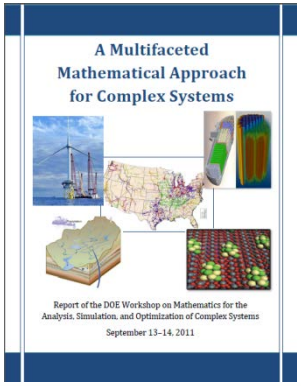
Advanced Scientific Computing Research (ASCR)

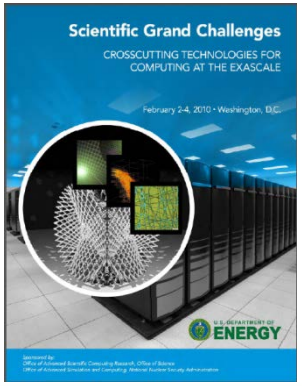
Mission

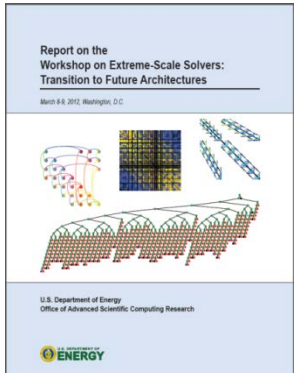
Advance applied mathematics and computer science; deliver, in partnership with disciplinary science, the most advanced computational scientific applications; advance computing and networking capabilities; and develop, in partnership with U.S. industry, future generations of computing hardware and tools for science.

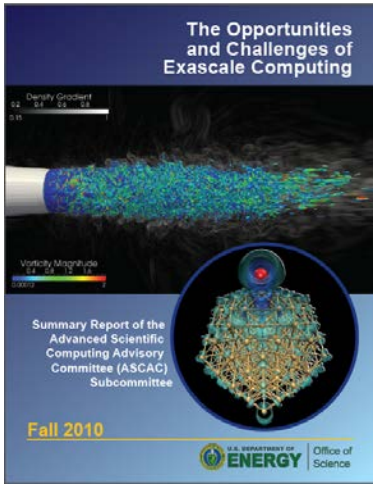
A particular challenge of this program is fulfilling the science potential of emerging computing systems and other novel computing architectures, which will require numerous and significant modifications to today's tools and techniques to deliver on the promise of exascale science.





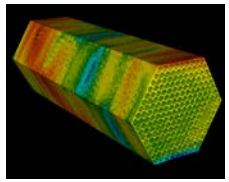






ASCR Programs

- **Applied Math:** development of mathematical descriptions, models, methods and algorithms to enable scientists to accurately describe and understand the behavior of complex systems involving processes that span vastly different time and/or length scales
- **Computer Science:** research that enables computing at extreme scales and the understanding of extreme scale data from both simulations and experiments, making scientific computers as easy and effective to use as possible.
  - Extreme scale: the use of Exascale (10^18 FLOPS) computing platforms that will operational in the 2018–2020 timeframe.
- **SciDAC – Scientific Discovery Through Advanced Computing:** advancing key areas of computational science and discovery that advance the mission of the Office of Science through mutually beneficial partnerships.
- **Next Generation Networking:** To develop networking and collaboration tools and facilities that enable scientists worldwide to work together.
- **Facilities:** delivering the forefront computational and networking capabilities, enabling world-class researchers to extend the frontiers of science.



DOE Applied Mathematics

Mission:

- Support the research and development of applied mathematics models, methods and algorithms for understanding natural and engineered systems related to DOE's mission …

Challenge:

- Discover new applied mathematics to extract scientific insights through HPC models and simulations. for the ultra-low power, multicore-computing future and data-intensive science

Long-term goals:

- Mathematics research that 5-10+ years out will impact DOE mission efforts: DOE Applications, SciDAC Program, and Exascale Co-Design
- New Mathematical Multifaceted Integrated Capability Centers (MMICCs) directly enhances impact of applied math on DOE mission
- Cross-cutting computational mathematics projects: addresses foundational, algorithmic and extreme-scale mathematical challenges
- Exploratory Research: new mechanism to bring in highly innovative research

DOE Computer Science Program

- **Mission:**
  - Enabling computing at **extreme scales** and the understanding of **extreme scale data** from both DOE simulations and DOE experiments.
  - Leveraging technology advances to achieve 1000X performance over Petaflops systems, while keeping the power to 20 MW.
  - Developing new paradigms to make scientific computers energy efficient and as easy and effective to use as possible
- **Challenges:**
  - Extreme scale hardware and software architectures for exascale computing systems;
  - New paradigms to manage power/energy for HPC systems;
  - Scalable and fault tolerant operating and runtime systems;
  - Compilers, programming models, languages, and programming environments;
  - Auto-tuning, monitoring, analysis, and optimization tools;
  - Modeling and Simulation of Applications and of novel hardware architectures
  - Scientific data management, integration, analysis and visualization for petabyte to exabyte data sets, both static and streaming, including in-situ methods

Next-Generation Networks for Science

Mission:

The Goals of the program are 1) to research, develop, test and deploy advanced network technologies critical in addressing networking capabilities unique to DOE's science mission and 2) identify scientific principles that lead to understanding about network and application behavior. The program's portfolio consists of two main elements:

- High-Performance Networks
- High-Performance Middleware

Challenges:

- Develop a fundamental understanding about how DOE scientists use networks and how those networks behave
- Provide scientists with advanced technologies that simplify access to experimental facilities, Supercomputers and scientific data
- Provide dynamic and hybrid networking capabilities to support diverse types of high-end science applications at scale.

Getting to Know ASCR

- **Understand the Office of Science mission and its computational programs**
  - Understand the needs of DOE mission-based scientific applications
  - Reach out to the ASCR-funded CS, Applied Math, and SciDAC teams at Labs and Universities, as their research currently addresses scientific applications needs
- **Serve as a peer reviewer**
- **Attend ASCR workshops, meetings, and conferences:** http://science.energy.gov/ascr/news-and-resources/workshops-and-conferences/
- **Track funding opportunities:** http://science.doe.gov/grants/announcements.asp
  - In addition to ASCR funding opportunities, check out ASCR's Small Business Innovative Research (SBIR) sub topic focused on increased adoption of HPC modeling and simulation in the advanced manufacturing & engineering industries
- **Follow Advanced Scientific Computing Advisory Committee (ASCAC) meetings and reports: http://www.science.doe.gov/ascr/ASCAC/Reports.html**
- **Communicate with the program managers before applying**
  - Sending white papers and discussing ideas with program managers

ASCR Research General Guidance

Required:

- A strong research plan.
- Responsive to the solicitation.

Pluses:

- Clearly identifies potential advances in HPC tools, libraries and operating systems; mathematical models, methods and/or numerical algorithms; collaboratories and middleware.
- Make it clear why the proposed research is innovative.
- Clearly identifies relevance and potential impact to the DOE mission. Proposed research is motivated by DOE science and engineering drivers.
- Framing the proposed research relative to other approaches.
- Preliminary results providing some level of confidence that approach is appropriate and effective.
- A timeline of activities, may include a discussion of dependencies, level of risk, and potential alternative approaches, e.g. a “Plan B”.

ASCR Research General Guidance

Acceptable:

- A strong research plan which includes some software development and/or demonstration.
- Rigorous approaches and methods drawn from other disciplines, e.g. computer science, applied math, physics, biology, engineering, etc.
- Innovative approaches with some level of risk for achieving success. Proposals should identify that the proposed research is novel and speculative.
- Collaborative applications involving multiple institutions, which may include universities, laboratories, and/or private institutions, are encouraged but not required.

Minuses:

- Addresses a specific application problem without discussing broader applicability to DOE mission.
- Software development effort only; lacks a research plan.
- A proposal that was clearly recycled from another agency submission.

Neutral:

- An educational component.

How to Access ASCR's Facilities

ASCR Allocation Policy

- 10% of hours reserved for Facility Directors: Pilot or startup projects, code scaling and performance metrics research. (check out Facilities websites)

- Up to 30% of hours at each facility for **ASCR Leadership Computing Challenge** projects: High-risk, high-payoff projects related to Department's energy mission; broadening community of researchers that can use DOE Leadership and High Performance computing facilities (http://science.energy.gov/ascr/facilities/alcc/)

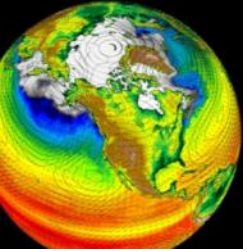
- 60% of hours at Leadership Computing Facilities for Innovative and Novel Impact on Theory and Experiment (INCITE) program: Large-scale , computationally intensive projects that address "grand challenges" in science and engineering. (http://science.energy.gov/ascr/facilities/incite/)

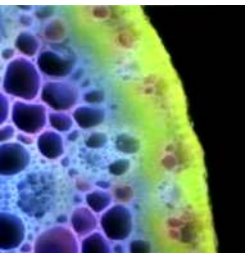
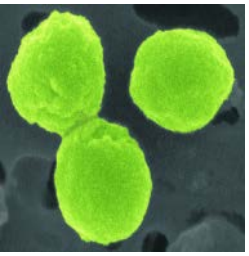
- The majority of (60-85%) of available processor hours at NERSC will be for researchers working on SC-funded or SC relevant projects. (http://www.nersc.gov/users/getting-started/)

www.olcf.ornl.gov

www.alcf.anl.gov

www.nersc.gov



Biological and Environmental Research

WDTS Visiting Faculty Program Briefing

August 8, 2013

John C. Houghton, Ph.D.
John.Houghton@science.doe.gov
301-903-8288
Biological and Environmental Research

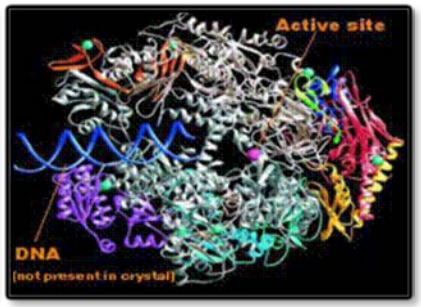
(**http://science.energy.gov/ber/**)

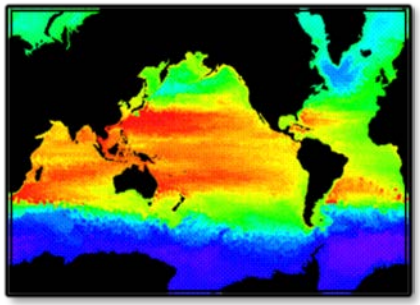
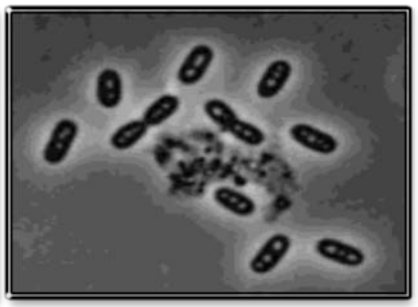
Biological and Environmental Research (BER)

Understanding complex biological, climatic, and environmental systems across vast spatial and temporal scales

The Scientific Challenges:

- Understand how genomic information is translated with confidence to redesign microbes, plants or ecosystems for improved carbon storage, contaminant remediation and sustainable biofuel production
- Understand the roles of Earth's biogeochemical systems (atmosphere, land, oceans, sea ice, subsurface) in determining climate so we can predict climate decades or centuries into the future, information needed to plan for future energy and resource needs.

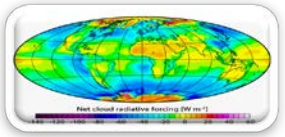



Biological and Environmental Research

Foundational Science - integrating observations and experimental capabilities with modeling for predictive understanding

jbei Joint BioEnergy Institute | BESC BioEnergy Science Center | Great Lakes Bioenergy Research Center | KBase Predictive Biology DOE Systems Biology Knowledgebase



Explore frontiers of genome-enabled biology

- Sustainable bioenergy resources
- Function & organization of plant and microbial systems
- Mechanisms and regulation of carbon storage in plant biomass and microbial communities
- Biosystems design
- Systems biology via data integration and analysis within a systems biology knowledgebase

Understand the effects of greenhouse gas emissions on Earth's climate and biosphere

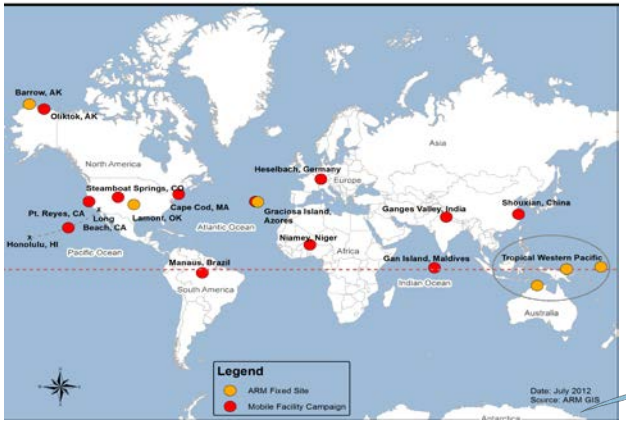
- World-leading capabilities in climate modeling
- Representation of clouds in climate models
- Direct/indirect effects of aerosols on climate
- Interactions of carbon cycle and climate
- Predictive understanding of terrestrial ecosystems, focus on sensitive systems, e.g., Arctic and tropics

Scientific User Facilities

Joint Genome Institute (JGI) - meeting the DNA sequencing needs of the bioenergy, carbon cycle, and biogeochemical science communities

Fungal ligninase

Poplar



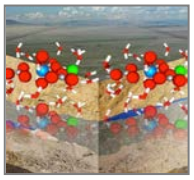
Atmospheric Radiation Measurement (ARM) Climate Research Facility - providing continuous field measurements and data products to improve cloud and aerosol science in climate models

ARM CLIMATE RESEARCH FACILITY

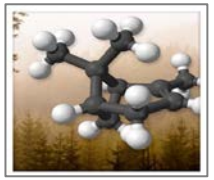
Environmental Molecular Sciences Laboratory (EMSL) - providing integrated experimental & computational resources for discovery and technological innovation

EMSL

Nanosized battery



Modeling contaminants



Atmospheric aerosols

Opportunities for support

- Funding for research support is announced through targeted Funding Opportunity Announcements (FOAs) on the Office of Science Grants and Contracts website (http://science.doe.gov/grants/).
  - Not all BER research areas have FOAs every year.
  - Topics vary over time to ensure overall portfolio balance.
- BER Scientific User Facilities available for use by researchers. Contact user facility for more information and user applications:
  - Joint Genome Institute (http://www.jgi.doe.gov/)
  - Atmospheric Radiation Measurement Climate Research Facility (http://www.arm.gov)
  - Environmental Molecular Sciences Laboratory (http://www.emsl.pnl.gov/emslweb/)
- SBIR/STTR (next announcement August 12)
  - (http://science.energy.gov/sbir/)

For more information:

BER website - http://science.energy.gov/ber/

BER staff - http://science.energy.gov/ber/about/staff/

David Thomassen, BER Chief Scientist
david.thomassen@science.doe.gov

Todd Anderson, Director, Biological Systems Science Division
todd.anderson@science.doe.gov

Gary Geernaert, Director, Climate and Environmental Sciences Division
gary.geernaert@science.doe.gov

Office of Basic Energy Sciences (BES)

http://science.energy.gov/bes/

Understanding, predicting, and ultimately controlling matter and energy flow at the electronic, atomic, and molecular levels

The Program:

Materials sciences & engineering—exploring macroscopic and microscopic material behaviors and their connections to various energy technologies

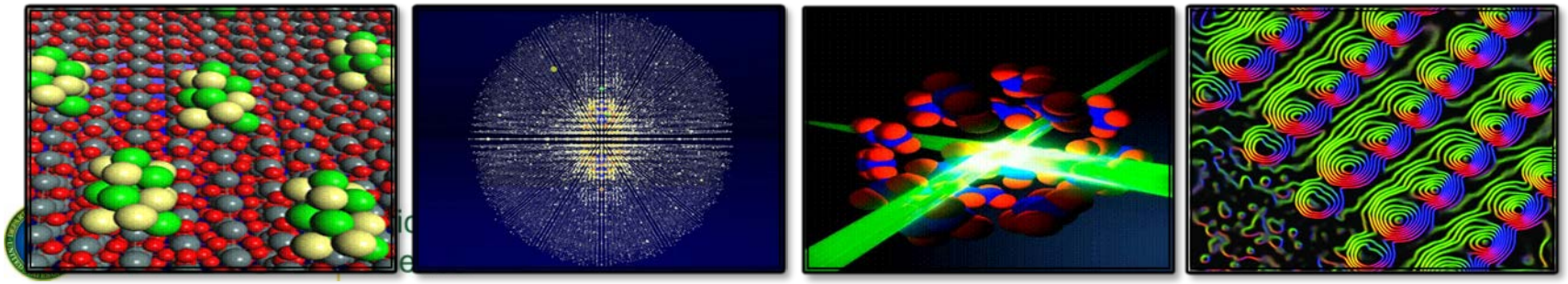
Chemical sciences, geosciences, and energy biosciences—exploring the fundamental aspects of chemical reactivity and energy transduction over wide ranges of scale and complexity and their applications to energy technologies

Supporting:

- 46 Energy Frontier Research Centers
- Two Hubs: Solar Fuels and Batteries
- The largest collection of facilities for electron, x-ray, and neutron scattering in the world

The Scientific Challenges:

- Synthesize, atom by atom, new forms of matter with tailored properties, including nano-scale objects with capabilities rivaling those of living things
- Direct and control matter and energy flow in materials and chemical assemblies over multiple length and time scales
- Explore materials & chemical functionalities and their connections to atomic, molecular, and electronic structures
- Explore basic research to achieve transformational discoveries for energy technologies



BES Scientific User Facilities

Lawrence Berkeley National Laboratory
- Advanced Light Source
- Molecular Foundry
- National Center for Electron Microscopy

Argonne National Laboratory
- Advanced Photon Source
- Center for Nanoscale Materials
- Electron Microscopy Center

Brookhaven National Laboratory
- Center for Functional Nanomaterials
- National Synchrotron Light Source
- National Synchrotron Light Source II

SLAC National Accelerator Laboratory
- Linac Coherent Light Source
- Stanford Synchrotron Radiation Lightsource

Oak Ridge National Laboratory
- Center for Nanophase Materials Sciences
- High Flux Isotope Reactor
- Shared Research Equipment Facility
- Spallation Neutron Source

Sandia National Laboratories
- Core Facility for Center for Integrated Nanotechnologies

Los Alamos National Laboratory
- Gateway Facility for Center for Integrated Nanotechnologies
- Lujan Neutron Scattering Center

Some Useful BES Publications

BES Summary Report

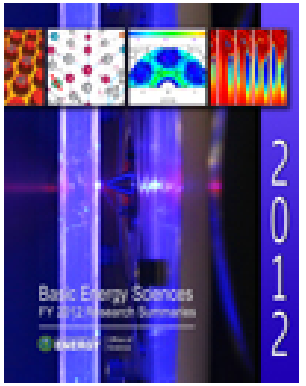
http://science.energy.gov/bes/research/

- Overview of BES
- How BES does business
- Descriptions and representative research highlights for 3 BES divisions, EFRCs, and Energy Innovation Hubs

BES FY 2012 Research Summaries

http://science.energy.gov/bes/research/

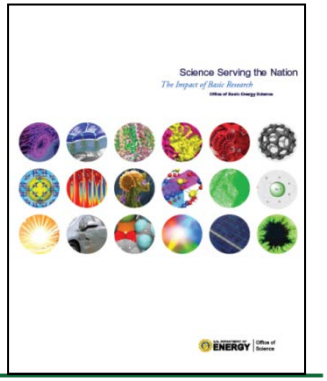
- A collection of research abstracts for more than 1,400 research projects funded by BES in Fiscal Year 2012 at some 180 institutions across the U.S.
- Organized along the three BES divisions: Materials Sciences and Engineering; Chemical Sciences, Geosciences, and Biosciences; and Scientific User Facilities.



Impact and Benefits of BES-funded Research

http://science.energy.gov/bes/benefits-of-bes/

- Brief vignettes describing the impact of BES funded research on scientific innovation and its impact on end-use technology



Dynamics of Active Self-Assembled Materials

Institution: Argonne National Laboratory
Point of Contact: Norman, Michael
Email: norman@anl.gov
Principal Investigator: Aronson, Igor
Sr. Investigator(s): Snezhko, Oleksiy, Argonne National Laboratory
Students: 2 Postdoctoral Fellow(s), 1 Graduate(s), 0 Undergraduate(s)
Funding: $1,006,000

PROGRAM SCOPE

Self-assembly, a natural tendency of simple building blocks to organize into complex architectures is a unique opportunity for materials science. The in-depth understanding of self-assembly paves the way for the design of tailored smart materials for emerging energy technologies, such as materials that can self-regulate porosity, strength, water or air resistance, viscosity, or conductivity. However, self-assembled materials pose a formidable challenge, as they are intrinsically complex, with often hierarchical organization occurring on many nested length and time scales. Our approach is a combination of in-depth theoretical and experimental studies of the dynamics of active self-assembled material for the purpose of control, and the prediction and design of novel bio-inspired materials for emerging energy applications.

In the past three years, our program yielded discoveries of self-assembled magnetic swimmers, drastic reduction of viscosity in suspensions of swimming bacteria, extraction of useful energy from chaotic movement of swimmers, and magnetic manipulation of self-assembled colloidal robots. For all these model systems, we have developed theoretical descriptions leading to the prediction and control of emergent self-assembled structures.

FY 2012 HIGHLIGHTS

Biological cells are capable of sensing mechanical cues and responding to these signals by undergoing morphological changes and directed motion. A significant challenge is creating cell-like objects that can translate mechanical stimuli into analogous behavior. We used computational modeling to design a simple mechanosensitive "cell" that responds to mechanical deformation through a shape change that allows it to undergo self-sustained, directed movement. Our cellular object is formed from a nanoparticle-filled microcapsule that is located on an adhesive substrate in solution. In response to a locally applied force, the deformed capsule releases nanoparticles that bind to the surface and dynamically create adhesion gradients. Due to the self-generated gradients, the capsule moves autonomously from regions of less adhesion to greater adhesion. During the capsule's motion, new nanoparticles are released that both sustain and propagate the adhesion gradients and thus, the capsule sustains autonomous movement along its path (until it is depleted of nanoparticles). The self-sustained motion occurs only if the permeability of the capsule's shell depends on mechanical deformation. Our findings can facilitate the fabrication of self-healing devices that are powered by the autonomous movement of microscopic synthetic cells. Additionally, the capsules could serve as sensors for mechanical strain, indicating the presence of strain fields by their spontaneous motion and release of nanoparticles; the latter behavior could be exploited in the fabrication of self-healing materials.

http://science.energy.gov/bes

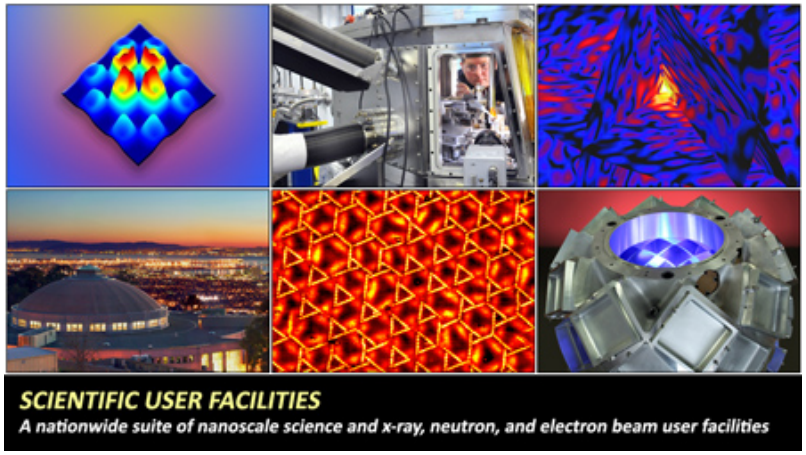
Or Google "DOE BES"

Look here for current FOAs

BES Funding Opportunities: Some FAQs

- **How do I get DOE/BES support?**
  - Respond to "Open Call For Proposals" (Special Calls may have different requirements – read these carefully)
  - Hypothesis driven, fundamental science project - energy relevance
  - White papers/pre-proposals are encouraged but not required for academic research (Contact program managers first)
  - All proposals are peer reviewed
- **How much support can I get?**
  - Peer review will assess requests versus research needs (10 CFR 605), i.e., funding is commensurate with project scope and needs (Special Calls may have different requirements – read these carefully)
- **How long will it take for me to find out if my project is funded?**
  - Open call is a continuous process (no fixed deadline for submission)
  - Reviews take 4 – 6 months to complete, awards are made based on strength of the merit review and available resources
  - Proposals can be held up to one year for consideration

Opportunities at BES User Facilities



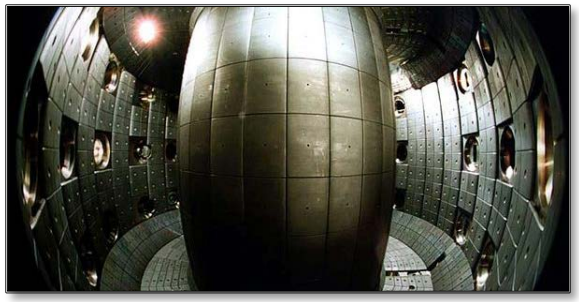
- BES User facilities provide unique capabilities to the scientific community and are a critical component of maintaining U.S. leadership in the physical sciences.
- BES user facilities are visited by more than 14,000 scientists and engineers annually in many fields of science and technology.
- Annual User Meetings are an excellent opportunity to learn and network with scientific staff at each facility, and to become a future user.

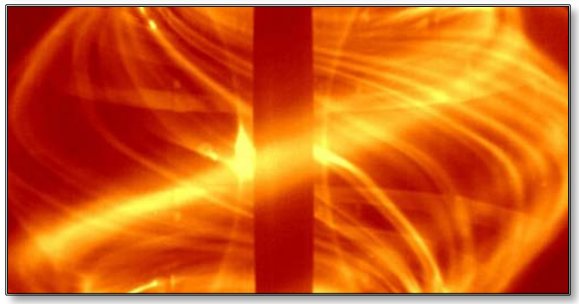
2012 Participants receiving training at APS beamline 6-ID from scientist Zahir Islam.

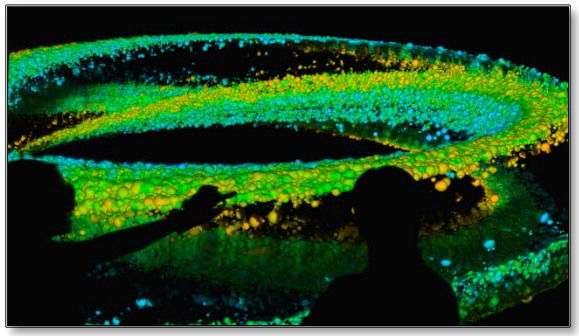
National School on X-Ray and Neutron Scattering

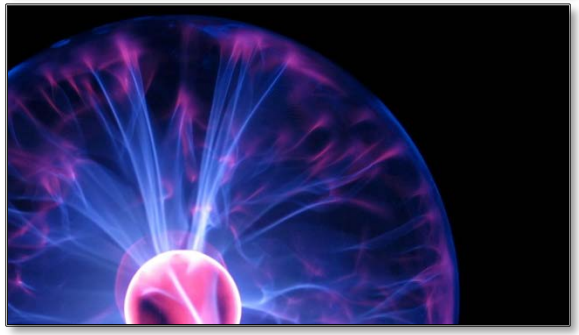
- ✓ Aims to provide a basic education, to primarily US-based graduate students, in the wide array of neutron and x-ray scattering techniques available at large-scale neutron and x-ray facilities.
- ✓ The participants spend one week at each of the hosting laboratories--ANL and ORNL.
- ✓ Participants are provided with lectures from leading experts, complemented by hands-on training using instruments at ANL's Advanced Photon Source, and ORNL's High Flux Isotope Reactor and Spallation Neutron Source.
- ✓ Lecture notes and video's available at: http://neutrons.ornl.gov/conf/nxs2012/

Funding Opportunities through the Office of Fusion Energy Sciences





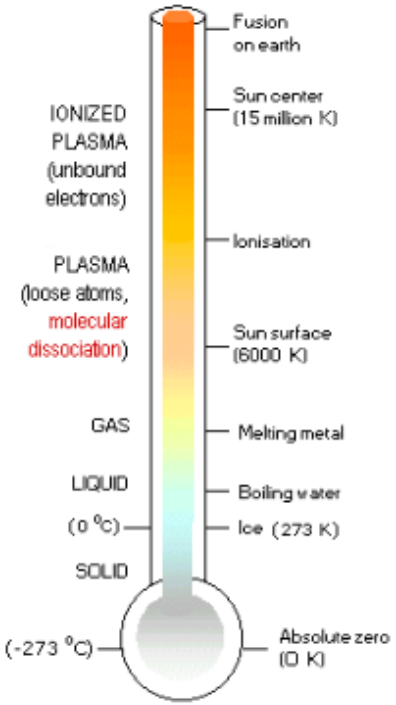


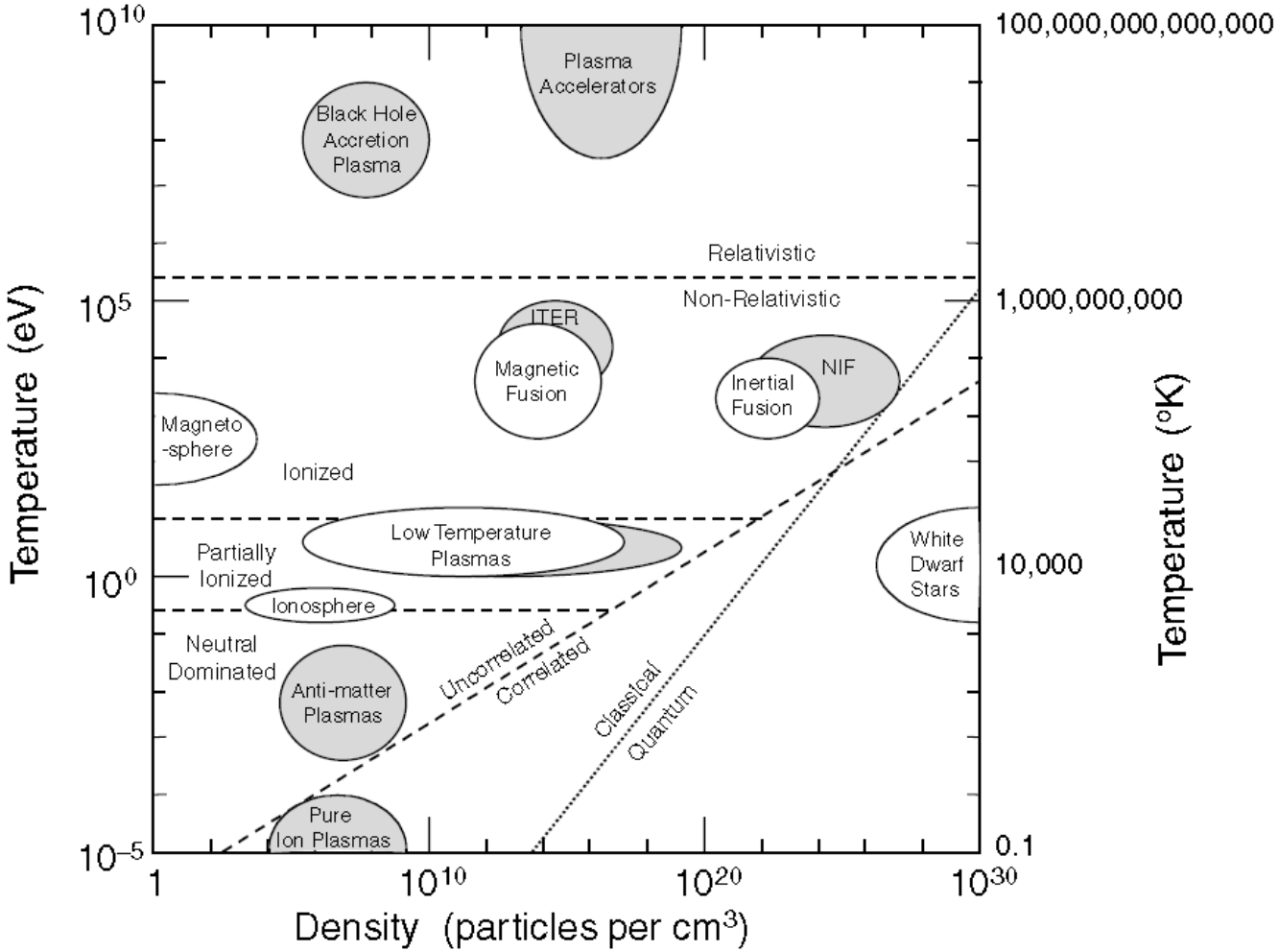


Mission:

- Advance the fundamental science of magnetically confined plasmas for fusion energy
- Pursue scientific opportunities and grand challenges in high energy density plasma science
- Support the development of the scientific understanding required to design and deploy fusion materials
- Increase the fundamental understanding of plasma science beyond burning plasmas

plasma: the 4th state of matter





FES: stewarding fusion & plasma science

High Energy Density Plasmas

Inertial Fusion Energy Science

Materials in Extreme Conditions Instrument (MECI) @ SLAC-LCLS

NNSA

Joint Program with National Nuclear Security Administration

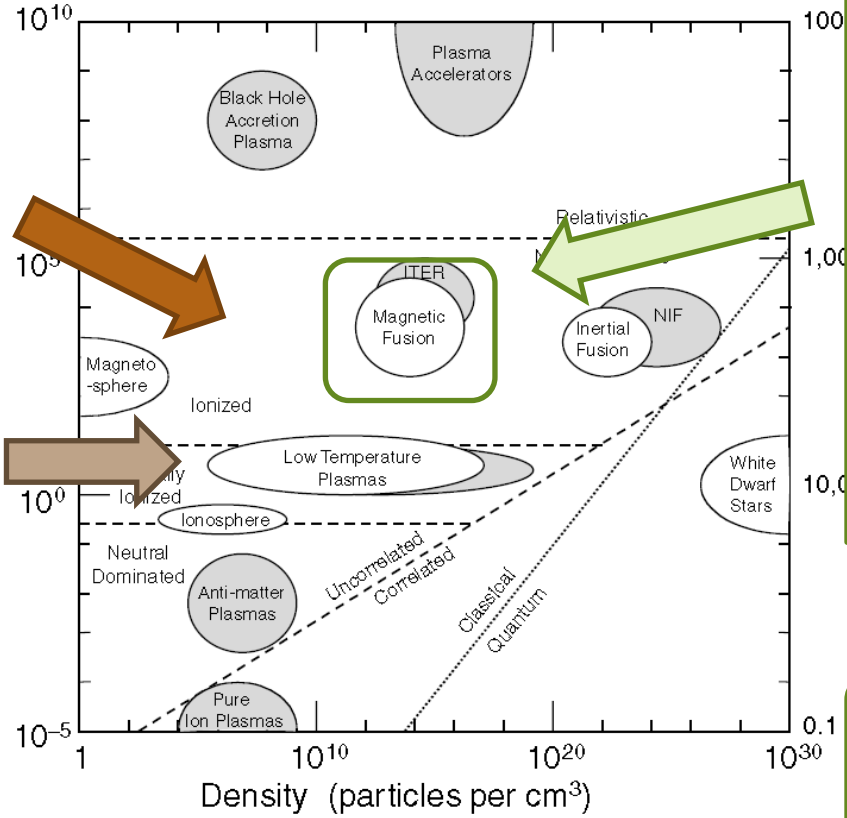
General Plasma Science

NSF/DOE Partnership in Basic Plasma Science

Max Planck Princeton Research Center for Plasma Physics

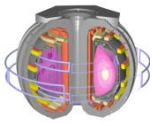
Low Temperature Plasma

Basic Plasma Science Facility



Magnetic Confinement Fusion

Facilities



DIII-D

NSTX-U

Experimental Plasma Research

Diagnostics

Theory& Simulation, SciDAC

International ITER

Enabling R&D

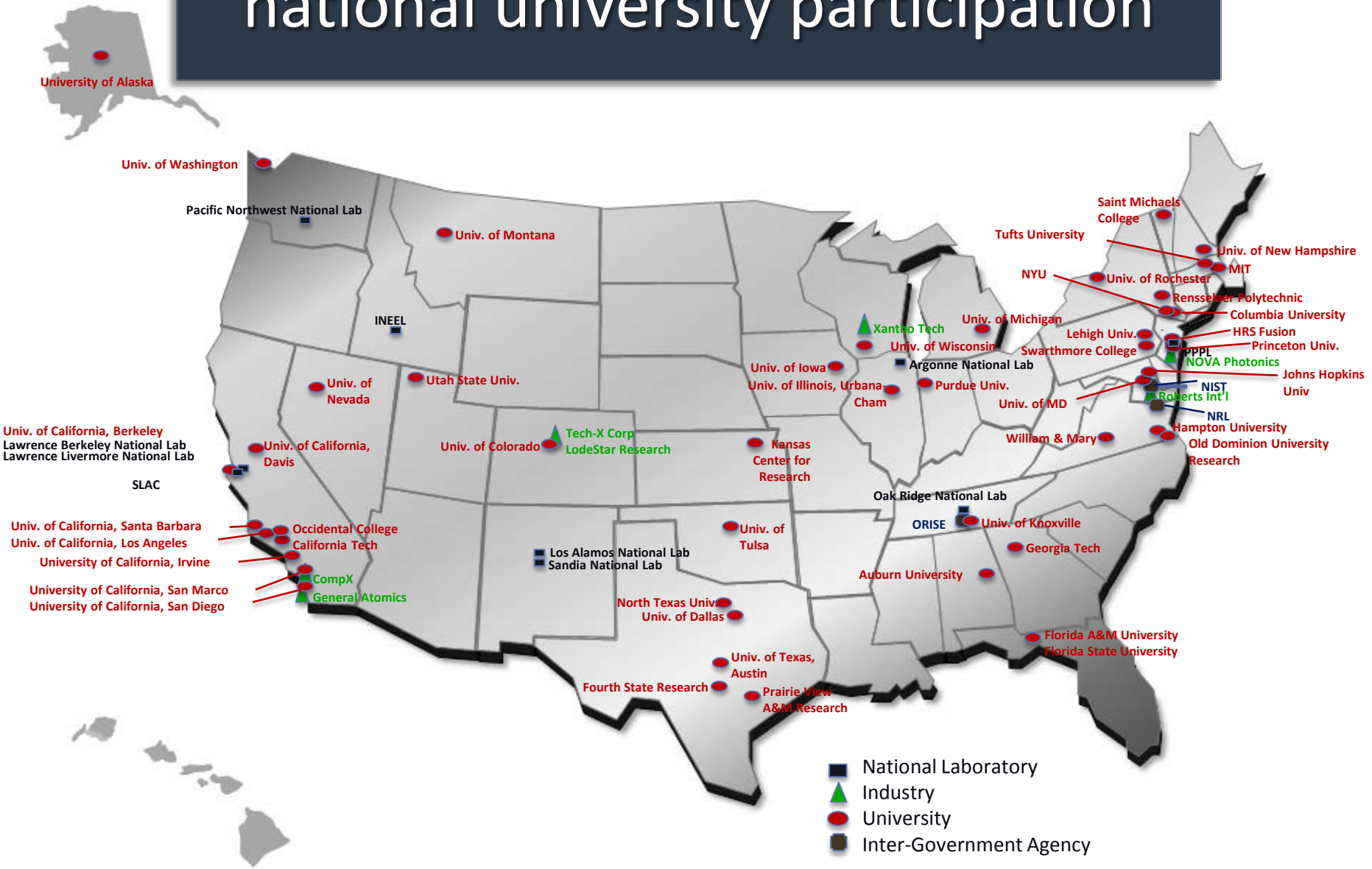
Fusion Materials Science

Enabling Technology

Advanced Design


Idaho National Laboratory
THE Ames Laboratory
Creating Materials & Energy Solutions
U.S. DEPARTMENT OF ENERGY
Argonne NATIONAL LABORATORY
BROOKHAVEN NATIONAL LABORATORY
Pacific Northwest NATIONAL LABORATORY
Pacific Northwest National Lab
INEEL
Argonne National Lab
PPPL
PPPL PRINCETON PLASMA PHYSICS LABORATORY
BERKELEY LAB
Oak Ridge National Lab
SLAC NATIONAL ACCELERATOR LABORATORY
Los Alamos National Lab
Sandia National Lab
SRNL SAVANNAH RIVER NATIONAL LABORATORY
Lawrence Livermore National Laboratory
Sandia National Laboratories
Los Alamos NATIONAL LABORATORY EST. 1943
OAK RIDGE National Laboratory

national university participation



pathways to financial support (1)

I. **General Open Notice**

Example: FY 2013 Continuation of Solicitation for the Office of Science Financial Assistance Program
DE-FOA-0000768
Post Date: September 28, 2012
Close Date: September 30, 2013
This Annual FOA, issued by the Office of Science, is for the submission of New, Renewal and Supplemental applications.

Typically used for:

- Supplements to existing grants or Lab activities
- 1 yr. Renewal's of projects for alignment with competitive program specific solicitations

pathways to financial support (2)

II. **Competitive Program Solicitations**

Example: Theoretical Research in Magnetic Fusion Energy Science
DE-FOA-0000879
Post Date: March 5, 2013
Close Date: May 22, 2013
Letter of Intent Strongly Encourged before 4/12/2013

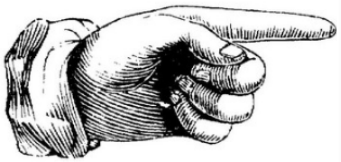
Typically used for:

- Addressing specific program priorities & research needs
- 3 year academic grants
- 5 year cooperative agreements for large centers

Other considerations:

- Not necessarily offered annually
- Applications are evaluated simultaneously against both new applications and renewal applications (i.e. competitively)


http://science.energy.gov/fes/
Fusion Energy Sciences (FE...
File Edit View Favorites Tools Help
SC Home SC Organization SC Jobs Contact SC DOE Home »
U.S. DEPARTMENT OF ENERGY
Office of Science
Search SC Website
SC Site Search
GO
Programs Laboratories User Facilities Universities Funding Opportunities Discovery & Innovation News About
You are here: SC Home » Programs » FES Home
Fusion Energy Sciences (FES)
FES Home
About FES
FES Research
FES Facilities
FES Science Highlights
Benefits of FES
FES Funding Opportunities
Fusion Energy Sciences Advisory Committee (FESAC)
FES News and Resources
CONTACT INFORMATION
Fusion Energy Sciences (FES)
U.S. Department of Energy
SC-24/Germantown Building
1000 Independence Ave., SW
Washington, DC 20585
P: (301) 903-4941
F: (301) 903-8584
E: sc.fes@science.doe.gov
More Information »
Fusion Energy Sciences
Plasma science forms the basis for research that is needed to establish our ability to harness the power of the stars in order to generate fusion energy on earth. The research required for fusion energy's success is intimately tied to rich scientific questions about some of nature's most extreme environments, inside and outside of stars, and has practical implications to industry beyond energy as well.
Low Temperature Plasma Science:
FUSION SIMULATION PROJECT
Print Text Size: A A A RSS Feeds Feedback Share Page
The pursuit of fusion energy embraces the challenge of bringing the energy-producing power of a star to earth for the benefit of humankind. The promise is enormous—an energy system whose fuel is obtained from seawater and from plentiful supplies of lithium in the earth, whose resulting radioactivity is modest, and which yields zero carbon emissions to the atmosphere. The pursuit is one of the most challenging programs of scientific research and development that has ever been undertaken. With the support of FES, a devoted, expert, and innovative scientific and engineering workforce has been responsible for the impressive progress in harnessing fusion energy since the earliest fusion experiments over sixty years ago. As a result, we are on the verge of a new age in fusion science during which researchers will undertake fundamental tests of fusion energy's viability. Establishing a deep scientific understanding of the requirements for harnessing and optimizing this process on earth is critical, and the progress has been dramatic.
http://science.energy.gov/fes
The science underpinning much of fusion energy research is plasma physics. Plasmas—the fourth state of matter—are hot gases, hot enough that electrons have been knocked free of atomic nuclei, forming an ensemble of ions and electrons that



http://science.energy.gov/fes/

Fusion Energy Sciences (FE...

File Edit View Favorites Tools Help

SC Home | SC Organization | SC Jobs | Contact SC | DOE Home »

U.S. DEPARTMENT OF ENERGY | Office of Science

Search SC Website | SC Site Search | GO

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

You are here: SC Home » Programs » FES Home

Fusion Energy Sciences (FES)

- FES Home
- About FES
- FES Research
- FES Facilities
- FES Science Highlights
- Benefits of FES
- FES Funding Opportunities
- Fusion Energy Sciences Advisory Committee (FESAC)
- FES News and Resources

CONTACT INFORMATION

Fusion Energy Sciences (FES)
U.S. Department of Energy
SC-24/Germantown Building
1000 Independence Ave., SW
Washington, DC 20585
P: (301) 903-4941
F: (301) 903-8584
E: sc.fes@science.doe.gov
More Information »

Fusion Energy Sciences

Plasma science forms the basis for research that is needed to establish our ability to harness the power of the stars in order to generate fusion energy on earth. The research required for fusion energy's success is intimately tied to rich scientific questions about some of nature's most extreme environments, inside and outside of stars, and has practical implications to industry beyond energy as well.

Print | Text Size: A A A | RSS Feeds | Feedback | Share Page

The pursuit of fusion energy embraces the challenge of bringing the energy-producing power of a star to earth for the benefit of humankind. The promise is enormous—an energy system whose fuel is obtained from seawater and from plentiful supplies of lithium in the earth, whose resulting radioactivity is modest, and which yields zero carbon emissions to the atmosphere. The pursuit is one of the most challenging programs of scientific research and development that has ever been undertaken. With the support of FES, a devoted, expert, and innovative scientific and engineering workforce has been responsible for the impressive progress in harnessing fusion energy since the earliest fusion experiments over sixty years ago. As a result, we are on the verge of a new age in fusion science during which researchers will undertake fundamental tests of fusion energy's viability. Establishing a deep scientific understanding of the requirements for harnessing and optimizing this process on earth is critical, and the progress has been dramatic.

http://science.energy.gov/fes

The science underpinning much of fusion energy research is plasma physics. Plasmas—the fourth state of matter—are hot gases, hot enough that electrons have been knocked free of atomic nuclei, forming an ensemble of ions and electrons that

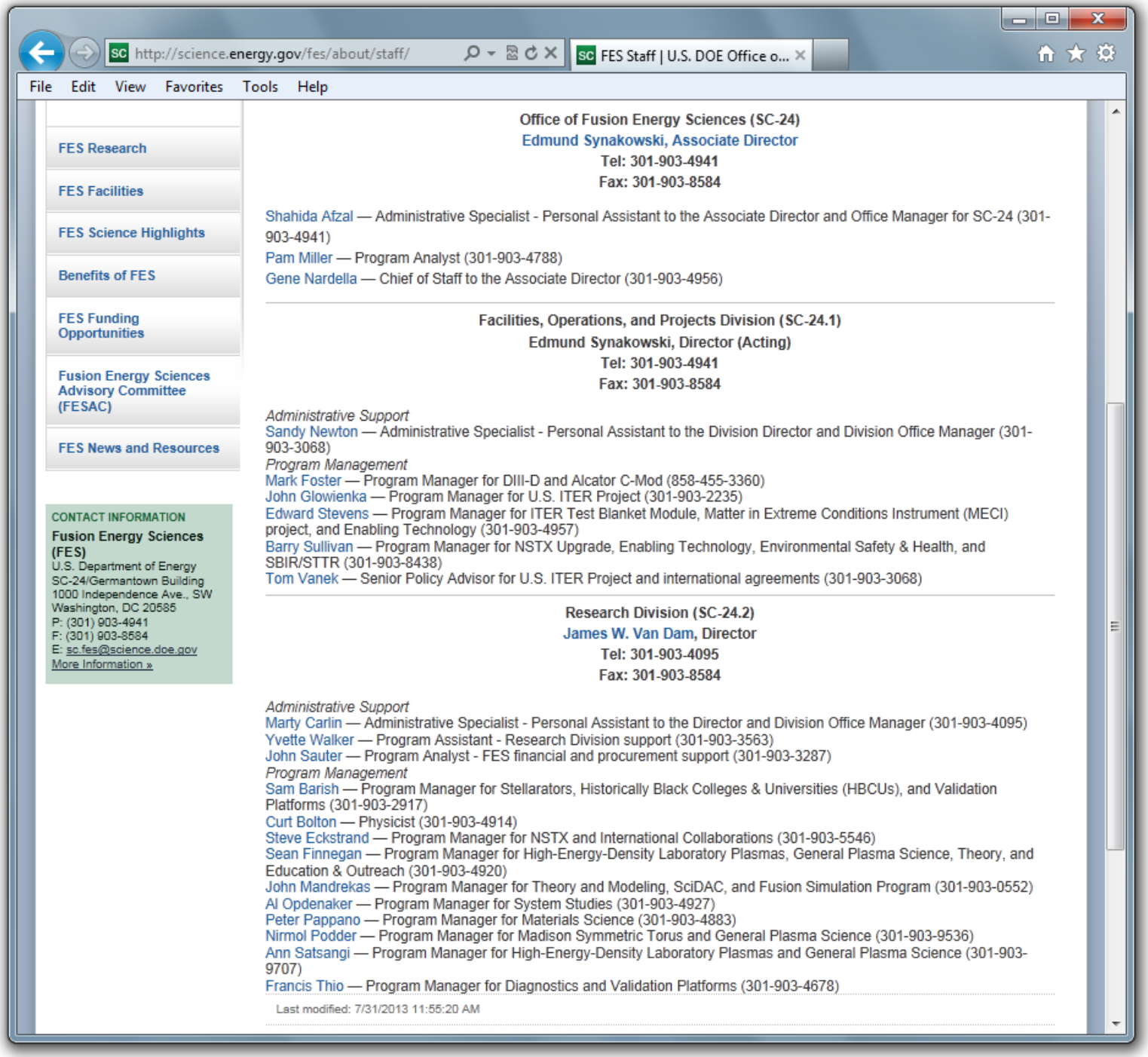
funding opportunities: *Last Year*

Solicitation	Date Issued	Proposals Due	$ Anticipated funding level
Theoretical Research in Magnetic Fusion Energy Science	27 March 2012	31 May 2012	$4.5M/yr
Collaborative Research in Magnetic Fusion Energy Sciences on International Research Facilities	16 April 2012	21 June 2012	$6M/yr
Opportunities in Basic Plasma Science	11 May 2012	16 July 2012	$1.4M/yr
Diagnostic Systems for Magnetic Fusion Energy Sciences	22 June 2012	14 August 2012	$3M/yr
High Energy Density Laboratory Plasma Science for Inertial Fusion Energy	22 June 2012	1 October 2012	$5M/yr
Collaborative Research in Magnetic Fusion Energy Sciences on the National Spherical Torus Experiment Upgrade	18 July 2012	26 September 2012	$1.7M/yr
SBIR/STTR Phase I	13 August 2012	16 October 2012	
NSF/DOE Partnership in Basic Plasma Science and Engineering		5 November 2012	$2M/yr
High-Energy-Density Laboratory Plasma Science ($2M/yr)	13 August 2012	16 November 2012	$2M/yr
Office of Science Early Career Research Program	20 July 2012	26 November 2012	

upcoming funding opportunities

Solicitation	Date Issued	Proposals Due	$ Anticipated funding level
NSTX-U: Collaborative Research on Configuration Optimization	TBD (August 2013)	TBD (October 2013)	
High-Energy-Density Laboratory Plasma Science	TBD (August 2013)	TBD (November 2013)	$2M/yr
Office of Science Early Career Research Program	23 July 2013	19 November 2013	
NSF/DOE Partnership in Basic Plasma Science and Engineering	TBD	TBD (November 2013)	$2M/yr

* Please check regularly as these may change depending on appropriations in FY 2014



CONTACT INFORMATION
Fusion Energy Sciences (FES)
U.S. Department of Energy
SC-24/Germantown Building
1000 Independence Ave., SW
Washington, DC 20585
P: (301) 903-4941
F: (301) 903-8584
E: sc.fes@science.doe.gov
More Information »

Office of Fusion Energy Sciences (SC-24)
Edmund Synakowski, Associate Director
Tel: 301-903-4941
Fax: 301-903-8584

Shahida Afzal — Administrative Specialist - Personal Assistant to the Associate Director and Office Manager for SC-24 (301-903-4941)
Pam Miller — Program Analyst (301-903-4788)
Gene Nardella — Chief of Staff to the Associate Director (301-903-4956)

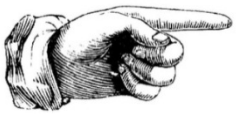
Facilities, Operations, and Projects Division (SC-24.1)
Edmund Synakowski, Director (Acting)
Tel: 301-903-4941
Fax: 301-903-8584

Administrative Support
Sandy Newton — Administrative Specialist - Personal Assistant to the Division Director and Division Office Manager (301-903-3068)
Program Management
Mark Foster — Program Manager for DIII-D and Alcator C-Mod (858-455-3360)
John Glowienka — Program Manager for U.S. ITER Project (301-903-2235)
Edward Stevens — Program Manager for ITER Test Blanket Module, Matter in Extreme Conditions Instrument (MECI) project, and Enabling Technology (301-903-4957)
Barry Sullivan — Program Manager for NSTX Upgrade, Enabling Technology, Environmental Safety & Health, and SBIR/STTR (301-903-8438)
Tom Vanek — Senior Policy Advisor for U.S. ITER Project and international agreements (301-903-3068)

Research Division (SC-24.2)
James W. Van Dam, Director
Tel: 301-903-4095
Fax: 301-903-8584

Administrative Support
Marty Carlin — Administrative Specialist - Personal Assistant to the Director and Division Office Manager (301-903-4095)
Yvette Walker — Program Assistant - Research Division support (301-903-3563)
John Sauter — Program Analyst - FES financial and procurement support (301-903-3287)
Program Management
Sam Barish — Program Manager for Stellarators, Historically Black Colleges & Universities (HBCUs), and Validation Platforms (301-903-2917)
Curt Bolton — Physicist (301-903-4914)
Steve Eckstrand — Program Manager for NSTX and International Collaborations (301-903-5546)
Sean Finnegan — Program Manager for High-Energy-Density Laboratory Plasmas, General Plasma Science, Theory, and Education & Outreach (301-903-4920)
John Mandrekas — Program Manager for Theory and Modeling, SciDAC, and Fusion Simulation Program (301-903-0552)
Al Opdenaker — Program Manager for System Studies (301-903-4927)
Peter Pappano — Program Manager for Materials Science (301-903-4883)
Nirmol Podder — Program Manager for Madison Symmetric Torus and General Plasma Science (301-903-9536)
Ann Satsangi — Program Manager for High-Energy-Density Laboratory Plasmas and General Plasma Science (301-903-9707)
Francis Thio — Program Manager for Diagnostics and Validation Platforms (301-903-4678)

Last modified: 7/31/2013 11:55:20 AM



http://science.energy.gov/fes/about/staff/

FES Staff | U.S. DOE Office o...

File Edit View Favorites Tools Help

- FES Research
- FES Facilities
- FES Science Highlights
- Benefits of FES
- FES Funding Opportunities
- Fusion Energy Sciences Advisory Committee (FESAC)
- FES News and Resources

CONTACT INFORMATION

Fusion Energy Sciences (FES)
U.S. Department of Energy
SC-24/Germantown Building
1000 Independence Ave., SW
Washington, DC 20585
P: (301) 903-4941
F: (301) 903-8584
E: sc.fes@science.doe.gov
More Information »

Office of Fusion Energy Sciences (SC-24)
Edmund Synakowski, Associate Director
Tel: 301-903-4941
Fax: 301-903-8584

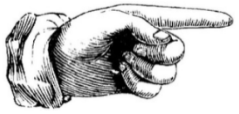
Shahida Afzal — Administrative Specialist - Personal Assistant to the Associate Director and Office Manager for SC-24 (301-903-4941)
Pam Miller — Program Analyst (301-903-4788)
Gene Nardella — Chief of Staff to the Associate Director (301-903-4956)

Facilities, Operations, and Projects Division (SC-24.1)
Edmund Synakowski, Director (Acting)
Tel: 301-903-4941
Fax: 301-903-8584

Administrative Support
Sandy Newton — Administrative Specialist - Personal Assistant to the Division Director and Division Office Manager (301-903-3068)
Program Management
Mark Foster — Program Manager for DIII-D and Alcator C-Mod (858-455-3360)
John Glowienka — Program Manager for U.S. ITER Project (301-903-2235)
Edward Stevens — Program Manager for ITER Test Blanket Module, Matter in Extreme Conditions Instrument (MECI) project, and Enabling Technology (301-903-4957)
Barry Sullivan — Program Manager for NSTX Upgrade, Enabling Technology, Environmental Safety & Health, and SBIR/STTR (301-903-8438)
Tom Vanek — Senior Policy Advisor for U.S. ITER Project and international agreements (301-903-3068)

Research Division (SC-24.2)
James W. Van Dam, Director
Tel: 301-903-4095
Fax: 301-903-8584

Administrative Support
Marty Carlin — Administrative Specialist - Personal Assistant to the Director and Division Office Manager (301-903-4095)
Yvette Walker — Program Assistant - Research Division support (301-903-3563)
John Sauter — Program Analyst - FES financial and procurement support (301-903-3287)
Program Management
Sam Barish — Program Manager for Stellarators, Historically Black Colleges & Universities (HBCUs), and Validation Platforms (301-903-2917)
Curt Bolton — Physicist (301-903-4914)
Steve Eckstrand — Program Manager for NSTX and International Collaborations (301-903-5546)
Sean Finnegan — Program Manager for High-Energy-Density Laboratory Plasmas, General Plasma Science, Theory, and Education & Outreach (301-903-4920)
John Mandrekas — Program Manager for Theory and Modeling, SciDAC, and Fusion Simulation Program (301-903-0552)
Al Opdenaker — Program Manager for System Studies (301-903-4927)
Peter Pappano — Program Manager for Materials Science (301-903-4883)
Nirmol Podder — Program Manager for Madison Symmetric Torus and General Plasma Science (301-903-9536)
Ann Satsangi — Program Manager for High-Energy-Density Laboratory Plasmas and General Plasma Science (301-903-9707)
Francis Thio — Program Manager for Diagnostics and Validation Platforms (301-903-4678)



Last modified: 7/31/2013 11:55:20 AM

in summary

The Office of Fusion Energy Sciences supports a nationally and institutionally diverse portfolio of research in fusion and plasma science.

I. **General Open DOE Office of Science Notice (annual)**

Typically used for:

- Supplements to existing grants or Lab activities
- 1 yr. Renewal's of projects for alignment with competitive program specific solicitations

II. **Competitive Program Solicitations**

Typically used for:

- Addressing specific program priorities & research needs
- 3 year academic grants
- 5 year cooperative agreements for large centers

Other considerations:

- Not necessarily offered annually
- Applications are evaluated simultaneously against both new applications and renewal applications (i.e. competitively)

in summary

Don’t be Shy!

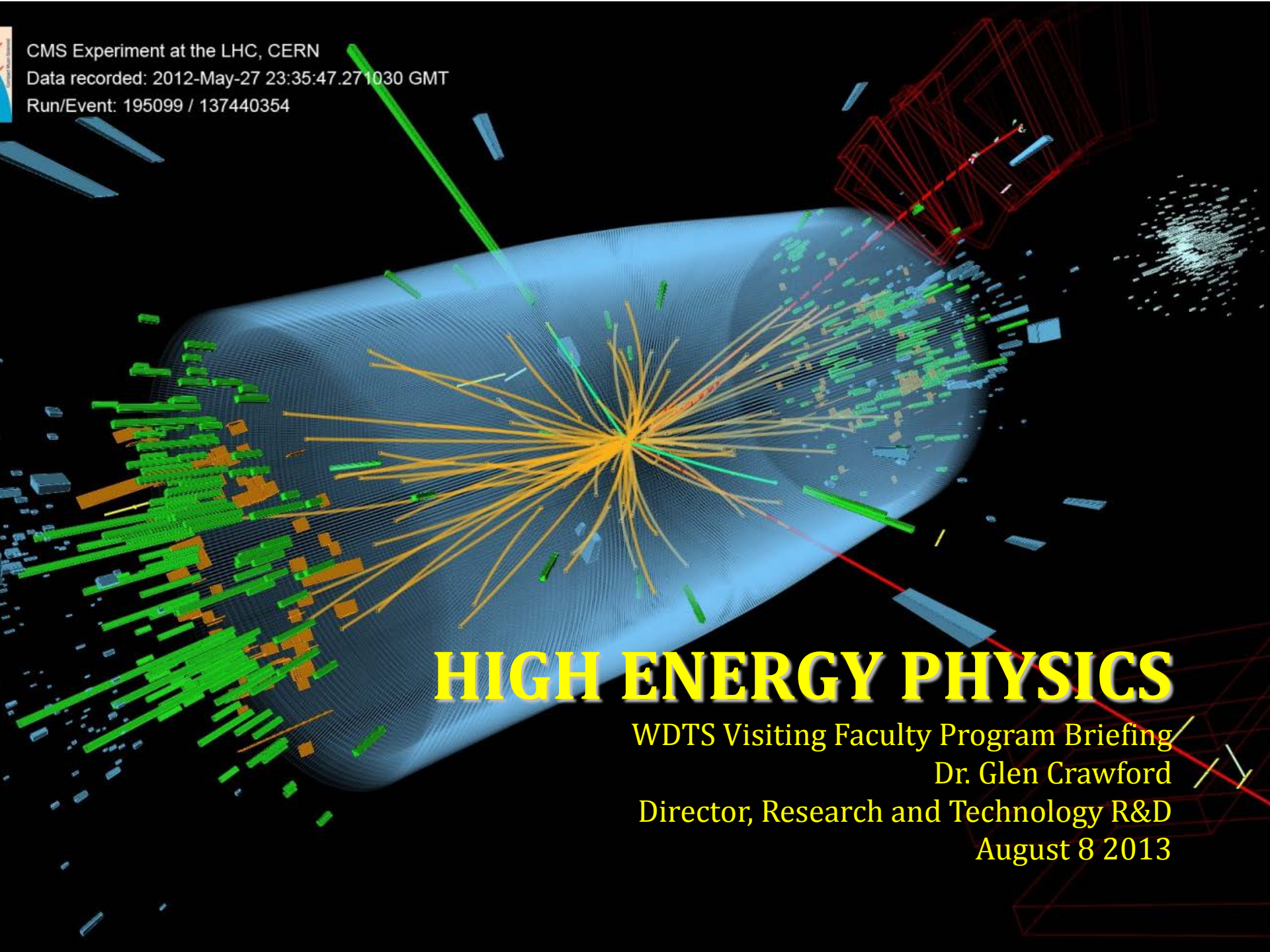
Please contact me if you have questions about FES or our programs

Sean M. Finnegan, Ph. D.

Program Manager:
HEDLP, GPS, MFE Theory, Ed. & Outreach

Email: Sean.Finnegan@science.doe.gov

Phone: 301-903-4920



HIGH ENERGY PHYSICS

WDTS Visiting Faculty Program Briefing

Dr. Glen Crawford
Director, Research and Technology R&D

August 8 2013

Office of

High Energy Physics

Fundamental

to the

Frontiers of

Discovery

HEP's Mission:

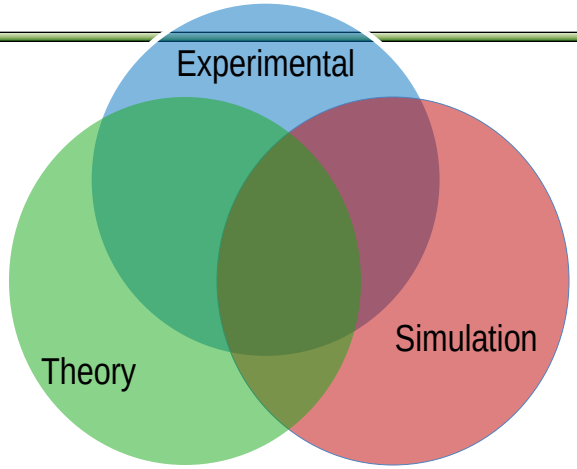
To explore the most fundamental questions about the nature of the universe at the Cosmic, Intensity, and Energy Frontiers of scientific discovery, and to develop the tools and instrumentation that expand that research.

HEP seeks answers to Big Questions:

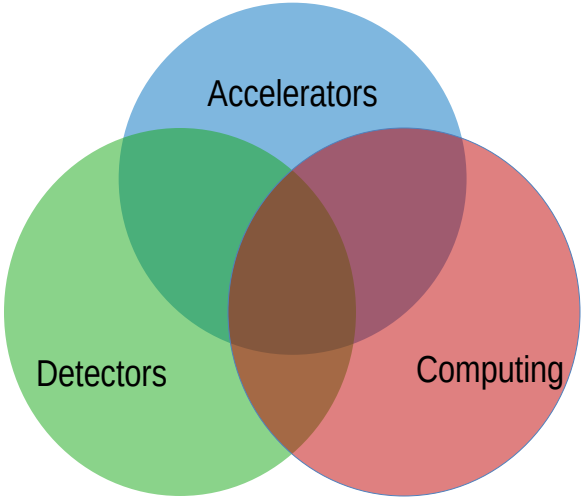
How does mass originate?
Why is the world matter and not anti-matter?
What is dark energy? Dark matter?
Do all the forces become one and on what scale?
What are the origins of the Universe?

HEP offers high-impact research opportunities for small-scale collaborations at the Cosmic and Intensity Frontiers to full-blown international collaborations at the Energy Frontier. More than 20 physicists supported by the Office of High Energy Physics have received the Nobel Prize.

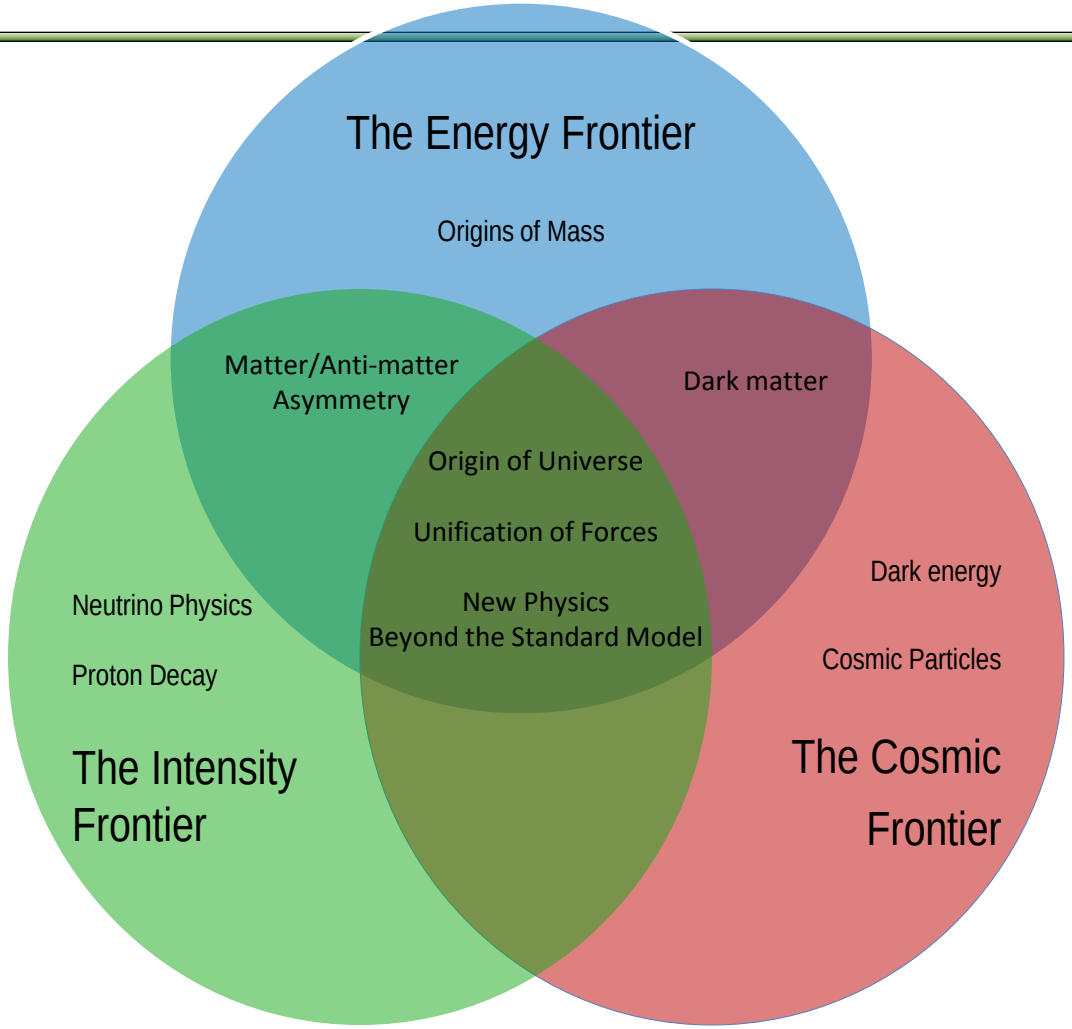
HEP Physics and Technology



Along Three Paths



Enabled by
Advanced Technologies in:

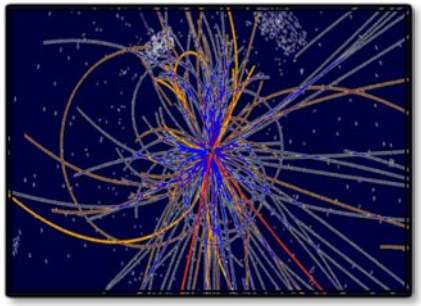
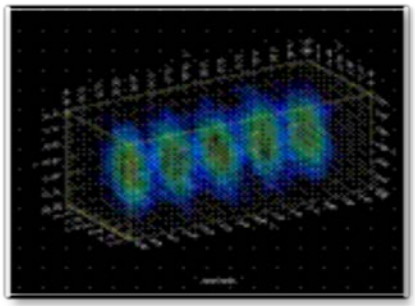
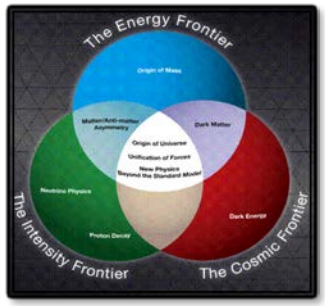


Physics Frontiers

High Energy Physics

Understanding how the universe works at its most fundamental level

- **Energy Frontier:**
  - Research at the LHC, including measurements to address whether the recently discovered particle is consistent with a Standard Model Higgs boson.
- **Intensity Frontier:**
  - Neutrino physics: NOvA project will be in full operation in 2014
  - Rare processes: Muon to Electron Conversion Experiment (Mu2e) experiment, now under construction, will search for the conversion of a muon to an electron in the field of a nucleus, expected to be a very rare event.
- **Cosmic Frontier: Dark matter and dark energy experiments (with NSF):**
  - R&D for next-gen experiments designed to directly detect dark matter particles using underground detectors
  - Large Synoptic Survey Telescope for studies of dark energy using ground-based telescope facility
- **Accelerator stewardship:** New subprogram focuses on fundamental physics of charged particle beams and on accelerator technology with broad applications.

Funding Opportunities

- Funding for research support is announced through targeted Funding Opportunity Announcements (FOAs) on the Office of Science Grants and Contracts website (http://science.doe.gov/grants/).
  - HEP-specific calls also linked on HEP website:
    - http://science.energy.gov/hep/funding-opportunities/
    - You can also find HEP grant guidelines and other info here
  - All major HEP subprograms currently open for new proposals through the 2014 Comparative Review solicitation (closes Sep 9)
  - Specialized programs may have additional *ad hoc* FOAs as needed
- Some HEP-supported large science collaborations also have programs for partial support of university researchers and students working at a DOE host lab.
  - Contact your collaboration spokesperson(s) for further info

Contacts

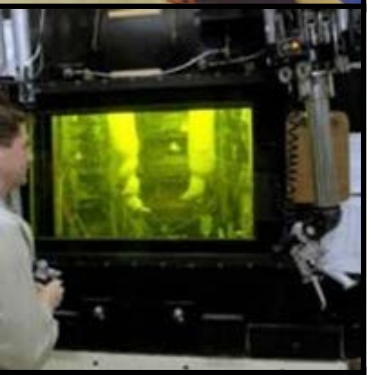
For further information:

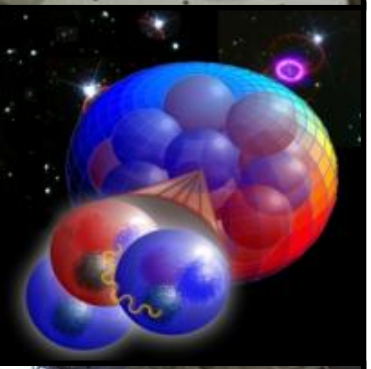
HEP Website: http://science.energy.gov/hep

HEP Staff: http://science.energy.gov/hep/about/staff/

HEP Research and Technology R&D Division Program Managers:

- Energy Frontier: Abid Patwa
- Intensity Frontier: Alan Stone
- Cosmic Frontier: Kathy Turner
- Theoretical High Energy Physics: Simona Rolli
- Accelerator R&D: L. K. Len
- Particle Detector R&D: Glen Crawford
- Computational HEP: Lali Chatterjee
- All can be reached at : *firstname.lastname@science.doe.gov*





Nuclear Physics

WDTS Visiting Faculty Program Briefing

August 8, 2013

George Fai
Program Manager, Nuclear Theory
Office of Nuclear Physics

http://science.energy.gov/np/

Research in Nuclear Physics

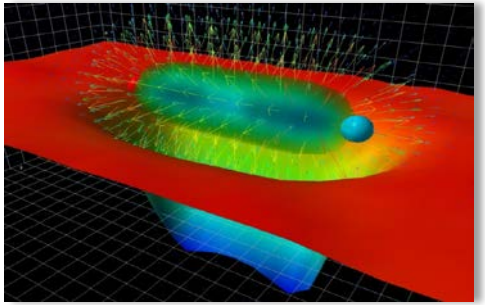
DOE/NP Mission Statement:

"The mission of the Nuclear Physics (NP) program is to discover, explore, and understand all forms of nuclear matter. The fundamental particles that compose nuclear matter - quarks and gluons - are relatively well understood, but exactly how they fit together and interact to create different types of matter in the universe is still not fully explained.

To solve this mystery, NP supports experimental and theoretical research - along with the development and operation of particle accelerators and advanced technologies - to create, detect, and describe the different forms and complexities of nuclear matter that can exist in the universe, including those that are no longer found naturally."

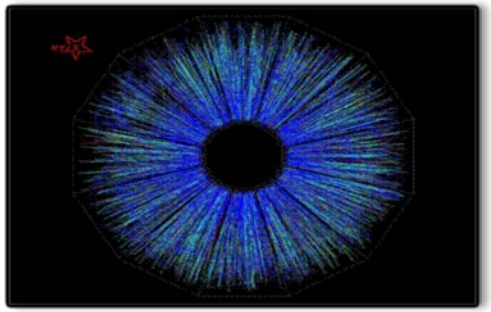
Low Energy NP

Nuclei, and the theoretical methods used to study them



Medium Energy NP

A quark-antiquark pair bound by a gluonic flux tube



Heavy Ion NP

The decay products of a gold+gold heavy ion collision

Primary areas of research supported by the NP Office:

Heavy Ion Physics – phase structure of strongly interacting matter – studies of the quark gluon plasma (QGP). RHIC facility at BNL; LHC at CERN.

Medium Energy NP – strongly interacting particles “hadrons” made of quarks and gluons. Their production, interactions, and decays. TJNAF.

Low Energy NP – properties of nuclei and bulk nuclear matter; nuclear species, their production, reactions and decays. Formation in nature; nuclear astrophysics. Rare decays and tests of the Standard Model. ATLAS facility at ANL; FRIB in the future.

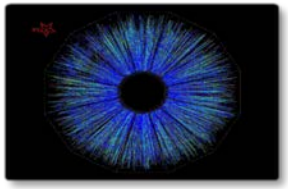
Theoretical NP – theoretical calculations in support of the above experimental areas in terms of basic physical principles. Quantum Chromodynamics (QCD), the theory of the interactions of quarks and gluons, the fundamental particles that comprise all strongly interacting matter.

NP Facilities (2 of 3)

The Relativistic Heavy Ion Collider (RHIC) is the only dedicated machine in the world for colliding heavy ions at near light speed

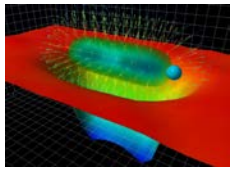
The Continuous Electron Beam Accelerator Facility (CEBAF) is the world's most powerful probe for studying the nucleus of the atom

RHIC (BNL)

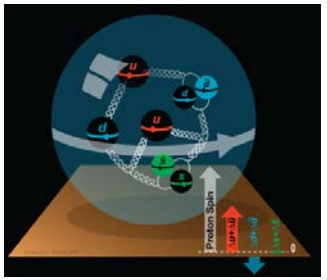


Quark - Gluon Plasma

TJNAF



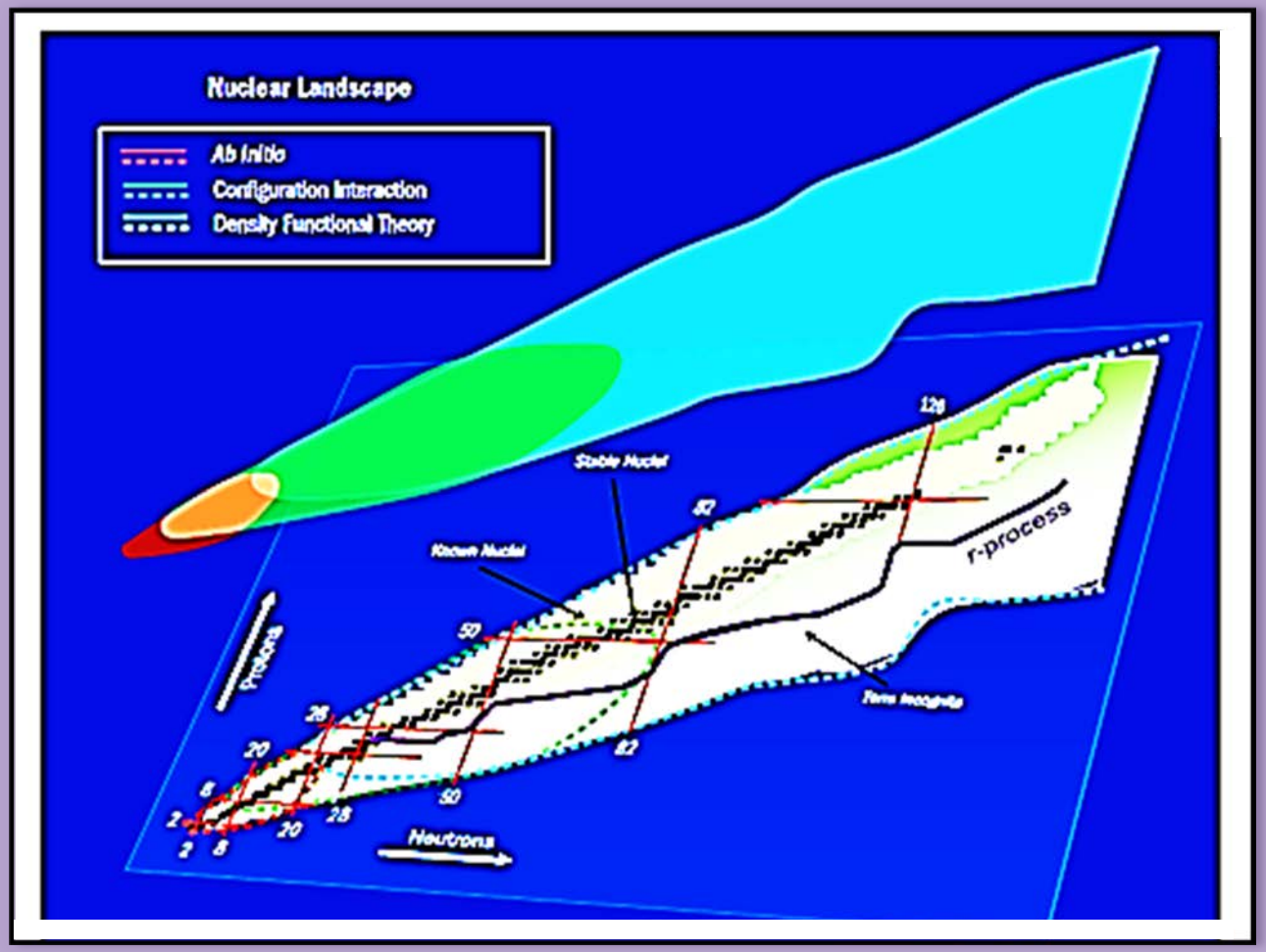
Quark Confinement; Exotic Mesons



Structure of Hadrons

NP Facilities (3rd of 3)

Facility for Rare Isotope Beams (FRIB at MSU): future



- Funding for research support is announced through targeted Funding Opportunity Announcements (FOAs) on the Office of Science Grants and Contracts website (http://science.doe.gov/grants/).
- SC general open call: many NP proposals use this avenue
- Examples of FOAs for research on specialized topics: Topical Collaborations in Nuclear Theory, Computational NP Research (SciDAC).
- NP also supports research on topics in applied nuclear physics (*e.g.* SBIR, Accelerator Research, Isotope Production and Applications).
- NP supports programs and workshops on specific NP topics at the Institute for Nuclear Theory (INT) in Seattle.
- National Laboratories with major NP programs (for VFP contacts to co-develop projects):
  - Argonne National Laboratory
  - Brookhaven National Laboratory
  - Lawrence Berkeley National Laboratory
  - Lawrence Livermore National Laboratory
  - Los Alamos National Laboratory
  - Oak Ridge National Laboratory
  - Thomas Jefferson National Accelerator Facility

For more information:

NP website - http://science.energy.gov/np/

NP staff - http://science.energy.gov/np/about/staff/

Timothy Hallman - NP Associate Director of Science for Nuclear Physics;
Acting Director, Physics Research Division
timothy.hallman@science.doe.gov

Jehanne Gillo - Director, Facilities and Project Management Division
jehanne.gillo@science.doe.gov

The “NP staff” website lists the Program Managers for the various NP subprograms.

U.S. DEPARTMENT OF ENERGY

An Overview of the DOE's SBIR and STTR Programs

Chris O'Gwin
DOE SBIR/STTR Programs Office

DOE SBIR/STTR Web: www.science.energy.gov/sbir

Visiting Faculty Program Webinar

August 8, 2013

Federal SBIR/STTR Programs

- Two R&D programs
  - SBIR: Small Business Innovation Research—authorized in 1982
  - STTR: Small Business Technology Transfer—authorized in 1992
    - requires collaboration with Research Institution
- Original Charter
  - stimulate technological innovation;
  - use small business to meet Federal R/R&D needs;
  - foster and encourage participation by the socially and economically disadvantaged small business concerns, and by small business concerns that are 51 percent owned and controlled by women, in technological innovation; and
  - increase private sector commercialization of innovations derived from Federal R/R&D, thereby increasing competition, productivity, and economic growth
- SBIR Small Business Stats
  - 15,000 firms
  - $21 billion in research
  - 50,000 patents
  - 7 patents a day
  - 400,000 scientists & engineers

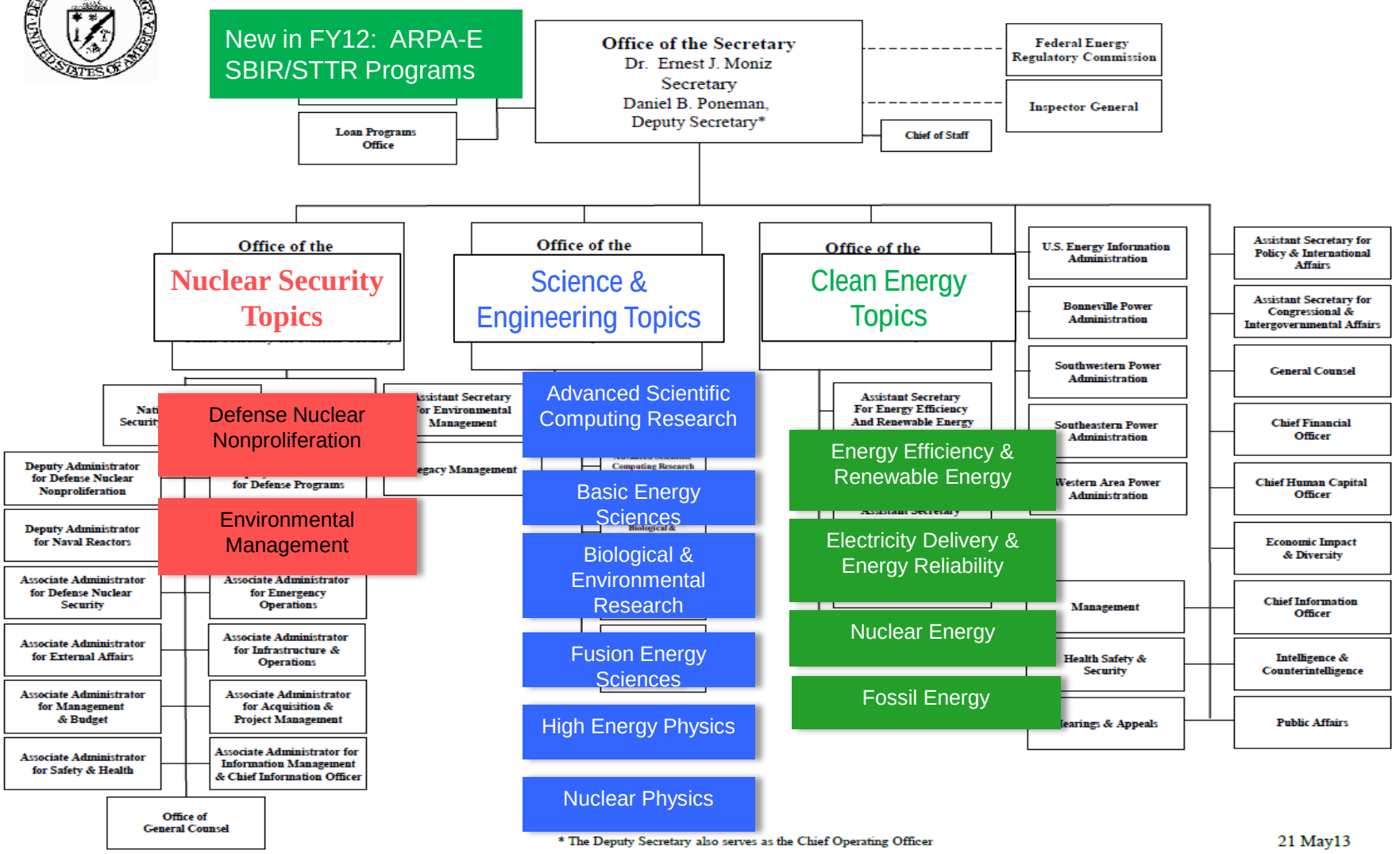
Program Funding, Eligibility & Evaluation

- Appropriations
  - The SBIR & STTR Programs do not receive direct appropriations from Congress. Program allocations are based on a percentage of an agency's extramural R&D budget
- Small Business Eligibility
  - For-profit, at least 51% US-owned, small business with 500 or fewer employees, located in the US .
    - Further information may be obtained at this Small Business Administration Size web address http://www.sba.gov/size.
- Principle Investigator (PI) Eligibility
  - PI primary employment must be with the small business for SBIR. For STTR, PI may come from the research institution.
- Evaluation
  - Strength of the Scientific/Technical Approach – 33%
  - Ability to Carry out the Project in a Cost Effective Manner – 33%
  - Impact – 33%

DOE SBIR/STTR Program Features

- *Competitive* Grants Driven Program
- Two Phased Approach
  - $150/225K Phase I (9 months) – Feasibility
  - $1/1.5M Phase II (24 months) – Development
  - Fast-Track – Combined Phase I and Phase II – No Funding Gap
  - Technology Transfer Opportunities (TTO)
- Phase III?
  - Yes. Focus is on commercialization and funded by private sector or federal agencies' non-SBIR program funds
- Must Be Awarded DOE Phase I to Compete in Phase II
- Offer Phase I and Phase II Commercialization Assistance

DOE Research Offices Participating in SBIR/STTR



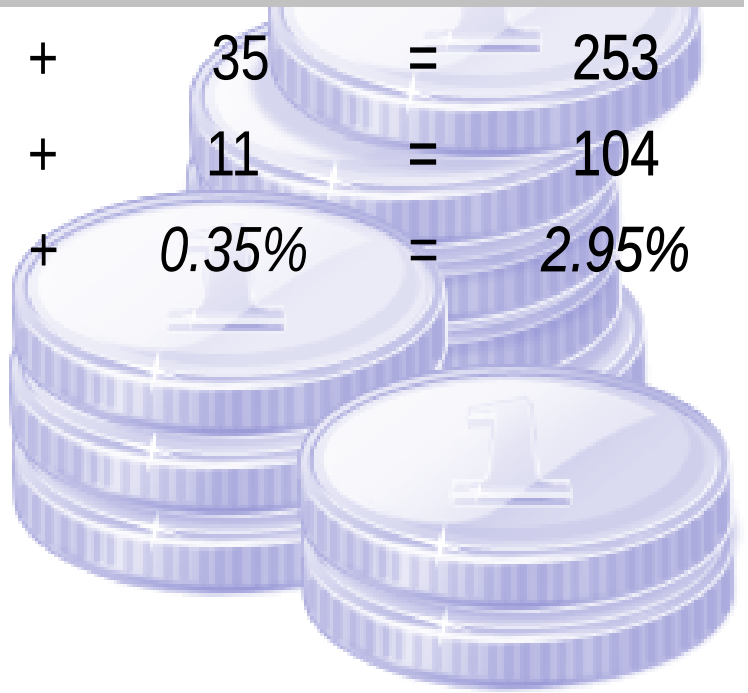
Thank you.

DOE's SBIR/STTR Budget vs. Awards

(in Millions $)

	SBIR		STTR		Totals
FY 2012 Budget	$153	+	$22	=	$175
Phase I Awards	218	+	35	=	253
Phase II Awards	93	+	11	=	104
DOE R&D Set-Aside	*2.6%*	+	*0.35%*	=	*2.95%*

(Approx. $6.0 Billion in Extramural DOE R&D)



*FY 2014 Phase I Schedule

	Release 1 – Science & Engineering (Goals 2&3)	Release 2 – Clean Energy (Goal 1)
Topics Issued	July 15, 2013	October 28, 2013
- Topic Webinars	Week of July 22, 2013	Week of November 4, 2013
Funding Opportunity Announcement (FOA) Issued	August 12, 2013	November 25, 2013
- FOA Webinar	August 16, 2013	December 3, 2013
Letters of Intent Due	September 3, 2013	December 16, 2013
Full Applications Due	October 15, 2013	February 4, 2014
Award Notification	Early January 2014	Late April 2014
Grant Start Date	Mid-February 2014	Early June 9, 2014

*FY is Fiscal Year and each federal FY begins October 1

Questions?

Contact information:

- DOE SBIR/STTR Operations Phone: 301-903-5707
- Email: sbir-sttr@science.doe.gov
- Chris O'Gwin: chris.ogwin@science.doe.gov; Phone: 301-903-5713

Our Website:

- DOE SBIR/STTR Website: www.science.energy.gov/sbir

Join our Mailing List:

- DOE SBIR/STTR Mailing List: http://1.usa.gov/12SkziW

Thank you.