BER SFA Categories

All SFAs will be identified as belonging to one of the following eight (8) SFA categories.

1. Genomic Science: Foundational Science

Genomic Science Program Foundational Science SFAs pursue team oriented, DOE mission driven research aimed at identifying the foundational principles that drive biological systems. These principles govern the translation of genetic codes into integrated networks of catalytic proteins, regulatory elements, and metabolite pools underlying the functional processes of organisms. The dynamic interactions of these components determine the overall systems biology of plants, microbes, and multispecies communities. SFA research in this category also develops and applies -omics driven tools to understand interactions between organisms that form biological communities and examine their functional processes in context of their surrounding environments, bridging molecular-scale functional biology with ecosystem-scale environmental processes. The goal of SFAs in this area is to advance understanding of the fundamental rules and dynamic properties of these systems and develop predictive computational models of plants, microbes, and communities.

2. Genomic Science: Biofuels

Genomic Science Program Biofuels SFAs pursue team oriented, DOE mission driven research aimed developing fundamental knowledge and innovative new approaches for sustainable bioenergy production. Research in Biofuels SFAs focuses on non-food plants that can serve as dedicated cellulosic biomass feedstocks or microbes capable of deconstructing biomass into their sugar subunits and synthesizing next generation biofuels (either from cellulosic biomass or through direct photosynthesis). The goal of SFAs in this area is to develop predictive systems biology understanding of these organisms and the underlying rules that govern their functional properties, enabling rational biosystems design of plants and microbes for bioenergy production.

3. Genomic Science: Systems Biology Knowledgebase

The DOE Systems Biology Knowledgebase (KBase) is an advanced computational infrastructure that will provide an extensible framework to facilitate predictive biology in microbes, microbial communities and plants. The goal is to allow researchers to explore experimental and computational ideas to understand possible connections between genotypes to molecular, organismal and ecological phenotypes. KBase is an open-source and open-architecture system that brings together biological data and modeling algorithms for reproducible, iterative and sharable workflows that address complex biological problems in energy and the environment. A secondary aim of KBase is to provide a platform to engender active sharing of data, methods and knowledge within the scientific community served by DOE.

4. Radiobiology

The Low Dose Radiation Research Program supports competitive peer-reviewed research aimed at informing the development of future national radiation risk policy for the public and the workplace. Research in the program contributes to the understanding of radiation-related health issues of relevance to the Department of Energy's missions in energy and environment.

5. Radiochemistry and Instrumentation

The programmatic goals are to support fundamental radiochemistry and imaging instrumentation research aligned with the BER mission specific needs for developing new methodologies for real-time, high-resolution imaging of dynamic biological processes in living systems

6. Earth System Modeling

Integrative earth system modeling focuses on advancing the science of physical-biogeochemical interactions and interdependencies applicable to a very high resolution earth system. This involves understanding atmospheric, oceanic, cryospheric, and terrestrial processes, both independently and as a system. Integrative modeling also builds predictive capabilities, from regional to global, using parameterizations extracted from research both on e.g. environmental systems and atmospheric sciences.

7. Environmental System Science

Environmental system science encompasses process studies including ecology, geomechanics, biogeochemistry, carbon cycling, water cycling, and heavy metal transport and transformations, both in the terrestrial surface and subsurface. Efforts are to resolve environmental sciences issues that provide significant drivers and/or feedbacks to earth system change, and to provide valuable information for DOE efforts to manage the fate and transport of DOE's legacy nuclear wastes. Parameterizations based ESS research emphasizes 'subgrid' scales of the Community Land Model.

8. Atmospheric System Research

DOE Atmospheric System Research focuses on the use of laboratory and field data, combined with process level models, to study and parameterize the physical, chemical, and dynamical processes governing aerosol and cloud lifecycles; aerosol-cloud-precipitation interactions; radiative transfer through an atmosphere containing aerosols and warm, mixed phase, and cold clouds; and the role of clouds and aerosols in the carbon and water cycles.