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National Lab Day

Lectures

10-9-2019

Biological and Environmental Research

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Biological and Environmental Research

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Lawrence Berkeley National Laboratory

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DOE's Office of Biological and Environmental Research

- Mission: support transformative science and scientific user facilities to achieve a predictive understanding of complex biological, earth, and environmental systems for energy and infrastructure security, independence, and prosperity.
- The program seeks to understand the biological, biogeochemical, and physical processes that span from molecular and genomics-controlled scales to the regional and global scales that govern changes in watershed dynamics, climate, and the earth system.



BERKELEY LAB

BER is comprised of two Divisions

Biological Systems Science Division

- Genomics
- Computational biosciences
- Biomolecular characterization and imaging science
- Joint Genome Institute User Facility
- Bioenergy Research Centers







Earth and Environmental Systems Sciences Division

- Atmospheric system
- Earth and environmental systems modeling
- Terrestrial ecosystems
- Subsurface biogeochemistry
- Atmospheric Radiation Measurement User Facility
- Environmental Molecular Sciences Laboratory User Facility



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BER funds university and national lab research differently

Type	Lead	Partners
Funding Opportunity Announcements (FOAs)		
Scientific Focus Areas		
Other lab calls		

User Facilities



- User Facilities are funded by DOE to provide research and expertise for the scientific community
- Specialized research that requires domain expertise and large capital equipment investments
- Regular calls for user proposals + competitive selection process



DOE Joint Genome Institute



Large-scale genomics and analysis of plants, microbes, and communities of microbes **relevant to the DOE mission** goals of harnessing science and technology for addressing energy and environmental challenges

Academic	1,365
Other Research Institutes	352
DOE National Laboratory	143
Industry	22

>8,000 data downloaders
>13,000 portal users

ORCID registration required
Digital Object Identifiers (DOIs) for all datasets from new proposals

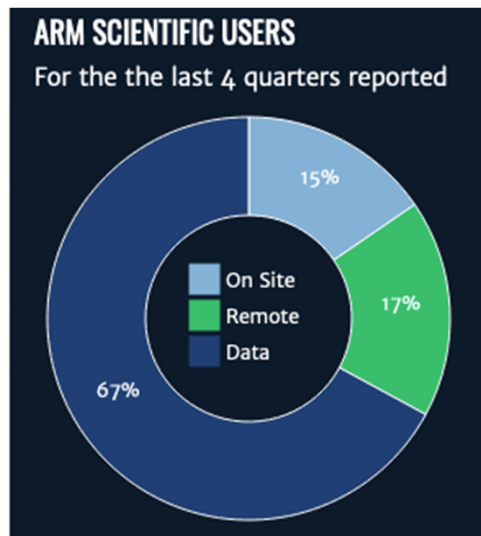


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Atmospheric Radiation Measurement Research Facility



Continuous observation of cloud and aerosol properties across a range of climate conditions to understand Earth's energy balance



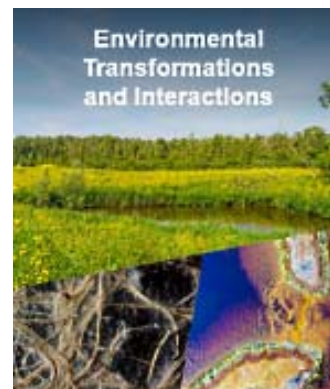
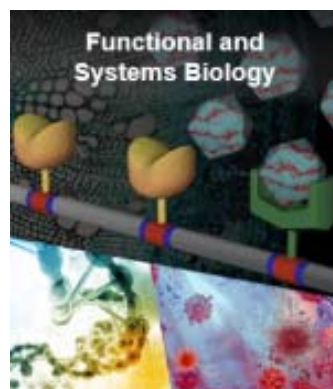
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Environmental Molecular Sciences Laboratory



EMSL accelerates scientific discovery and pioneers new capabilities to understand biological and environmental processes across temporal and spatial scales

Academic	214
Other DOE National Laboratory	52
Industry	6



Cell Isolation and
Systems Analysis

Deposition and
Microfabrication

Mass Spectrometry

Microscopy

Molecular Science
Computing

NMR and EPR

Plant, Soil and
Subsurface Flow and
Transport

Spectroscopy and
Diffraction



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Some Berkeley Lab BER-funded projects



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Data and analysis

DOE Systems Biology Knowledgebase



- Knowledge creation and discovery environment
- Powerful scientific framework for predicting function of biomolecules, microorganisms, plants and their communities



National Microbiome Data Collaborative



- Empower the research community to more effectively harness microbiome data
- Connect data resources and compute for open science and shared ownership

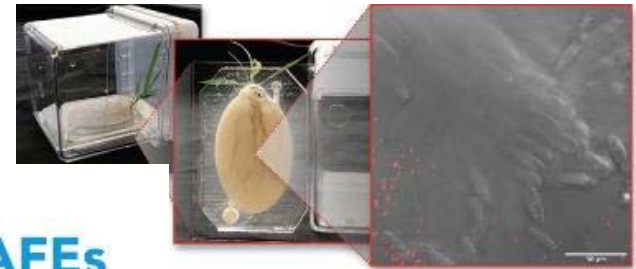
Understanding microbial communities

ENIGMA



- Develop a predictive understanding of basic biological processes and how these processes impact ecosystem functions
- Link biology to environment

mCAFEs



- Enabling a Mechanistic and Predictive Understanding of Rhizosphere Microbial Communities
- Development of fabricated laboratory ecosystems



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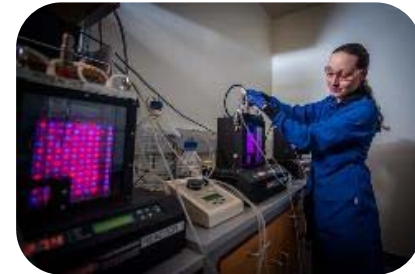
Other ways to interact with national labs



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DOE programs for faculty and students

- Visiting Faculty Program
 - Faculty member + up to 2 students collaborate with national lab staff on DOE-relevant projects
- Office of Science Graduate Student Research Program
 - Supplemental awards to graduate students to perform part of their research at a national lab
- Science Undergraduate Laboratory Internships
 - Research experience for undergraduates at national laboratories
- Community College Internships
 - Technical training at national labs for community college students



An aerial night photograph of a city, likely Seattle, Washington. In the foreground, a large, circular building with a prominent dome is illuminated. The city lights are visible in the middle ground, and a large body of water, possibly Puget Sound, is in the background under a twilight sky.

Thank you!

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