



2023 Agenda

Genomic Science Program Annual PI Meeting

April 17–19, 2023

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WEDNESDAY, APRIL 19

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NOTE: All times EST



U.S. DEPARTMENT OF
ENERGY

Office of
Science

Biological and Environmental Research Program

NOTE: All times EST

SUNDAY, APRIL 16

5:00–6:00 p.m. Registration desk open

MONDAY, APRIL 17

Opening Session

Grand Ballroom A-E

8:00 a.m. **Logistics**

8:20 a.m. **Opening Remarks**

Speaker: Gary Geernaert, Acting Associate Director, DOE Biological and Environmental Research Program (BER)

8:30 a.m. **Meeting Introduction**

Speaker: Todd Anderson, Director, Biological Systems Science Division

Keynote Presentation

9:00 a.m. **Pursuing Wild Microbes: How Microbiome Interactions and Ecophysiological Traits Shape the Persistence of Soil Carbon**

Speaker: Jennifer Pett-Ridge: 2022 Lawrence Award Laureate
Senior Staff Scientist, Lawrence Livermore National Laboratory

10:00 a.m. **Break**

Plenary Session 1: Office of Science Activities Update

Grand Ballroom A-E

10:30 a.m. DOE's Office of Science (SC) actively developed a number of new initiatives in 2022 and early 2023 that span SC programs. This session will provide updates from working groups for several of these initiatives, including Integrated Research Infrastructure, Biopreparedness research, Data Management, and Energy Earthshots. Specific opportunities related to diversity and inclusion will also be discussed, such as Reaching a New Energy Sciences Workforce (RENEW) and Funding for Accelerated, Inclusive Research (FAIR).

Moderator: Resham Kulkarni

10:30–10:50 a.m. **DOE's Integrated Research Infrastructure**

Speaker: Ben Brown, Facilities Division Director, Advanced Scientific Computing Research (ASCR)

10:50–11:10 a.m. **Foundational Science for Biopreparedness and Response**

Speaker: Michelle Buchanan, Senior Technical Advisor to the Deputy Director for Science Programs, Office of Science

- 11:10–11:30 a.m. Public Access Policy and Data Management**
Speaker: Michael Cooke, Senior Technical Advisor to the Deputy Director for Science Programs, Office of Science
- 11:30–11:45 a.m. Energy Earthshots Initiative**
Speaker: Devinn Lambert, Deputy Director of Science and Energy Crosscuts, Office of the Under Secretary for Science and Innovation
- 11:45 a.m.–12 p.m. Office of Science Diversity, Equity, and Inclusion Initiatives and Topics**
Speaker: Julie Carruthers, Acting Director of the Office of Scientific Workforce, Diversity, Equity, and Inclusion
- 12:00 p.m. Break for lunch**

Plenary Session 2: User Facilities and Resources

Grand Ballroom A-E

- 1:30 p.m.** The DOE Office of Science supports national scientific user facilities, community resources, and computational resources at national laboratories across the country as shared resources for the scientific community, with access determined on a competitive basis using peer review. Tens of thousands of researchers use these facilities each year. These world-class facilities not only provide access to a suite of enabling capabilities, technologies, and data to BER researchers and the broader user community but also foster multidisciplinary research efforts through cross-facility integrative programs. In this session, representatives from BER-supported facilities will provide updates on the latest scientific capabilities, user programs, and joint efforts among user facilities to advance Genomic Science research.

Moderator: Ramana Madupu

- 1:30–1:50 p.m. Integrative and Collaborative Genome Science at and with the JGI**
Speaker: Nigel Mouncey, Director of the DOE Joint Genome Institute (JGI), Lawrence Berkeley National Laboratory
- 1:50–2:10 p.m. EMSL: New Offerings, Partnerships, and Opportunities**
Speaker: Douglas Mans, Director of the Environmental Molecular Science Laboratory (EMSL), Pacific Northwest National Laboratory
- 2:10–2:30 p.m. PDB: Open Access 3D Biostructure Data Resource for Basic and Applied DOE Research**
Speaker: Stephen Burley, Director, RCSB Protein Data Bank, Rutgers, The State University of New Jersey

- 2:30–2:50 p.m. **Connecting Data, People, and Ideas with the National Microbiome Data Collaborative**
Speaker: Emiley Eloie-Fadrosh, National Microbiome Data Collaborative (NMDC), Lawrence Berkeley National Laboratory
- 2:50–3:10 p.m. **Community-Driven Predictive Biology with KBase**
Speaker: Adam Arkin, DOE Systems Biology Knowledgebase (KBase), Lawrence Berkeley National Laboratory
- 3:10–3:30 p.m. **Q&A**

Poster Session

Grand Ballroom F-H

3:30 p.m.

TUESDAY, APRIL 18

Plenary Session 3: Bioenergy Research Centers

Grand Ballroom A-E

8:00 a.m. The path to generate sustainable bioproducts and biofuels from lignocellulosic bioenergy feedstocks requires many different biological and chemical technologies. The Bioenergy Research Centers (BRCs) take integrative approaches to address technological challenges toward bioproducts and biofuels production. In this plenary session, the BRCs will describe recent research updates on designing sustainable production systems for biofuels and bioproducts from lignocellulosic bioenergy crops. The centers will discuss recent progress on understanding the interactions between crops and their environment, impacts of crop choice and management systems, and key plant-microbe-environment interactions that provide a range of ecosystem services.

Moderator: Shing Kwok

8:00–8:30 a.m. **Great Lakes Bioenergy Research Center (GLBRC) — Overcoming Impediments to a Sustainable Bioenergy Future**
Speaker: Douglas Landis, Michigan State University

8:30–9:00 a.m. **Center for Advanced Bioenergy and Bioproducts Innovation (CABBI) — Integrating Measurements and Modeling to Design an Ecologically and Economically Sustainable Bioeconomy in the Rainfed U.S.**
Speaker: Wendy Yang, University of Illinois Urbana-Champaign

9:00–9:30 a.m. **Joint BioEnergy Institute (JBEI) — Engineering Microbes and Bioenergy Crops for the Next Generation of Sustainable Aviation Fuels and Bioproducts**

Speaker: Corinne Scown, Lawrence Berkeley National Laboratory

9:30–10:00 a.m. **Center for Bioenergy Innovation (CBI) — Quantifying the Implications of Energy Crop Genetic Variability for Costs and Carbon**

Speaker: John Field, Oak Ridge National Laboratory

10:00 a.m. **Break**

Poster Session

Grand Ballroom F-H

10:30 a.m.

KBase Training and Help Sessions

Online

10:00 a.m.– **KBase Training Sessions (Registration required)**

12 p.m.

This session will introduce users to the KBase platform and showcase popular protocols for multi-omics analysis in KBase. Attendees will learn how to import data and use KBase apps for processing next-generation sequencing reads, assembly, annotation, feature analysis, and taxonomy. KBase staff will also introduce users to the platform's microbiome analysis workflows, from metagenome assembly and genome extraction to functional annotation and taxonomic prediction. Learn how KBase users perform powerful comparative analysis of their multi-omics data within an online platform that hosts a variety of public data and supports publishing and collaboration. This session is a great opportunity for new and experienced KBase users to learn about new features and developments to advance your research and to ask questions and get support from KBase staff.

Registration link:

<https://lbl.zoom.us/meeting/register/tjcpduCorj0oE91UyaqLacDZZKiumUPbyZ5Q>

(Varies)

KBase 1-on-1 Consultation and Help (by appointment)

KBase offers one-on-one consultation support throughout the meeting as an opportunity to meet with KBase staff to discuss specific questions regarding how you would use KBase in your research. Appointments are available in person and virtually during the poster sessions. Email engage@kbase.us to request an appointment.

12 p.m.

Break for lunch

NMDC Workshop

Online

1:00–3:00 p.m. The NMDC team will host an interactive, two-hour workshop to showcase the features of the NMDC Submission System and NMDC EDGE. During the first hour of the workshop, attendees will work in small breakout groups to validate metadata from microbiome samples against existing data standards within the NMDC Submission System. During the second hour, attendees will have the opportunity to run data through standardized bioinformatics workflows including metagenome annotation and the newly released virus and plasmid detection workflow. Attendees will be encouraged to provide real-time user feedback to the NMDC team throughout the workshop.

Registration required

Registration link:

<https://lbnl.zoom.us/meeting/register/tJlodOqrqj0iE9NesyzAom8uZRI-SgYfomGR>

Plenary Session 4: Genomic Science 2022 Early Career Program Awardees

Grand Ballroom A-E

2:00 p.m. The 2022 Office of Science Early Career Research Program awardees from BER's Biological Systems Science Division will present their projects to the Genomic Science Program community.

Moderator: Pablo Rabinowicz

2:00–2:20 p.m. **Investigation of Encapsulin Nanocompartment Systems as a Scaffold for Biomaterials Synthesis in *Rhodococcus* spp.**

Speaker/PI: Mimi Yung, Lawrence Livermore National Laboratory

2:20–2:40 p.m. **Synthetic Membrane Biology in Microbial Cell Factories**

Speaker/PI: Itay Budin, University of California–San Diego

Plenary Session 5: Workshop Activities Report-Out

Grand Ballroom A-E

2:40 p.m. This session will feature a summary of the workshop on “Artificial Intelligence/ Machine Learning (AI/ML) for Bioenergy Research” (AMBER), organized by BER within the Office of Science (SC) and by the Bioenergy Technologies Office (BETO) within the Office of Energy Efficiency and Renewable Energy. The AMBER workshop, held virtually on August 23–25, 2022, focused on how AI/ML approaches could be integrated within genomics-enabled basic and applied science, biodesign for optimization of biological systems, and bioprocess development.

Moderator: Resham Kulkarni

Speaker: Huimin Zhao

3:15 p.m. Break

Breakout Sessions

3:30 p.m. **BREAKOUT SESSION 1: ENVIRONMENTAL MICROBIOLOGY**
Grand Ballroom

Environmental microbiomes are comprised of interconnected and dynamic populations of microbes with high phyletic and genomic diversity. Networks of microbial interactions shape and condition the environment in ways that profoundly affect the physical world. This session highlights BER's support for studies that leverage integrated, multidisciplinary research to assess microbial cycling of elements in the environment and will seek to explore future trends and challenges in environmental microbiome research.

Moderator: Boris Wawrik

3:30–3:55 p.m. **Diversity and Ecology of RNA Viruses Along a Permafrost Thaw Gradient**

Project: From Viromes to Virocells: Dissecting Viral Roles in Terrestrial Microbiomes and Nutrient Cycling

Speaker: Adjie Pratama, Ohio State University

PI: Matthew Sullivan, Ohio State University

3:55–4:20 p.m. **Volatile Mediated Plant and Microbial Interactions and Their Potential to Extend the Rhizosphere and Enhance Soil Carbon Storage**

Project: A Volatile Environment: How Volatile Mediated Plant and Microbial Interactions Extend the Rhizosphere and Enhance Soil Carbon Storage

Speaker/PI: Laura Meredith, University of Arizona

4:20–4:45 p.m. **Using Model Soils to Infer How Microbes and Minerals Make Necromass that Persists**

Project: How Microbiomes and Minerals Make Necromass that Persists

Speaker/PI: Kristen DeAngelis, University of Massachusetts

4:45–5:05 p.m. **The Role of Plant-Derived Persistent Compounds in Peatland Soil Carbon Sequestration Under Climate Change**

Project: Toward a Predictive Understanding of the Role of Plant-Derived Persistent Compounds in Peatland Soil Carbon Sequestration Under Climate Change: Revisiting the “Enzyme Latch” Hypothesis

Speaker/PI: Joel Kostka, Georgia Institute of Technology

5:05–5:30 p.m. **A Death Knell for the Enzymatic Latch Theory: Diverse Polyphenol Metabolisms Expressed in Redox-Spanning Wetland Soils**
Project: Decoding the Unifying Microbial Metabolic Controllers on Soil Carbon Cycling Across Freshwater Wetlands
Speaker/PI: Kelly Wrighton, Colorado State University

5:30–5:55 p.m. **An Integrative Approach to Examining Mixed Heavy Metal Stress in Subsurface Microorganisms**
Project: ENIGMA: Ecosystems and Networks Integrated with Genes and Molecular Assemblies
Speaker: Jennifer Goff, University of Georgia
PI: Paul Adams, Lawrence Berkeley National Laboratory

3:30 p.m. **BREAKOUT SESSION 2: COMPUTATIONAL BIOLOGY**

Glen Echo

BER Science Across Facilities: The Science Focus Areas (SFAs) and BER's user facility-enabled research generate a significant amount of omics data and related data analysis software that eventually lead to publications. Those data and analyses are being made available and more accessible to the broader research community, beyond just a publication, through BER user facilities and computational resources. This session will highlight new science that demonstrates the power of data and analysis tools and how to access them, including end-to-end support for user science. Featured topics in this session will cover analysis of qSIP (quantitative stable isotope probing) data to determine metabolic activity of microbial taxa, tools to perform co-assemblies of very large metagenomic datasets, and novel ways to explore function in data on native and synthetic communities. This session will also highlight how several SFAs are developing complementary modeling tools to aid in understanding microbial function and support microbial community design. Join to learn more about how your BER science project can be advanced by harnessing user resources at DOE's Joint Genome Institute (JGI), Systems Biology Knowledgebase (KBase), National Microbiome Data Collaborative (NMDC), and Environmental Molecular Sciences Laboratory (EMSL).

3:30–3:35 p.m. *Introduction:* Ramana Madupu, moderator

3:35–4:00 p.m. **Cross-Site Syntheses with Quantitative Stable Isotope Probing**
SFA: Microbes Persist – Systems Biology of the Soil Microbiome
Speaker: Bruce Hungate, Northern Arizona University
PI: Jennifer Pett-Ridge, Lawrence Livermore National Laboratory

- 4:00–4:15 p.m.** **From Microbial Isolates to Metagenomes and Back: Long Read Sequencing for Predictive Microbiology**
SFA: ENIGMA – Ecosystems and Networks Integrated with Genes and Molecular Assemblies
Speaker: Lauren Lui, Lawrence Berkeley National Laboratory
PI: Paul Adams, Lawrence Berkeley National Laboratory
- 4:15–4:30 p.m.** **Terabase Scale Metagenome Coassembly with MetaHipMer**
User Facility: Joint Genome Institute
Speaker: Robert Riley, Lawrence Berkeley National Laboratory
PI: Nigel Mouncey, Lawrence Berkeley National Laboratory
- 4:30–4:55 p.m.** **Putting Microorganisms on the Map: Continental Scale Context for Microbial Genomes Sampled from North American watersheds**
Project: Microbial Genomes Across the World’s Rivers Community Science Project at JGI to create GROW (Genome Resolved Open Watershed) Database
Speaker: Mikayla A. Borton, Colorado State University
PI: Kelly Wrighton, Colorado State University
- 4:55–5:00 p.m. Break**
- 5:00–5:15 p.m.** **Expanding Functional Annotation Coverage for Genomic Data**
SFA: Persistence Control of Engineered Functions in Complex Soil Microbiomes
Speaker: William B. Nelson, Pacific Northwest National Laboratory
PI: Robert Egbert, Pacific Northwest National Laboratory
- 5:15–5:30 p.m.** **From Annotation Uncertainty to Modeling Confidence: Probabilistic Annotation and Ensemble Metabolic Modeling in KBase**
SFA: A Systems Biology Approach to Interactions and Resource Allocation in Bioenergy-Relevant Microbial Communities
Speaker: Patrik D’Haeseleer, Lawrence Livermore National Laboratory
PI: Rhona Stuart, Lawrence Livermore National Laboratory

5:30–5:45 pm **Integrating Tools in KBase for Automated Fitting of Metabolic Models to Multi-Omics and Growth Phenotype Data**
SFA: Phenotypic Response of the Soil Microbiome to Environmental Perturbations
Speaker: Hyun-Seob Song, University of Nebraska–Lincoln
PI: Kirsten S. Hofmockel, Pacific Northwest National Laboratory

5:45–6:00 pm **Moving from Single Species to Exploration of Synthetic Community Development in Plant-Microbe Interfaces in KBase**
SFA: Plant-Microbe Interfaces
Speaker: Priya Ranjan, Oak Ridge National Laboratory
PI: Mitchel J. Doktycz, Oak Ridge National Laboratory

3:30 p.m. **BREAKOUT SESSION 3: SUSTAINABLE FEEDSTOCK DEVELOPMENT FOR BIOENERGY**
White Oak B

Plants respond to environmental change through complex networks, many involving interactions with the surrounding microbiome, that can influence plant growth, development, and metabolism. Systems biology and omics technologies, together with computational approaches, are allowing researchers to map these complex networks, enabling a predictive understanding of their performance. Systems Biology Research to Advance Sustainable Bioenergy Crop Development awardees are applying these tools to examine the ecological impacts of fully sustainable, bioenergy crop production. This session will highlight progress in understanding how candidate biofuel plants interact with environmental factors to affect long-term plant feedstock performance.

3:30–3:35 p.m. *Introduction:* Shing Kwok, moderator

3:35–3:55 p.m. **EndoPopulus: Elucidation of the Roles of Diazotrophic Endophyte Communities in Promoting Productivity and Resilience of *Populus* through Systems Biology Approaches**
Project: Elucidation of the Roles of Diazotrophic Endophyte Communities in Promoting Productivity and Resilience of *Populus* through Systems Biology Approaches
Speaker/PI: Sharon Doty, University of Washington–Seattle

3:55–4:15 p.m. **Predicting and Modulating Rhizosphere Processes for Improved Bioenergy Crop Productivity**
Project: Integration of Experimental and Modeling Approaches to Understand, Predict, and Modulate Rhizosphere Processes for Improved Bioenergy Crop Productivity
Speaker/PI: Karsten Zengler, University of California–San Diego

- 4:15–4:35 p.m.** **Understanding and Improving Abiotic Stress Resilience in Pennycress, an Emerging Oilseed Cash Cover Crop**
Project: Interrogating Pennycress Natural and Induced Variation to Improve Abiotic Stress Tolerance and Oilseed Bioenergy Crop Resilience
Speaker/PI: John Sedbrook, Illinois State University
- 4:35–4:55 p.m.** **Systems Biology to Improve Camelina Oilseed Traits and Nitrogen Use**
Project: ECON – Enhancing Camelina Oilseed Production with Minimum Nitrogen Fertilization in Sustainable Cropping Systems
Speaker/PI: Chaofu Lu, Montana State University
- 4:55–5:15 pm** **Exploring Plant-Microbe-Environment Interactions and Climate Adaptation in Switchgrass (*Panicum virgatum*)**
Project: Testing Predictions of Plant-Microbe-Environment Interactions to Optimize Climate Adaptation and Improve Sustainability in Switchgrass Feedstocks
Speaker/PI: Tom Juenger, University of Texas–Austin
- 5:15–5:35 p.m.** **Exploring Biological Nitrogen Fixation on the Aerial Roots of Sorghum for Increased Sustainability of Bioenergy Production**
Project: A Systems Understanding of Nitrogen Fixation on the Aerial Roots of Sorghum
Speaker/PI: Jean-Michel Ane, University of Wisconsin–Madison
- 5:35–5:55 p.m.** **Analysis of the Beneficial Associations of Sorghum with Arbuscular Mycorrhizal Fungi Studied with Genetics, Genomics, and Microbiomics**
Project: Systems Analysis of the Beneficial Associations of Sorghum with Arbuscular Mycorrhizal Fungi Studied with Genetics, Genomics, Imaging, and Microbiomics
Speaker/PI: Jeffrey Bennetzen, University of Georgia–Athens

WEDNESDAY, APRIL 19

Breakout Sessions

8:00 a.m. BREAKOUT SESSION 4: SYSTEMS BIOLOGY OF BIOENERGY-RELEVANT MICROBES
Glen Echo

The Genomic Science program supports research aimed at understanding the fundamental properties of bioenergy-relevant organisms at the genomic scale and aims to have researchers translate that gained knowledge to enhance the production capabilities of microbes for sustainable bioenergy. The portfolio supports projects spanning a diverse range of organisms and approaches to understand and harness the biosynthetic processing power of the microbial world. This session will provide opportunities for different projects in the portfolio to share their current research.

Moderator: Dawn Adin

8:00–8:25 a.m. Systems Biology to Enable Modular Metabolic Engineering of Fatty Acid Production in Cyanobacteria
PI: Jamey Young, Vanderbilt University

8:25–8:50 a.m. Converting Methoxy Groups on Lignin-Derived Aromatics from a Toxic Hurdle to a Useful Resource: A Systems-Driven Approach
PI: Chris Marx, University of Idaho

8:50–9:15 a.m. Induced Changes in Gene Dosage: Chromosomal Manipulation to Create Synthetic Metabolic Pathways
PI: Ellen Neidle, University of Georgia

9:15–9:40 a.m. Optimizing Enzymes for Plastic Upcycling Using Evolution-Informed Design and High-Throughput Experiments
PI: Nick Gauthier, Dana-Farber Cancer Institute

9:40–10:05 a.m. SynThetic BiolOgy Driven Approach to Repurpose PolyAMides (STORM)
PI: Kate Kucharzyk, Battelle Memorial Institute

10:05–10:30 a.m. Discovery of Distributed Pathways for Plastic Conversion in the Yellow Mealworm Microbiome
PI: Kevin Solomon, University of Delaware

8:00 a.m. **BREAKOUT SESSION 5: INTRODUCING THE NEW BIOSYSTEMS DESIGN AWARDS 2022**
White Oak B

BER made seven new awards within its Biosystems Design element of the Genomic Science program. This portfolio aims at uncovering the fundamental principles that govern biological systems to enable computer-aided design and engineering of plants and microbes for improved production of biofuels, bioproducts, and biomaterials from renewable biomass, as a byproduct of photosynthesis, or from synthetic polymers. PIs will introduce their new projects to the Genomic Science program research community.

8:00–8:05 a.m. **Introduction:** Pablo Rabinowicz, moderator

8:05–8:25 a.m. **Designing Large, Genome-Wide CRISPRa/i Programs for Efficient and Effective Carbon-Conserving Bioproduction**
PI: James Carothers, University of Washington–Seattle

8:25–8:45 a.m. **B5: Bigger Better Brassicaceae Biofuels and Bioproducts**
PI: Edgar Cahoon, University of Nebraska–Lincoln

8:45–9:05 a.m. **Systems Engineering of *Auxenochlorella protothecoides*: From Photosynthesis to Biofuels and Bioproducts**
Speaker: Jeffrey Moseley, University of California–Berkeley
PI: Sabeeha Merchant, University of California–Berkeley

9:05–9:25 a.m. **Microbial Community Engineering Tools for Enhancing Polyolefin Degradation and Valorization**
PI: Mark Blenner, University of Delaware

9:25–9:45 a.m. **Integrated Engineering of Whole Plant Water Use Efficiency in *Sorghum* and *Setaria***
PI: Ivan Baxter, Donald Danforth Plant Science Center

9:45–10:05 a.m. **BioPoplar: A Tunable Chassis for Diversified Bioproduct Production**
PI: C. Robin Buell, University of Georgia

10:05–10:25 a.m. **Integrating Cell-Free Systems and Genome Engineering to Accelerate Biosystems Design for Carbon-Negative Biomanufacturing**
PI: Michael Jewett, Northwestern University

8:00 a.m.

BREAKOUT SESSION 6: BIOMOLECULAR CHARACTERIZATION AND IMAGING SCIENCE (BCIS) TECHNOLOGIES FOR INVESTIGATING THE RHIZOSPHERE

(shared breakout with BCIS)

Grand Ballroom

BCIS investigators will demonstrate the impact of technologies on components of and communication within the rhizosphere. Speakers will describe spatial methods and efforts to map chemical composition using advanced imaging and sensing techniques. Also discussed will be techniques to define system components with chambers for co-culture of bacteria, fungus, and plant roots for evaluating species interactions and metabolic cooperation in synthetic and real soils. Finally, investigations at multiple scales with multiple modes will be presented that will provide an understanding of the interrelationships of roots, microbes, and metabolites. The focus on how enabling technologies can reveal both rhizosphere structure and function supports BER's larger objective of understanding the basic biology underlying bioenergy and a bioeconomy.

8:00–8:05 a.m.

Introduction: Paul Sammak, moderator

8:05–8:20 a.m.

A Reproducible and Tunable Synthetic Rhizosphere Microbial Community Enables Quantitative Plant-Microbe Studies

PI: Karsten Zengler, University of California–San Diego

8:20–8:35 a.m.

Non-Destructive, Three-Dimensional Imaging of Processes in the Rhizosphere Utilizing High Energy Photons

PI: Shiva Abbaszadeh, University of California–Santa Cruz

8:35–8:50 a.m.

Visualizing the Hidden Half: Plant-Microbe Interactions in the Rhizosphere

PI: Pubudu P. Handakumbura, Pacific Northwest National Laboratory

8:50–9:05 a.m.

Biological Imaging Using Entangled Photons

PI: Theodore Goodson, University of Michigan–Ann Arbor

9:05–9:20 a.m.

Biocompatible Surface Functionalization Architecture for a Diamond Quantum Sensor

PI: Peter C. Maurer, University of Chicago/Q-NEXT Quantum Information Center at Argonne National Laboratory

9:20–9:35 a.m.

Plant Root Imaging During Symbiosis with Mycorrhizal Fungi

PI: Andreas Vasdekis, University of Idaho

- 9:35–9:50 a.m.** **Imaging the Rhizosphere Using Synchrotron Techniques**
PI: Tiffany Victor Lovelace, Brookhaven National Laboratory
- 9:50–10:05 a.m.** **Revealing the Molecular Universe of Environmental Microbiomes Using Mass Spectrometry Imaging**
PI: Chris Anderton, Pacific Northwest National Laboratory
- 10:05–10:20 a.m.** **Reduced-Complexity Synthetic Soil Habitats Facilitate Multimodal Imaging of Soil Ecosystem Processes**
PI: Arunima Bhattacharjee, Pacific Northwest National Laboratory
- 10:20–10:35 a.m.** **Multimodal Imaging for Root-Microbe Visualization**
PI: Natalie Elisabeth, Lawrence Berkeley National Laboratory
- 10:35–10:45 a.m.** **Open Discussion**

Plenary Session 6: Emerging Topics and Technologies

Grand Ballroom A-E

- 11:00 a.m.** This joint GSP and BCIS session will highlight forward-looking approaches and tools to tackle challenges within the scope of BER research on investigating, understanding, and modifying molecular function. Topics discussed will address how to advance or expedite ongoing research or pave the path for entirely new insights.
- 11:00–11:05 a.m.** ***Introduction:*** Amy Swain, moderator
- 11:05–11:30 a.m.** **Inter-Facility Collaboration: Genomes to Structure and Function**
PI: Yasuo Yoshikuni, Joint Genome Institute, Lawrence Berkeley National Laboratory
- 11:30–11:40 a.m.** **eBERlight User Program for Environmental and Biological Research at the APS**
PI: Karolina Michalska, Advanced Photon Source, Argonne National Laboratory
- 11:40 a.m.–
12:00 p.m.** **Natural and Synthetic Mobile Genetic Elements in Bacteria**
PI: Joe Schoeniger, Sandia National Laboratories

12:00–12:20 p.m. Visualizing Rhizosphere Systems with Quantum Light
PI: Theodore Goodson III, University of Michigan

**12:20–12:40 p.m. Single Cell and Spatial Omics of BER-Relevant Systems Using
Nanodroplet Processing and Advanced Mass Spectrometry
Approaches**
PI: Liljana Pasa-Tolic, Pacific Northwest National Laboratory

Adjourn

12:45 p.m. Adjourn — Safe travels, everyone!