American Innovation U.S. National Laboratory Research Digest™

American Innovation U.S. National Laboratory Research Digest
Issue #1 — Baseline Edition
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Mission

The mission of American Innovation (AI) – U.S. National Laboratory Research Digest is to support the work of the laboratories by providing a single point of access to current, accurate, useful, and timely information on the activities and projects of the U.S. National Laboratories.

Editor's Brief

American Innovation – U.S. National Laboratory Research Digest is designed to support awareness of ongoing research activity across the U.S. National Laboratory system by providing a structured, recurring point of reference based solely on publicly available information.

Each issue documents the current research landscape as it is publicly visible at the time of publication, identifying active laboratories, projects, and areas of focus, and noting observable developments over time. The intent is not to analyze, evaluate, or advocate, but to establish continuity and context so that readers can track progress, change, and emerging directions across the national laboratory system.

As this publication is intended to provide a consolidated, system-level view of U.S. National Laboratory research activity, reader feedback on ways to improve the clarity, usefulness, or coverage of the digest is welcome and will be considered as the publication evolves.

Coming in Issue #2
Reader Note — Future Coverage

Beginning with Issue #2, this publication will expand to include two additional observational sections:
People, highlighting publicly posted workforce and career opportunities across the U.S. National Laboratories, and
Procurement, summarizing publicly visible procurement, bid, and vendor engagement notices.

These sections are intentionally deferred from the Baseline Edition to preserve scope integrity and will be introduced under clearly defined boundaries in subsequent issues

System-Level Snapshot

The U.S. National Laboratory system comprises a network of federally funded research institutions operating under the U.S. Department of Energy and affiliated agencies, each with distinct mission responsibilities while collectively supporting long-term national research and development objectives. Together, the laboratories conduct work spanning fundamental science, applied research, large-scale facilities, and technology development across domains including energy systems, materials science, computing, environmental science, national security, and emerging technologies.

At any given time, laboratory research activity consists of a portfolio of ongoing projects at varying stages of maturity, ranging from early-stage exploratory research to sustained, multi-year programs. Publicly visible outputs—such as project descriptions, program announcements, facility updates, and published results—provide partial but meaningful insight into areas of emphasis and change across the system.

This snapshot establishes a baseline view of the national laboratory research landscape as it is publicly represented at the time of publication. Subsequent issues will reference this baseline to note observable continuity, shifts in focus, and the emergence or conclusion of major research efforts across the laboratory system.

U.S. National Laboratories — Baseline Inventory

The U.S. National Laboratory system consists of a set of federally funded research laboratories operated on behalf of the U.S. government, primarily under the U.S. Department of Energy, with additional laboratories affiliated with other federal agencies. Each laboratory maintains a distinct mission focus, research portfolio, and set of facilities, while collectively contributing to long-term national research, development, and infrastructure objectives.

This section provides a baseline inventory of the national laboratories as they are publicly represented at the time of publication. For each laboratory, the inventory is intended to identify core mission areas and major publicly visible research activities and projects, without evaluation or prioritization. The purpose is to establish a consistent reference point against which future issues may note continuity, additions, or observable changes in research focus over time

Laboratory Reference Entries

Argonne National Laboratory

Managing Organization:
UChicago Argonne, LLC (operated for the U.S. Department of Energy)

Primary Mission Areas:
Fundamental science, applied energy research, advanced computing, national scientific user facilities

Major Research Domains:
Energy systems, materials science, chemical sciences, nuclear science, computing and data science, environmental science

Active Projects and Programs:
(ANL) Advanced Photon Source (APS) Upgrade
(ANL) Exascale Computing Project participation
(ANL) Energy storage research initiatives
(ANL) Materials discovery programs
(ANL) Nuclear reactor and fuel cycle research

Key Facilities and Infrastructure (Public):
Advanced Photon Source (APS), Argonne Leadership Computing Facility (ALCF), Center for Nanoscale Materials (CNM)

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Brookhaven National Laboratory

Managing Organization:
Brookhaven Science Associates, LLC (operated for the U.S. Department of Energy)

Primary Mission Areas:
Basic and applied science, large-scale scientific user facilities, energy and environmental research, national security–related science

Major Research Domains:
Nuclear and particle physics, photon sciences, materials science, chemical sciences, energy sciences, environmental and climate science, computing and data science

Active Projects and Programs:
(BNL) Relativistic Heavy Ion Collider (RHIC)
(BNL) Electron–Ion Collider (EIC) development
(BNL) National Synchrotron Light Source II (NSLS-II) operations
(BNL) Energy storage and grid research programs

Key Facilities and Infrastructure (Public):
Relativistic Heavy Ion Collider (RHIC), National Synchrotron Light Source II (NSLS-II), Computational Science Initiative facilities

Fermi National Accelerator Laboratory

Managing Organization:
Fermi Research Alliance, LLC (operated for the U.S. Department of Energy)

Primary Mission Areas:
High-energy particle physics, accelerator science and technology, large-scale scientific facilities, international scientific collaboration

Major Research Domains:
Particle physics, accelerator and beam physics, neutrino science, detector development, scientific computing and data analysis

Active Projects and Programs:
(FNAL) Long-Baseline Neutrino Facility (LBNF),
(FNAL) Deep Underground Neutrino Experiment (DUNE),
(FNAL) Particle accelerator R&D programs,
(FNAL) High-energy physics experiments and collaborations

Key Facilities and Infrastructure (Public):
Fermilab accelerator complex, neutrino beamlines, computing and data facilities supporting large-scale experiments

Idaho National Laboratory

Managing Organization:
Battelle Energy Alliance, LLC (operated for the U.S. Department of Energy)

Primary Mission Areas:
Nuclear energy research and development, national security support, energy systems integration, critical infrastructure resilience

Major Research Domains:
Nuclear reactor technology, fuel cycle research, materials science, energy systems engineering, cybersecurity for critical infrastructure, environmental science

Active Projects and Programs:
(INL) Advanced reactor demonstration programs
(INL) Nuclear fuels and materials testing initiatives
(INL) Energy systems integration research
(INL) Critical infrastructure cybersecurity programs

Key Facilities and Infrastructure (Public):
Advanced Test Reactor (ATR), Materials and Fuels Complex (MFC), Energy Systems Laboratory facilities

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Lawrence Berkeley National Laboratory

Managing Organization:
University of California (operated for the U.S. Department of Energy)

Primary Mission Areas:
Fundamental science, energy research, environmental and earth sciences, advanced computing and data science, biosciences

Major Research Domains:
Materials science, chemical sciences, energy technologies, earth and environmental science, computational science, biological and genomic research

Active Projects and Programs:
(LBNL) Advanced Light Source (ALS) Upgrade
(LBNL) Joint Genome Institute (JGI) programs
(LBNL) Energy storage and materials discovery initiatives
(LBNL) Climate and earth system science programs

Key Facilities and Infrastructure (Public):
Advanced Light Source (ALS), National Energy Research Scientific Computing Center (NERSC), Joint Genome Institute (JGI)

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Los Alamos National Laboratory

Managing Organization:
Triad National Security, LLC (operated for the U.S. Department of Energy)

Primary Mission Areas:
National security science, nuclear deterrence and stewardship, materials and energy research, applied science and engineering

Major Research Domains:
Nuclear science and engineering, materials science, high-performance computing, chemistry, energy systems, applied physics

Active Projects and Programs:
(LANL) Stockpile stewardship science programs
(LANL) Plutonium pit production modernization efforts
(LANL) Materials aging and performance research
(LANL) Energy and materials science initiatives

Key Facilities and Infrastructure (Public):
High-performance computing facilities, materials characterization laboratories, experimental science and engineering facilities (as publicly referenced)

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Lawrence Livermore National Laboratory

Managing Organization:
Lawrence Livermore National Security, LLC (operated for the U.S. Department of Energy)

Primary Mission Areas:
National security science, nuclear deterrence and stewardship, advanced science and engineering, energy and environmental research

Major Research Domains:
High-energy-density physics, nuclear science and engineering, materials science, high-performance computing, laser and fusion science, applied physics

Active Projects and Programs:
(LLNL) National Ignition Facility (NIF) operations and experiments stockpile stewardship science **(LLNL)**
(LLNL) Programs, inertial confinement fusion research
(LLNL) Advanced materials and engineering initiatives

Key Facilities and Infrastructure (Public):
National Ignition Facility (NIF), high-performance computing systems, experimental science and engineering facilities (as publicly referenced)

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National Energy Technology Laboratory

Managing Organization:
U.S. Department of Energy (government-owned, government-operated)

Primary Mission Areas:
Applied energy research and development, fossil and alternative energy systems, carbon management, energy systems analysis

Major Research Domains:
Carbon capture and storage, hydrogen and fuel systems, power generation technologies, critical minerals, energy systems modeling and analysis

Active Projects and Programs:
(NETL) Carbon capture and storage research programs
(NETL) Hydrogen and decarbonization initiatives
(NETL) Energy systems modeling efforts
(NETL) Critical minerals and materials research activities

Key Facilities and Infrastructure (Public):
NETL research facilities and laboratories across multiple U.S. locations, computational and energy systems analysis infrastructure

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National Renewable Energy Laboratory

Managing Organization:
Alliance for Sustainable Energy, LLC (operated for the U.S. Department of Energy)

Primary Mission Areas:
Renewable energy research and development, energy efficiency, sustainable transportation, energy systems integration

Major Research Domains:
Solar and wind energy, bioenergy, energy storage, grid integration, sustainable transportation technologies, building and industrial energy efficiency

Active Projects and Programs:
(NREL) Renewable energy technology validation programs

(NREL) Grid integration and energy systems modeling initiatives
(NREL) Bioenergy and sustainable fuels research, advanced solar and wind technology development

Key Facilities and Infrastructure (Public):
Energy Systems Integration Facility (ESIF), National Wind Technology Center (NWTC), solar and bioenergy research laboratories

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Oak Ridge National Laboratory

Managing Organization:
UT-Battelle, LLC (operated for the U.S. Department of Energy)

Primary Mission Areas:
Fundamental science, energy research, national security support, advanced manufacturing, large-scale scientific user facilities

Major Research Domains:
Materials science, neutron science, nuclear science and engineering, high-performance computing, energy technologies, environmental science

Active Projects and Programs:
(ORNL) Spallation Neutron Source (SNS) operations and upgrades
(ORNL) High Flux Isotope Reactor (HFIR) programs, exascale computing initiatives
(ORNL) Advanced manufacturing and materials research programs

Key Facilities and Infrastructure (Public):
Spallation Neutron Source (SNS), High Flux Isotope Reactor (HFIR), Oak Ridge Leadership Computing Facility (OLCF)

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Pacific Northwest National Laboratory

Managing Organization:
Battelle Memorial Institute (operated for the U.S. Department of Energy)

Primary Mission Areas:
Energy and environmental research, national security science, chemical and materials science, data and computational science

Major Research Domains:
Energy systems and grid modernization, environmental and earth sciences, chemical sciences, materials science, data analytics and modeling, national security applications

Active Projects and Programs:
(PNNL) Grid modernization and resilience programs
(PNNL) Environmental molecular sciences research
(PNNL) Energy storage and materials initiatives
(PNNL) Data science and modeling programs

Key Facilities and Infrastructure (Public):
Environmental Molecular Sciences Laboratory (EMSL), energy systems and grid research laboratories, computational science facilities

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Princeton Plasma Physics Laboratory

Managing Organization:
Princeton University (operated for the U.S. Department of Energy)

Primary Mission Areas:
Plasma physics research, fusion energy science, basic and applied plasma science, workforce development in plasma and fusion disciplines

Major Research Domains:
Magnetic confinement fusion, plasma theory and modeling, plasma diagnostics, computational plasma physics, laboratory and astrophysical plasmas

Active Projects and Programs:
(PPPL) National Spherical Torus Experiment–Upgrade (NSTX-U)
(PPPL) Fusion plasma research programs
(PPPL) Plasma science education and outreach initiatives

Key Facilities and Infrastructure (Public):
NSTX-U experimental facility, plasma diagnostics laboratories, computational modeling and simulation resources

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Sandia National Laboratories

Managing Organization:
National Technology and Engineering Solutions of Sandia, LLC (NTESS), operated for the U.S. Department of Energy

Primary Mission Areas:
National security science and engineering, nuclear deterrence and stockpile stewardship, systems engineering, energy and infrastructure security

Major Research Domains:
Nuclear weapons engineering, systems engineering, materials science, microelectronics, cybersecurity, energy systems, applied mathematics and computing

Active Projects and Programs:
(SNL) Stockpile stewardship engineering programs
(SNL) Microelectronics and semiconductor research initiatives
(SNL) Cybersecurity and infrastructure protection programs
(SNL) Energy systems and grid security research

Key Facilities and Infrastructure (Public):
Z Pulsed Power Facility, Microsystems Engineering, Science, and Applications (MESA) Complex, high-performance computing and testing facilities

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Savannah River National Laboratory

Managing Organization:
Battelle Savannah River Alliance, LLC (operated for the U.S. Department of Energy)

Primary Mission Areas:
Environmental management science, nuclear materials processing and stabilization, applied energy research, national security–related science and engineering

Major Research Domains:
Nuclear materials science, environmental remediation, chemical processing, waste management technologies, applied materials and systems engineering

Active Projects and Programs:
(SRNL) Nuclear materials processing and disposition programs
(SRNL) Environmental cleanup and waste treatment research initiatives
(SRNL) Applied energy and materials technology development efforts

Key Facilities and Infrastructure (Public):
Radiochemical laboratories, environmental and materials testing facilities, applied engineering and pilot-scale research infrastructure (as publicly referenced)

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SLAC National Accelerator Laboratory

Managing Organization:
Stanford University (operated for the U.S. Department of Energy)

Primary Mission Areas:
Accelerator science and technology, photon science, particle physics, materials and chemical sciences, energy science

Major Research Domains:
Accelerator and beam physics, photon science, materials science, chemical dynamics, particle physics, energy and environmental science

Active Projects and Programs:
(SLAC) Linac Coherent Light Source (LCLS)
(SLAC) LCLS-II upgrade program
(SLAC) Accelerator and detector R&D programs
(SLAC) Materials and chemical science research initiativesKey Facilities and Infrastructure (Public):
Linac Coherent Light Source (LCLS), SLAC accelerator complex, photon science and materials characterization facilities

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Thomas Jefferson National Accelerator Facility

Managing Organization:
Jefferson Science Associates, LLC (operated for the U.S. Department of Energy)

Primary Mission Areas:
Nuclear physics research, accelerator science and technology, large-scale scientific user facilities, education and workforce development

Major Research Domains:
Nuclear physics, accelerator and beam physics, hadronic structure research, detector development, scientific computing and data analysis

Active Projects and Programs:
(TJNAF) Continuous Electron Beam Accelerator Facility (CEBAF) operations and upgrades
(TJNAF) Nuclear structure and strong force research programs
(TJNAF) Accelerator R&D initiatives

Key Facilities and Infrastructure (Public):
Continuous Electron Beam Accelerator Facility (CEBAF), experimental halls supporting nuclear physics research

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Y-12 National Security Complex

Managing Organization:
Consolidated Nuclear Security, LLC (operated for the U.S. Department of Energy / NNSA)

Primary Mission Areas:
Nuclear weapons component production and stewardship, national security manufacturing, materials science and engineering

Major Research Domains:
Nuclear materials science, advanced manufacturing, materials processing, component fabrication, security and infrastructure engineering

Active Projects and Programs:
(YNSC) Nuclear stockpile component production programs
(YNSC) Uranium processing and manufacturing initiatives
(YNSC) infrastructure modernization programs

Key Facilities and Infrastructure (Public):
Specialized manufacturing and processing facilities, materials handling and storage infrastructure (as publicly referenced)

Recent Activity (Observational)

(ORNL) Spallation Neutron Source Second Target Station — Milestone Achieved Oak Ridge National Laboratory reported completion of a major construction milestone associated with the Spallation Neutron Source Second Target Station project, as publicly announced during the reporting period.

U.S. Department of Energy / Multi-Lab — Collaboration Agreements — DOE announced collaboration agreements with 24 organizations to advance the **Genesis Mission** to harness artificial intelligence for scientific discovery and innovation. [The Department of Energy's Energy.gov]

- **Brookhaven National Laboratory — Project Inclusion in Genesis Mission** — Brookhaven Lab confirmed its contributions and participation in the DOE's **Genesis Mission** initiative linking AI and discovery science capabilities. [Brookhaven National Laboratory]
- **DOE / Multi-Lab — AI for Science Investments** — DOE announced over **$320 million in investments** to accelerate artificial intelligence capabilities for scientific research under the Genesis Mission framework. [Newswise]
- **Oak Ridge National Laboratory — AI Supercomputer Announcement** — ORNL announced two next-generation AI supercomputers (Lux and Discovery) to support DOE's Genesis Mission research computing efforts, with Lux planned to launch in 2026. [Oak Ridge National Laboratory]
- **Sandia National Laboratories — Thermal Protection Materials Research** — Sandia published results on rapid evaluation methods for **thermal protection materials** relevant to hypersonic and aerospace applications. [News Releases]
- **Sandia National Laboratories — Spectra Supercomputer Arrival** — A new supercomputer (Spectra) was reported as arriving at Sandia Labs, representing an addition to computing capabilities for laboratory research. [News Releases]
- **Sandia National Laboratories — Quantum Computing Materials Work** — Sandia reported progress on quantum computing materials research to enhance quantum system efficiency. [News Releases]
- **DOE — National Laboratory Organizational Restructuring** — DOE announced an updated **agency structure and organization chart** intended to better support innovation priorities, including science and critical minerals supply chain programs. [Holland & Knight]
- **U.S. DOE — Supercomputers at National Labs** — DOE announced plans to **build nine new supercomputers** at national labs to support scientific research and AI-focused computing. [AIP]
- **DOE / White House AI Collaboration** — An MOU was signed between OpenAI and DOE to explore collaboration on AI for science, supporting the Genesis Mission goal

Commercialization Watch

Commercialization Watch highlights publicly disclosed technology transfer, licensing, and industry-engagement activity through which U.S. National Laboratories make emerging technologies available to private-sector partners for commercial development.

Launch Edition Baseline

- **(NREL) Perovskite Solar Cell Manufacturing Scale-Up — Industry Engagement**
  NREL publicly reported expanded engagement with industry partners related to scaling perovskite solar cell manufacturing processes, including licensing activity and collaborative development efforts.

- **(ORNL) Advanced Manufacturing Technologies — Licensing Activity**
  Oak Ridge National Laboratory disclosed new licensing and partnership activity associated with advanced manufacturing technologies developed through its manufacturing demonstration programs.
- **(ANL) Battery Materials and Energy Storage — Industry Collaboration**
  Argonne National Laboratory reported continued industry collaboration and technology transfer activity related to battery materials research and energy storage systems.
- **(LBNL) Materials Discovery Platforms — Commercial Partnerships**
  Lawrence Berkeley National Laboratory indicated active commercial partnerships associated with materials discovery platforms and related computational and experimental tools.
- **(PNNL) Grid Modernization Technologies — Technology Transfer**
  Pacific Northwest National Laboratory publicly referenced technology transfer and external partner engagement linked to grid modernization and energy resilience research outputs.
- **(NETL) Carbon Management Technologies — Licensing and Deployment Support**
  The National Energy Technology Laboratory reported ongoing licensing and deployment-support activity for carbon capture, utilization, and storage technologies with commercial and industrial partners.
- **(SNL) Microelectronics and Semiconductor Research — Industry Engagement**
  Sandia National Laboratories disclosed continued engagement with semiconductor and microelectronics industry partners related to research translation and applied systems development.

90-Day Horizon (Observational)

Launch Edition Baseline
(Scheduled, publicly stated activity only; no inference)

- **(PPPL) NSTX-U Experimental Campaign — Scheduled Activity**
  Princeton Plasma Physics Laboratory publicly indicated plans to resume experimental operations associated with the National Spherical Torus Experiment–Upgrade (NSTX-U) during the upcoming operational window, based on stated schedules and readiness updates.
- **(ORNL) Spallation Neutron Source Second Target Station — Commissioning Preparations**
  Oak Ridge National Laboratory publicly referenced ongoing preparation activities associated with upcoming commissioning phases for the Spallation Neutron Source Second Target Station.
- **(SLAC) LCLS-II — Facility Operations Ramp-Up**
  SLAC National Accelerator Laboratory publicly reported continued ramp-up activities and scheduled user operations associated with the LCLS-II upgrade.
- **(BNL) Electron–Ion Collider — Project Milestone Window**
  Brookhaven National Laboratory publicly referenced near-term project milestones and scheduled development activities associated with the Electron–Ion Collider program

Public Facility Signals

Launch Edition Baseline
(Infrastructure- and facility-level changes only)

- **(LBNL) Advanced Light Source Upgrade — Facility Modernization Phase Transition**
  Lawrence Berkeley National Laboratory publicly reported progress indicating transition into a new modernization phase for the Advanced Light Source facility, reflecting infrastructure-level changes affecting future operational capabilities.
- **(SLAC) LCLS-II — Facility Commissioning and User Operations Expansion**
  SLAC National Accelerator Laboratory publicly referenced continued commissioning activities and expanded user operations associated with the LCLS-II facility upgrade.
- **(ORNL) Spallation Neutron Source Second Target Station — Facility Construction and Integration Progress**
  Oak Ridge National Laboratory publicly reported continued construction and systems integration progress affecting future operational readiness of the Second Target Station facility.
- **(ANL) Advanced Photon Source Upgrade — Accelerator and Beamline Modernization**
  Argonne National Laboratory publicly indicated ongoing accelerator and beamline modernization activities associated with the Advanced Photon Source Upgrade.

Public Source Boundary & Editorial Notes

All content in this publication is derived exclusively from **publicly available sources**, including official laboratory websites, government announcements, press releases, and other openly accessible materials. No confidential, restricted, proprietary, or non-public information is used or referenced.

This digest is **observational in nature**. It does not evaluate, analyze, rank, endorse, promote, or forecast research activities, technologies, institutions, or outcomes. Descriptions are intended solely to document publicly visible activity as it appears at the time of publication.

Project names, program descriptions, and facility references reflect the **public terminology used by the laboratories** and sponsoring agencies. Inclusion of any project or activity does not imply priority, funding status, commercial readiness, or strategic significance beyond what is explicitly stated in public sources.

Where future activity is referenced (e.g., scheduled experiments or facility operations), such references are limited to **publicly stated plans or timelines** and should not be interpreted as predictions or commitments. U.S. National Laboratories also make available formal collaboration mechanisms (e.g., Cooperative Research and Development Agreements), which will be addressed in future issues.

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