

Call for Proposals

FY 2022 Laboratory Directed Research and Development (LDRD) Program

I. Overview

The LDRD program encourages innovation, creativity, originality, and quality to keep the Laboratory's research activities and staff at the forefront of science and technology.

The FY2022 LDRD program will return to three funding tracks for proposals. Please note that these tracks are not in order of priority and are as follows:

- Lab-wide Initiative
- Area-Priority
- Early Career Development

All proposals, including continuations, must be submitted via <https://ldrd.lbl.gov/>.

The Lab-wide Initiative Track

Proposals in this track will foster the development of teams and activities in fields that directly support new, high level strategic goals of the Laboratory (<https://www.lbl.gov/programs/our-vision/>). The intent of this track is to ensure that appropriate review is provided for those strategically important topics that cut across several Laboratory Areas. These proposals will be submitted to one strategic initiative: Negative Emissions Science and Technology (NEST).

Proposals outside of the NEST initiative that may support other potential Lab strategic goals will be reviewed under the Area Priority funding track.

Principal Investigators (PIs) will indicate on their proposal submission that they wish to be reviewed via the Lab-wide Initiative funding track.

Criteria

Proposals will be evaluated based on:

- Alignment with NEST;
- The quality of the proposed research;
- The ability to leverage the Lab's native cross-area capabilities; and
- The proposed project's uniqueness and novelty.



Review

Lab-wide Initiative proposals will be reviewed in two rounds: First by a committee formed and managed by the Initiative Review Lead (see table below), and then by the scientific Division Directors (DDs), Associate Laboratory Directors (ALDs), and Senior Lab management.

Both reviews will involve a combination of an evaluation of the written proposal and presentation(s) to a review team. The proposal text and presentation may be modified after the first round based on input from the review committee.

The LDRD Lab-wide Initiative Review Leads will organize and manage the first round of reviews, including selection of other experts for the review committee.

For the second round of reviews, a selected set of related Lab-wide Initiative proposals will be presented as a portfolio to a review committee of the scientific DDs, ALDs, and Senior Lab management. For the second presentation, the Initiative Review Lead will also be responsible for a coordinated presentation of the proposals and may include one or more of the PIs.

Proposals that are considered scientifically competitive by the first review committee, but not well aligned with NEST, will be automatically reviewed via the Area Priority track.

The Area-Priority Track Criteria

Area-priority track proposals will be accepted from each of the Lab's scientific Areas and will be assessed based on their novelty and scientific quality, as well as the ability to introduce new research directions important to one or more of the Scientific Divisions. High-risk projects with the potential for significant scientific impact are strongly encouraged.

Multi-divisional and multi-area proposals are highly encouraged. Multi-Area topics may be called out in advance in two or more Area descriptions (See Section III below). The descriptions may differ in approach or division of work, so please read carefully. Proposals will be submitted by the lead division/area, usually the primary PI's division/area. However, if a proposal aligns more closely to an Area outside of the PI's home Area, please make sure to contact the appropriate ALD, Division Director, or deputy/business manager so they can review, offer feedback, and if necessary, champion the project.

Review

Each ALD and DD will review the proposals from their Area; they may also include additional reviewers in the process. The PI will be involved in a single round of reviews involving the written proposal and follow-up to Area and Division management. The highest ranking proposals will be presented by the relevant ALD or DD to the Lab Director and Deputy Lab Director for Research



for final selection and funding level recommendations. For multi-area proposals, the submitting ALD should seek feedback from the ALDs of the partner Areas and include this input during the final presentation to the Lab Director.

Early Career Development (ECD) Track

The intent of this track is to strengthen the Lab's scientific workforce by helping to position those PIs who are just beginning to embark on a successful career. An ECD LDRD grant is intended to be a first opportunity for an early career scientist to develop a PI experience at a national lab, which may include preparing for a DOE Early Career Research Program application. The Lab places great importance on developing a diverse workforce, and LDRD proposals from underrepresented employee groups are especially encouraged. Note: A maximum funding amount of \$450,000 per PI will be allocated for the entirety of the project. These funds may be spread over two or three years, e.g. \$225,000/year for two years or \$150,000/year for three years. The FY22 proposal budget request should reflect only the amount being requested for that specific fiscal year.

Criteria

To qualify for consideration on this track, PIs must have received their Ph.D. no earlier than January 1, 2013. Current postdocs are encouraged to submit proposals, and, if successfully funded, must have a scientific job title (career or career track, research scientist or staff scientist) before the project starts. Candidates are also expected to go through a suitable search prior to the job title change to encourage their long term growth and stability at the Lab.

A typical proposal should consist of funding for up to 50% of an FTE for the PI, and additional funding for a postdoc and/or students. While the topic of the proposed project should be consistent with Area strategy and create a strong basis for a future DOE Early Career Research Program application or other high value funding opportunities, it is expected that the ECD LDRD project will be independent from, and carried out in parallel to, the assigned work from a PI's home Division.

Please direct any further questions or inquiries about eligibility to the appropriate DD or ALD.

Review

The ECD LDRD application invites early career scientists to start thinking strategically about their long-term plans and how these plans fit into the program goals of the Lab and the DOE. Thus, ALDs and DDs should encourage and mentor outstanding early career scientists to become ECD PIs, paying particular attention to diversity and inclusion. Ongoing mentorship by the Area or Division will be essential for the success of the ECD PIs, thus ALDs/DDs should also prepare a mentoring plan for the PIs, and this plan is a critical part of the application.



ALDs and DDs will review the ECD proposals in their Area; they may also include additional reviewers in the process. The ECD PIs will be involved in a single round of review involving the written proposal and possibly a presentation to Area and Division management. Each ALD will forward the top ECD Proposal from their Area.

Each Area’s top-ranked ECD proposal will then be presented by their PI to the Lab Director, Deputy Lab Director, and all ALDs.

II. FY22 Lab-wide Initiative

As described above, new Lab-wide Initiative proposals will be considered for:

Negative Emissions Science and Technology (NEST): We seek proposals to explore how Berkeley Lab could contribute to the grand challenge of removing greenhouse gases (GHGs) from the climate system via investigations into the scientific and technical foundations for Negative Emission Technologies (NETs). According to the Intergovernmental Panel on Climate Change, addressing global warming will require rapid and widespread deployment of NETs to remove anthropogenic carbon dioxide and other GHGs from the climate system. This initiative will identify the most promising directions for future NETs research, leveraging the unique strengths of Berkeley Lab. Responsive proposals will:

- Identify and demonstrate the scientific foundations for new NETs;
- Find pathways to accelerate and optimize promising NETs with high potential; and/or
- Develop novel systems engineering approaches for capturing, handling, and converting carbon dioxide into biofuels, bioproducts, and biomaterials.

Initiative Topic	LDRD Lab-wide Initiative Review Lead
Negative Emission Science and Technology	Bill Collins

III. FY22 Area-priorities

Area-priority LDRD proposals are encouraged in new “breakthrough” science areas. Within each Area, the particular research topics for which proposals are especially encouraged are:

Biosciences: i) Biomaterials; ii) Biodefense / Biodetection; iii) C1 Biomanufacturing; iv) Single Cell Characterization; v) Plant- and Microbe-mediated Carbon Capture; vi) Quantum Imaging and Sensing; vii) Integrated Hybrid Methods; and viii) COVID-19 platform technologies and research.

Computing Sciences: i) New mathematical and statistical methods, including machine learning methods, that enable new capabilities in modeling, simulation, data analysis and control or steering of scientific instruments or energy systems; ii) Methods and systems to address complex data problems; iii) Techniques that explore new “superfacility” research challenges



and develop use cases that integrate HPC, networking, and edge devices with experimental and observational facilities; iv) Architectures, programming frameworks and system software for resilience, security, productivity and performance on future architectures, including advanced microelectronics devices, quantum devices, and specialized architectures “at the edge”; or v) topics aligned with national and homeland security mission needs. New cross-divisional and cross-area partnerships are especially encouraged.

Earth and Environmental Sciences: i) Novel experimental and modeling approaches for subsurface properties and processes; ii) Advanced approaches to simulate soil-microbe-plant interactions across scales and in response to environmental stresses; and iii) Science and technologies to advance resilience, adaptation, and security of natural resources and the built environment to range of stressors, including natural disasters and climate change.

Energy Sciences: Proof-of-concept studies, driven by scientific opportunities in chemistry and materials, that motivate long-term research and capabilities at the envisioned Charter Hill campus. Especially encouraged are proposals that develop and demonstrate “lab of the future” concepts. These may include approaches to outstanding challenges in basic energy sciences that closely couple theory, computation, synthesis and fabrication, and characterization, and that leverage data, artificial intelligence, machine learning, and/or robotics — for example, to enable automated and accelerated synthesis or understanding and control of materials phenomena and chemical transformations across multiple length and time scales. Concepts that have the potential to leverage the brightness and coherence of the upgraded ALS and emerging capabilities at the Molecular Foundry are also of particular interest. Multi-PI, cross-divisional and cross-area teams are encouraged.

Energy Technologies: i) Integrated Energy Systems: Develop spatiotemporal technologies and simulation tools to explain and engineer the dynamics of increasingly coupled energy systems (transportation, buildings, and industry) using the latest advances in computational, cybersecurity, economic and policy science; ii) Energy Storage Across Time and Length Scales: Novel concepts and foundational science for large-scale energy storage systems for stationary applications capable of >10 hours of discharge based on recent advances in chemistry and materials sciences with associated techno-economic and policy analysis; iii) Resilient Communities and Infrastructure: increase the resilience of the built environment through a focus on metrics, measurement, prediction and modeling, as well as scalable technologies and materials to be responsive to natural or health stressors; iv) Science of Manufacturing: enable a more circular economy through advances in chemical synthesis, materials science, and life-cycle assessment; v) Negative Emission Technologies: projects complementing this Lab-wide initiative; and vi) Contributions within the above priorities aligned with national and homeland security mission needs are also encouraged.

Physical Sciences: i) new scientific opportunities in particle physics and cosmology; ii) new



opportunities in nuclear science; iii) advanced accelerator systems for colliders and other applications including high power lasers; iv) novel technical concepts and capabilities: especially microelectronics, semiconductor detectors, quantum enabled technology, superconducting magnets; v) novel computing capabilities including AI/ML applied to particle physics, cosmology, nuclear science and accelerators; vi) new opportunities in fusion energy sciences; vii) leveraging LBNL capabilities to address national & homeland security mission needs, including monoenergetic photon sources, advanced neutron-based active interrogation concepts, and advanced radiation detection and imaging algorithms.

An important priority for PSA is to establish the technical and theoretical capabilities for Berkeley Lab leadership roles in the scientific opportunities identified in the Nuclear Physics Long Range Plan, the High Energy Physics P5 report, and the Fusion Energy Sciences Long Range Plan, and in planning for upcoming strategic planning exercises in these areas. These opportunities include the Electron-Ion Collider (EIC), next generation high energy hadron and lepton colliders, ton-scale neutrino-less double-beta decay experiments, next generation cosmic and dark matter surveys, high power lasers, superconducting magnet science and technology and other opportunities. Novel directions and high risk/high reward ideas are encouraged.

An Area-wide priority for FY22-23 is to support innovative ideas in instrumentation, with an emphasis on detector and readout R&D that could enable scientific opportunities in more than one discipline, with participation of multiple Divisions to create synergies across and outside the Area. Proposals may also include needed investments in technical infrastructure in support of instrumentation R&D.

IV. Detailed Requirements and Review Process

Proposals must include a:

- Cover Sheet
- Technical proposal (as described below)
- Budget Request form
- NEPA/CEQA form
- Human Subject and Animal Use form
- Intellectual Property forms

The technical proposal section may not exceed a maximum of three pages of text with one additional page for figures and references. Continuing project proposals must include (within the page limit) a statement of progress to date, detailed scope and deliverables for the current fiscal year, as well as prospects for follow-on funding.

Proposed work can neither supplement existing DOE projects, nor contain construction line items or maintenance activities. The expected duration of projects started in FY22 should target two



years, with a third year of funding available only in outstanding and exemplary circumstances. In addition, second year funding is not guaranteed and will be based on several factors, including progress towards goals and successful stewardship of project funding.

Proposals should be prepared carefully following the given specifications and requirements available online at Detailed Proposal Guidance.

Budget

Budgets must include payroll burden, procurement burden and support burden, if applicable, along with scientific organization burden. A Site Support overhead estimate should be included as a separate line item if applicable.

V. Schedule and Support

The nominal schedule for the FY 2022 cycle is posted - see LDRD Review Schedule. Final detailed scheduling of the review period and any presentations will be arranged by the ALD and/or Lab Director's offices.

Investigators should work with their divisional or Area support staff to prepare their LDRD proposals. Administrative questions may be addressed to Darren Ho (dho@lbl.gov).

For additional information about the purpose and implementation of the LDRD program, please visit: http://www.lbl.gov/DIR/assets/docs/LDRD_Guidelines_10-09-c.pdf

Information about the proposal submission and review process can be found at: <http://www.lbl.gov/DIR/LDRD/cfp/process.html>



FY 2022 Laboratory Directed R&D (LDRD) Proposal Schedule

Schedule as of December 3, 2020. For any updates, please go to:

<http://www.lbl.gov/DIR/LDRD/cfp/schedule.html>

Before January 1, 2021	Director issues Call for Proposals and guidance for FY 2022 LDRD to ALDs, Division Directors, and staff scientists via e-mail and Elements.
March 22, 2021	Principal investigators submit and lock FY 2022 LDRD proposals in the web-based submission system for Division processing. Associate Laboratory Directors (ALDs) initiate review processes of all proposals from their Area.
April 12, 2021	ALDs identify proposals selected for Early Career Development track review.
May 10, 2021	Presentation and Review Meetings for FY 2022 ECD, Lab-wide Initiative, and Area/Divisional Priority proposals.
May 11, 2021	Presentation and Review Meetings for FY 2022 Area/Divisional Priority proposals.
July 1, 2021	Director or Deputy Director for Research notifies ALDs and Division Directors of preliminary FY 2022 awards.
September 1, 2021	LDRD Office notifies successfully awarded FY 2022 PIs. Project concurrence requests are provided to DOE-Bay Area Site Office (BASO).
October 1, 2021	DOE project concurrence is provided, and LDRD projects begin work.
December 13, 2021	Awards announced in Elements after final allocations are made.