



U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy



Lab-Embedded Entrepreneurship Programs

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Topics

1. The problem we're after
2. The Lab-Embedded Entrepreneurship Programs
(at LBNL, ANL, ORNL)
3. How the programs work
4. Impact so far
5. Keys to success

Creating a home for science-based innovators

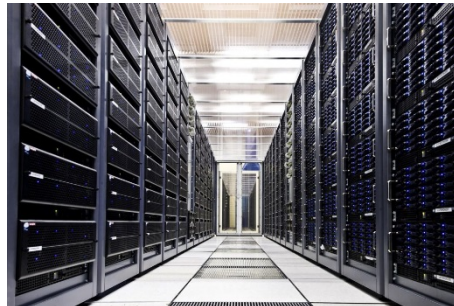
Where can innovators go to develop disruptive new hardware-based technology?



Academic R&D

INTEREST:

New ideas,
fundamental R&D;
focus on publications



Corporate R&D

INTEREST:

Incremental
technologies core to
business model



Tech Startup

INTEREST:

Later stage; good for
capital-light technologies

Spin the nation's top innovators "in" to the National Labs

The Lab-Embedded Entrepreneurship Program model



① **Recruit** the best energy technology innovators

② **Leverage** expert mentorship and world-class facilities at the national lab on a win-win basis

③ **Position** people and technology for market

The Lab-Embedded Entrepreneurship Programs

1. Cyclotron Road @ Lawrence Berkeley

- Launched mid-2014
- Partnership with Activation Energy
- Cohort 4 onboarding in progress

cyclotronroad



2. Chain Reaction Innovations @ Argonne

- Launched mid-2016
- Partnership with Polsky/Purdue
- Cohort 2 onboarding in progress



3. Innovation Crossroads @ Oak Ridge

- Launched mid-2016
- Partnership with LaunchTN
- Cohort 2 onboarding in progress



How the Programs work

Innovator financial support:

Oak Ridge Associated Universities (ORAU) administers ORISE fellowships for two years (funded by AMO).

National lab program support:

Full program administration provided by National Labs (funded by AMO)

Early-stage R&D support:

AMO-funded support to National Lab to seed innovator's R&D projects; Labs may supplement funding.

The President's Budget requested \$7.5M for the Programs in FY 2018.

- Planned support for each Program in FY 2018 is \$2.5M

Early successes from the Programs

- **Follow-on Funding:** Cyclotron Road Cohort 1 (6 projects) catalyzed over \$15 million of foundational research funding and initial private investments, including over \$5 million in private funding from sources including philanthropy, angel investors, venture capital, and strategic investors. All Cohort 1 teams graduated from Cyclotron Road with 12-18 months of follow-on runway.
- **Job Creation:** 30 high tech manufacturing innovation jobs already supported by new companies founded by Cyclotron Road's Cohort 1 innovators.
- **National Recognition:** Since 2016, a total of 7 innovators from the Programs have been named to Forbes' prestigious "30 under 30" list in the energy category, including 4 innovators in this year's list.
- **New Opportunities:** To date, the Programs have provided 39 top-tier innovators with a previously non-existent entrepreneurial platform from which to advance breakthrough energy technologies toward commercial impact.
- **Efficient Use of Funding/Avoided Costs:** Interviews suggest ~\$1M and 6-12 months of development cost/time can be avoided through participation in the Programs.
- **Federal Partnerships:** The DoD through DARPA is piloting support for 3 innovators at Cyclotron Road in 2018.

Leveraging National Lab capabilities and expertise

Argonne National Lab

- Center for Nanoscale Materials
- Advanced Photon Source
- Materials Engineering Research Facility

Oak Ridge National Lab

- Spallation Neutron Source
- Manufacturing Demonstration Facility
- Center for Nanophase Materials Sciences

Lawrence Berkeley National Lab

- The Molecular Foundry
 - Advanced Light Source
 - National Energy Research Scientific Computing Center
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Lab Scientists on Benefits:

- Lets me diversify knowledge, network, and research portfolio
- Get to work with “all-in” innovators & drive real-world impact
- Innovators are enhancing my equipment and capabilities
- learning about industry needs from a different perspective
- I may have an opportunity to be part of a startup
- Helps bring outside funding into the lab

Keys to Program success

1. Focus on the innovators, and on providing a pathway for top scientists and engineers to become energy and manufacturing entrepreneurs outside conventional financing pathways.
2. Focus on hardware-based technologies at a nascent stage that can significantly impact the energy sector. These technologies typically require high capital intensity and long development cycles.
3. Integrate the innovators into a world-leading technical environment coupled to a broader ecosystem to support entrepreneurial training and venture development.
4. Leverage the host institution infrastructure and technical expertise to serve entrepreneurs.
5. A commitment toward bottom-up execution with senior Lab leadership support.
6. Utilize entrepreneurship resources in the regional innovation ecosystem (e.g. Cyclotron Road proximity to the Silicon Valley entrepreneurship community).
7. Secure a high-intensity and top-notch execution team that is fully committed to the Lab-Embedded Entrepreneurship Programs.

Thank You

Cyclotron Road (alumni)

Cohort I

(2015-2017)

OPUS 12 electrochemical CO₂ to fuel

CALWAVE next generation wave power

POLYSPECTRA photo-activated
polymers for 3-d printing

SPARK thermionic heat engine on a
chip

MOSAIC materials for industrial gas
separations

VISOLIS bio-based production of
carbon-negative, high-performance
polymers



Cyclotron Road (alumni)

Cohort II

(2016-2018)

MALLINDA fully re-shapeable and recyclable polymers

IRIS PV ultra-high efficiency perovskite tandem solar cells

SYNVITROBIO cell-free platform for rapid bio-discovery

FEASIBLE diagnostic imaging for safer and cheaper batteries

SEPION nanoporous polymer separators for high energy batteries

CUBERG materials for ultra-low cost, high energy density batteries

