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# **Partnerships & Technology Transfer: Accessing National Laboratory Resources**

Cherri J Schmidt & Aaron G Sauers

2018 Midwest Regional Workshop on ASTFP

5 December 2018

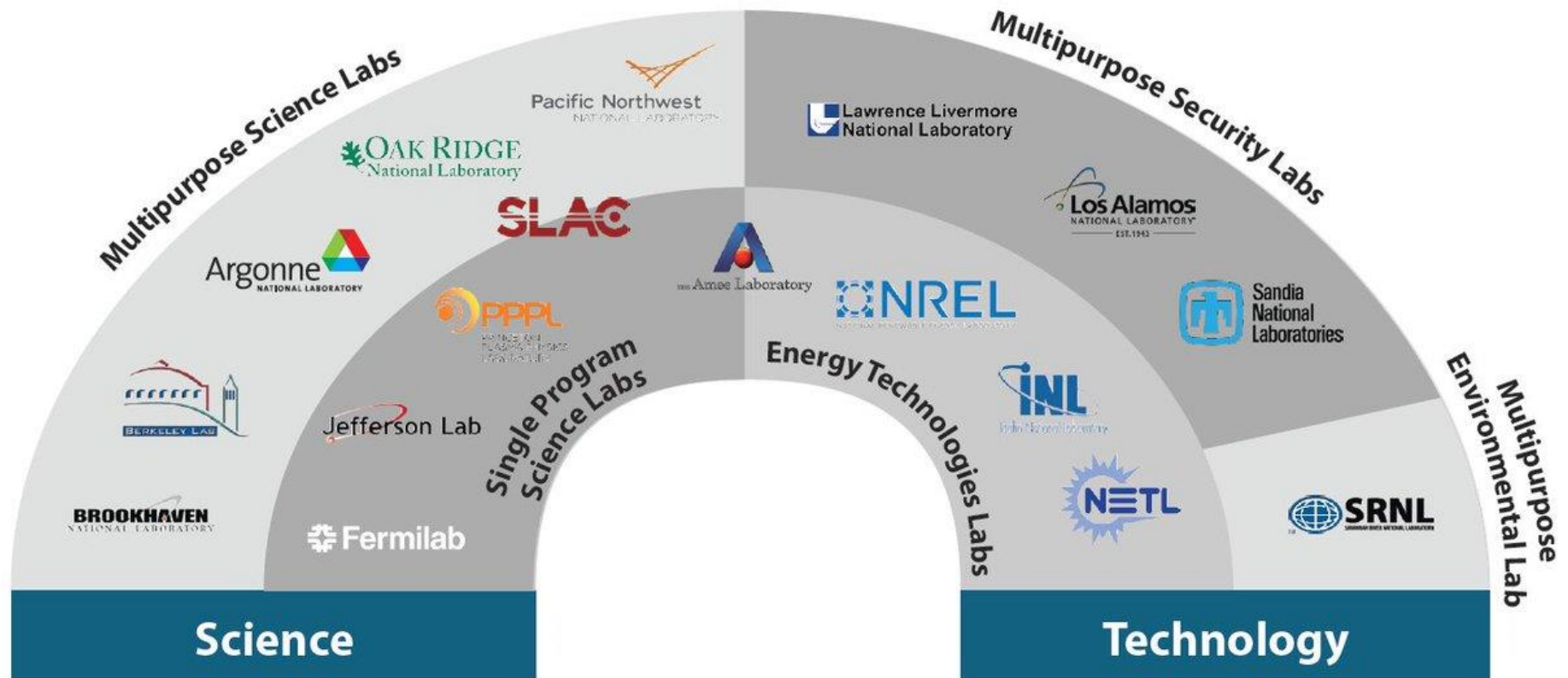
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# Partnerships & Technology Transfer: Accessing National Laboratory Resources

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- The National Lab System
- Fermilab's Technology Strengths
- Fermilab as an Engine of Innovation
- Partnering Mechanisms
- Licensing Opportunities
- OPTT Team

# The National Laboratory System



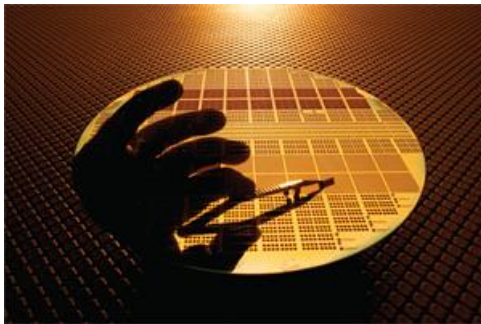
# Fermilab's Technology Strengths

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## Accelerator Technology

Fermilab is the U.S. accelerator laboratory, dedicated to developing particle accelerators for physics research. This technology also has many applications outside of physics, including medical applications like PET scans and commercial applications like curing rubber tires or shrink-wrapping products. Through the Illinois Accelerator Research Center (IARC), Fermilab partners with industry and universities to help create accelerator-based products, applications, companies and jobs



## Detector Technology

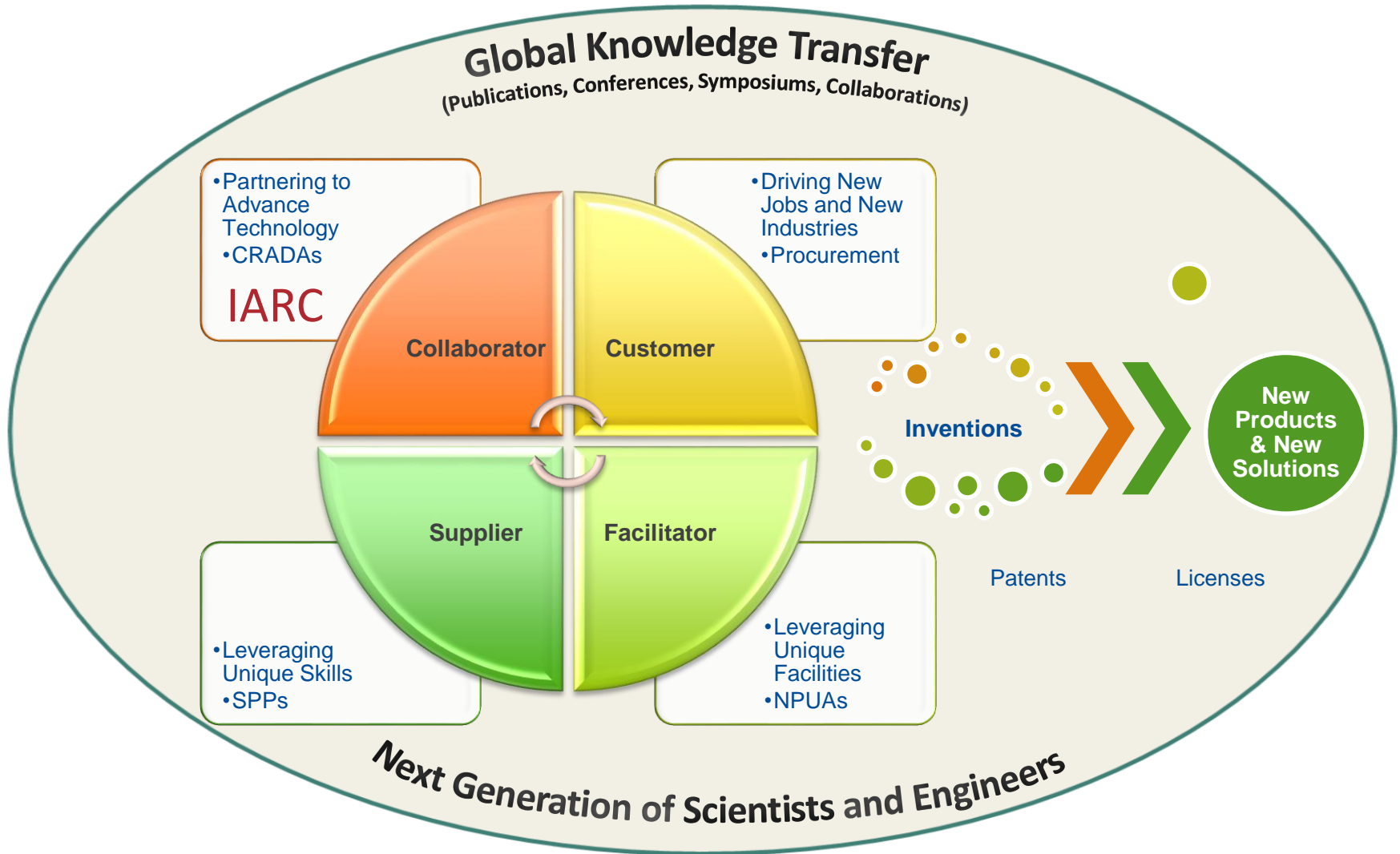
Accelerators can collide particles together, but scientists need detectors to reveal what happens when they do. Fermilab has been at the forefront of detector technology for decades, working most recently on the massive CMS detector at the Large Hadron Collider in Switzerland and the next generation of neutrino detectors for experiments in the U.S. The technologies developed for these physics experiments can be applied to fields as diverse as the financial industry and medical diagnostics.



## Computing Technology

Particle physics experiments produce an enormous amount of data. It takes an extraordinary amount of computing power to sift through that data and find the one signal in a billion that could tell us more about our universe. Fermilab's computing innovations have led to multiple applications, driven by our need to process massive amounts of information, store it and transmit it effectively.

# Fermilab as an engine of innovation



# User Facilities

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- Federally sponsored research facility available for external use to advance scientific or technical knowledge
- Open to all without regard to nationality or institutional affiliation
- Allocation of facility resources determined by merit review
- User fees are not charged for non-proprietary work; results must be published
- Full cost recovery (private funds) required for proprietary work (IP and data)
- Facility provides resources sufficient to conduct work safely and efficiently
- Facility supports a formal user organization
- Facility capability does not compete with an available private sector capability



# User Facilities in Illinois

- Argonne is home to five national user facilities with 5000 users
  - Advanced Photon Source (APS)
  - Argonne Leadership Computing Facility
  - Argonne Tandem Linear Accelerator System
  - ARM Southern Great Plains
  - Center for Nanoscale Materials
- Fermilab is home to one very large national user facility with 2000 users
  - 6800 acre site
  - 16 km of accelerators & beam lines
  - Seven accelerators
  - Two primary proton beams
  - Secondary beams of pions, kaons, muons and neutrinos



*Advanced Photon Source--- Most brilliant source of X-rays in the Western Hemisphere*



*Fermilab Accelerator Complex – Will produce the highest-intensity neutrino beam in the world*

# Partnering Mechanisms

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## Non-Proprietary User Agreement (NPUA)

Researchers can access Fermilab's unique Scientific User Facilities without paying a user fee.

- ✓ Users commit to publishing research results in the open literature
- ✓ Users retain the right to elect title to their own inventions
- ✓ Department of Energy retains unlimited rights in generated data

*Users are responsible for their own experimental costs.*

*Fermilab provides users with resources sufficient to conduct work safely and efficiently.*

*Users may access additional services by establishing User Accounts.*

## Proprietary User Agreement

Fermilab does not currently utilize the Proprietary User Agreement, although it is available at other DOE User Facilities. Under a Proprietary User Agreement:

- Users pay full cost for use of specialized laboratory equipment
- Users retain as proprietary technical data generated (with limited exceptions)
- Users retain rights to any new inventions



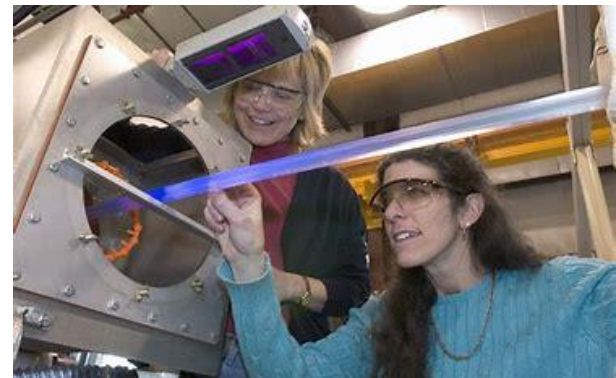
# Partnering Mechanisms

## Strategic Partnership Projects (SPP) Agreements

Formerly referred to as Work for Others (WFO), SPPs provide an excellent way for companies, universities, and other institutions to access the unique facilities, technologies, and expertise available at Fermilab on a project-specific basis.

Under an SPP agreement, a Partner can pay full cost recovery for unique laboratory services and receive these benefits:

- Retain right to elect title to Subject Inventions
- Protect generated data as proprietary
- Opt for a limited government R&D license (certain restrictions apply)



# Partnering Mechanisms

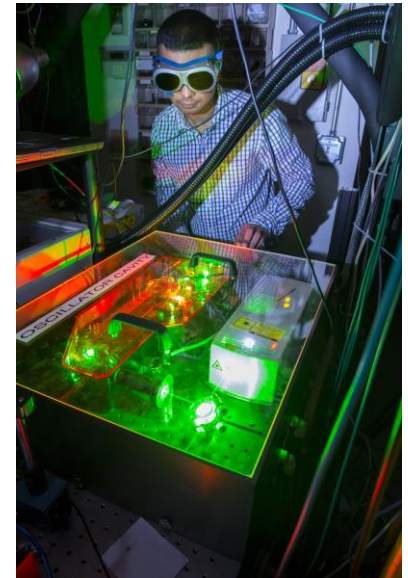
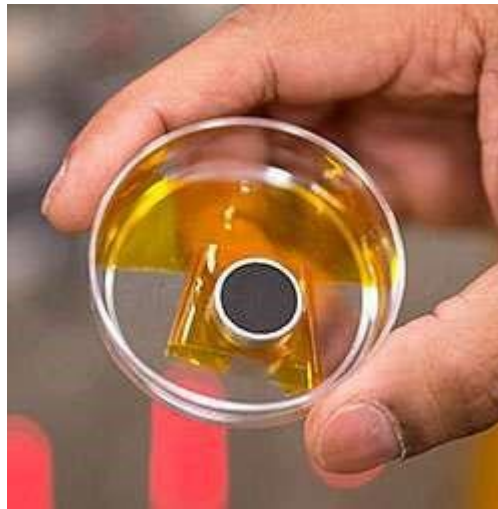
## Cooperative Research and Development Agreement (CRADA)

CRADAs provide a way for DOE laboratories to engage in collaborative research and development agreements with both public and private entities, for the mutual benefit of both parties. Under a CRADA:

- The Lab and the Partner may share costs or the Partner may pay 100% of the costs
- The Lab and the Partner may elect title to their own inventions, share joint inventions
- Partner has the right to negotiate exclusive license to Lab inventions

### Carbon Nanotube Cathode

*RadiaBeam Technologies  
Northern Illinois University  
Fermilab*

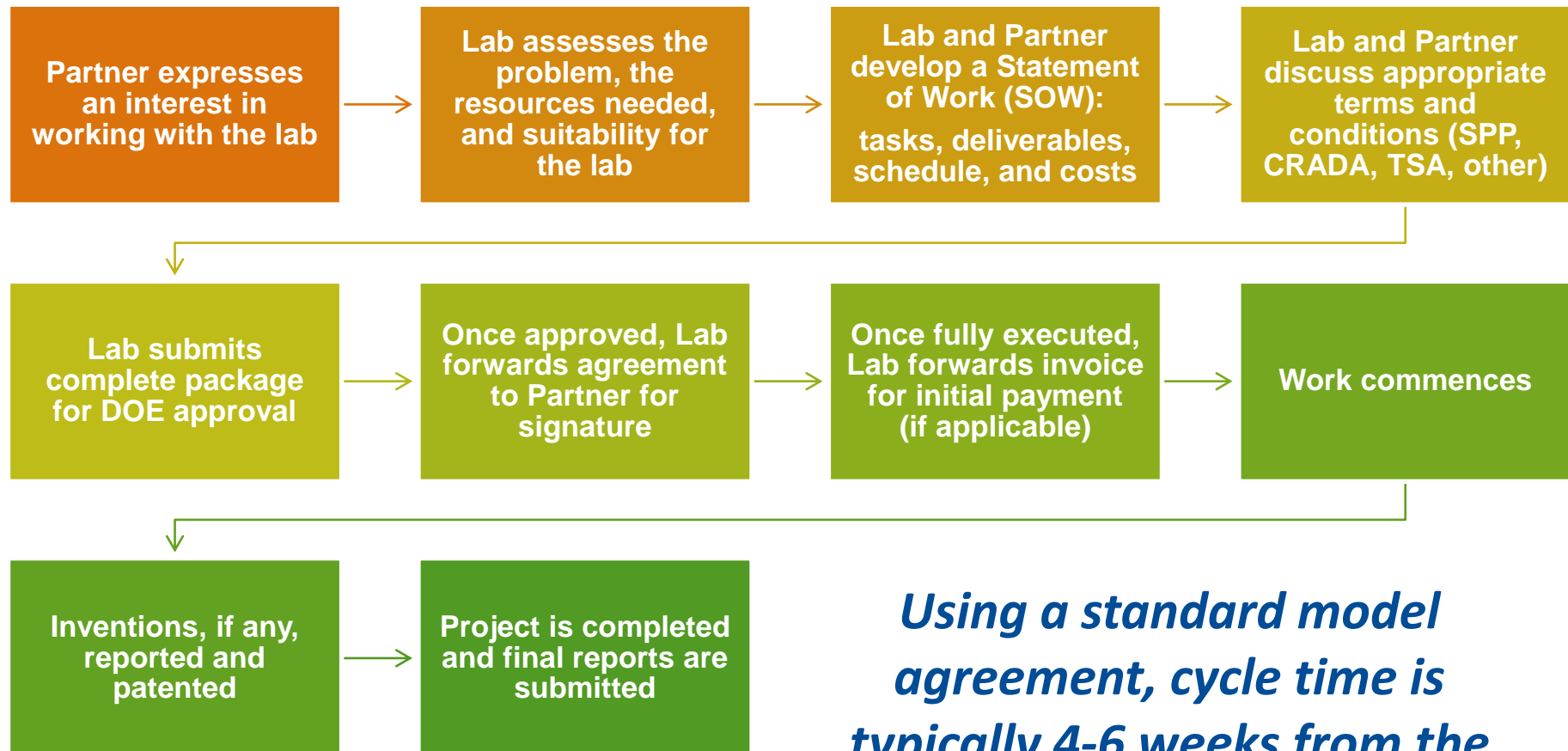


# A Few Rules of Engagement

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- Projects need to be clearly defined and scheduled in advance
- Projects should be consistent with or complement the mission of the laboratory and the Department of Energy (DOE)
- Projects cannot conflict or interfere with regular ongoing programs at the laboratory
- Labs may not directly compete with the domestic private sector
- Labs may not take on work that creates a future “burden” for DOE
- The DOE and the labs do not provide product endorsements

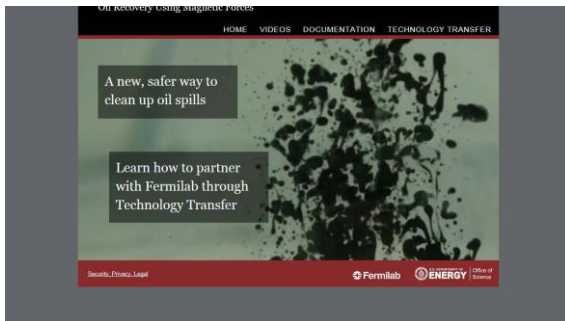
# Typical Process



***Using a standard model agreement, cycle time is typically 4-6 weeks from the time the SOW is drafted.***

# Licensing Technologies

- Fermilab holds a small number of patents and copyrights that are available for licensing to interested parties.
- Such licensing may be non-exclusive or exclusive depending on the interests of the laboratory and the licensing party.

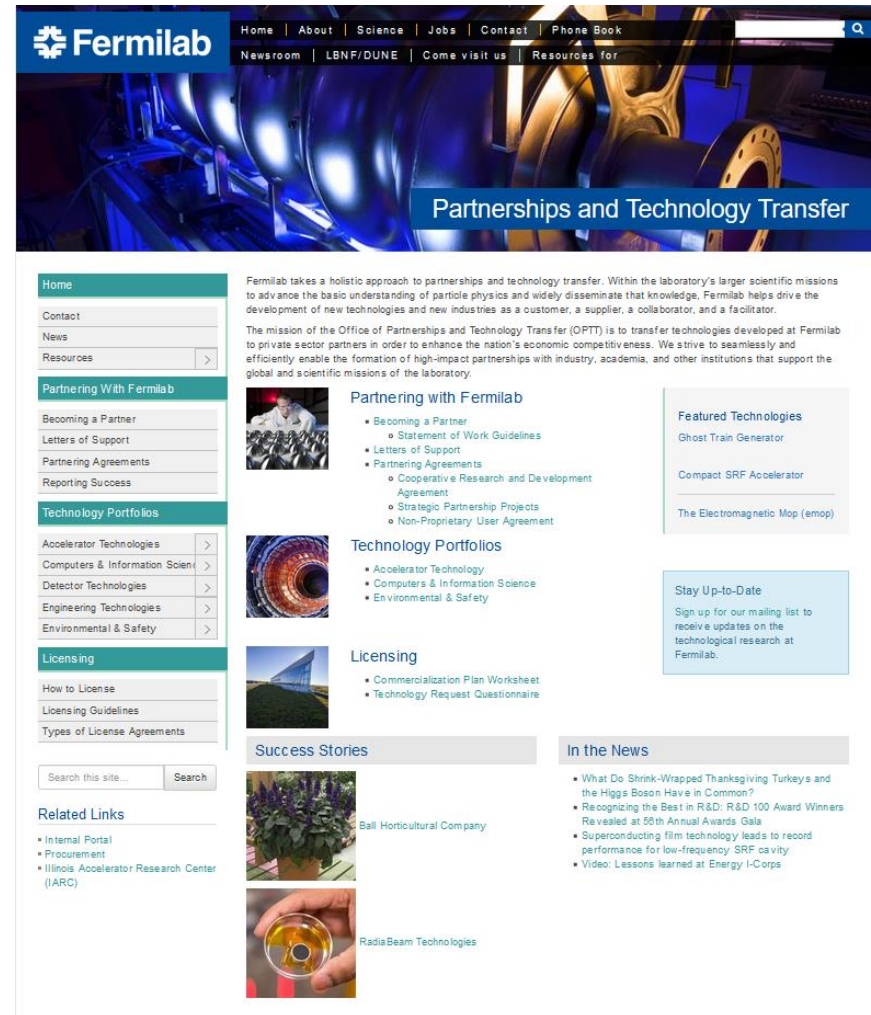






# Intellectual Property

- Patents
  - Methods
    - software algorithms
    - cavity treatment processes
  - Apparatuses
    - cavity couplers
    - radiation detectors
- Copyrights
  - Software
    - MARS15
  - Schematics
- Trademarks (rare)
- [partnerships.fnal.gov](http://partnerships.fnal.gov)





# Licensing

- Terms: Typical of industrial licensing
- Exclusive, partially exclusive, non-exclusive, options
- Field of use and/or territory
- License Fee and/or royalties based on sales
- Diligence requirements
- Background and Subject inventions are available
- Government retains specific rights
- [partnerships.fnal.gov](http://partnerships.fnal.gov)

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## Partnerships and Technology Transfer

Fermilab takes a holistic approach to partnerships and technology transfer. Within the laboratory's larger scientific missions to advance the basic understanding of particle physics and widely disseminate that knowledge, Fermilab helps drive the development of new technologies and new industries as a customer, a supplier, a collaborator, and a facilitator.

The mission of the Office of Partnerships and Technology Transfer (OPTT) is to transfer technologies developed at Fermilab to private sector partners in order to enhance the nation's economic competitiveness. We strive to seamlessly and efficiently enable the formation of high-impact partnerships with industry, academia, and other institutions that support the global and scientific missions of the laboratory.

### Partnering with Fermilab

- Becoming a Partner
  - Statement of Work Guidelines
- Letters of Support
- Partnering Agreements
  - Cooperative Research and Development Agreement
  - Strategic Partnership Projects
  - Non-Proprietary User Agreement

### Technology Portfolios

- Accelerator Technology
- Computers & Information Science
- Environmental & Safety

### Licensing

- Commercialization Plan Worksheet
- Technology Request Questionnaire

### Success Stories

- Ball Horticultural Company
- RadiaBeam Technologies

### In the News

- What Do Shrink-Wrapped Thanksgiving Turkeys and the Higgs Boson Have in Common?
- Recognizing the Best in R&D: R&D 100 Award Winners Revealed at 50th Annual Awards Gala
- Superconducting film technology leads to record performance for low-frequency SRF cavity
- Video: Lessons learned at Energy I-Corps

### Featured Technologies

- Ghost Train Generator
- Compact SRF Accelerator
- The Electromagnetic Mop (emop)

### Stay Up-to-Date

Sign up for our mailing list to receive updates on the technological research at Fermilab.

# Partnerships and Technology Transfer

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## Partnering With Fermilab

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## Technology Portfolios

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## Licensing

## Technology Portfolios

Fermilab holds a number of patents and copyrights that are available for licensing to interested parties. Such licensing may be non-exclusive or exclusive depending on the interests of the laboratory and the licensing party. Here are just a few of Fermilab's newest technologies that are available for license:

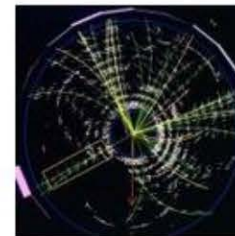
### Accelerator Technologies



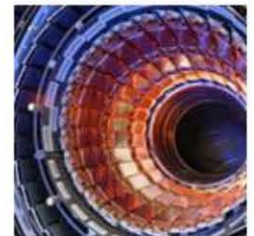
### Computers & Information



### Detector Technologies



### Engineering Technologies



### Environmental & Safety





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## Technology Portfolios

Accelerator Technologies

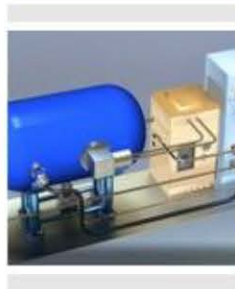


- Compact SRF Accelerator
- Pavement
- Magnetron
- 3D Additive Manufacturing with High Power Electron Gun
- Conduction Cooling
- Low Heat Leak Power Coupler

## Accelerator Technologies

Fermilab is the U.S. accelerator laboratory, dedicated to developing particle accelerators for physics research. This technology also has many applications outside of physics, including medical applications like PET scans and commercial applications like curing rubber tires or shrinkwrapping products. Through the Illinois Accelerator Research Center (IARC), Fermilab partners with industry and universities to help create accelerator-based products, applications, companies and jobs.

### Compact SRF Accelerator



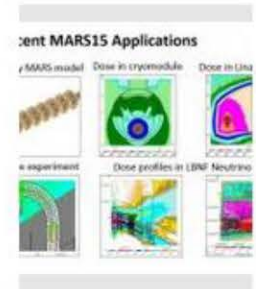
### Pavement



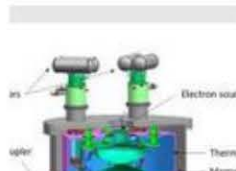
### Magnetron



### MARS15



### 3D Additive Manufacturing



### Conduction Cooling



### Low Heat Leak Coupler



### Fast Faraday Cup



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## Technology Portfolios

[Accelerator Technologies](#) ▾

- **Compact SRF Accelerator**
- Pavement
- Magnetron
- 3D Additive Manufacturing with High Power Electron Gun
- Conduction Cooling
- Low Heat Leak Power Coupler
- Fast Faraday Cup

[Computers & Information Science](#) >

[Detector Technologies](#) >

## Compact SRF Accelerator

### Technology Summary

Accelerators developed for science now are used broadly for industrial, medical, and security applications. Over 30,000 accelerators touch over \$500B/yr in products producing a major impact on our economy, health, and well-being. Industrial accelerators must be cost-effective, simple, versatile, efficient, and robust. Many industrial applications require high average beam power.

### The Invention

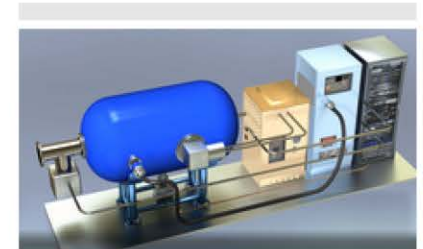
Exploiting recent advances in Superconducting Radio Frequency (SRF) cavities and RF power sources as well as innovative solutions for the SRF gun and cathode system we have developed a design for a compact SRF high-average power electron linac. Capable of >250 kW average power and continuous wave operation, this accelerator produces electron beam energies up to 10 MeV.

### Benefit

Small and light enough to mount on mobile platforms, Fermilab Compact SRF accelerators enable new in-situ environmental remediation, in-situ crosslinking of materials, and security applications. More importantly, this accelerator will be the first of a new class of simple, turn-key SRF accelerators.

### Applications and Industries

- Industry
- Medicine



### Invention Details

**Patent Status:** Multiple patents pending

#### Contact:

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Fermilab, MS 312- PO Box 500

Batavia, IL 60510



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## Technology Portfolios

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## Licensing

[How to License](#)[Licensing Guidelines](#)[Types of License Agreements](#)

## How to License

### Technology Evaluation

The first step in the licensing process is for you to identify technologies that interest you. Please see our [Technology Portfolios](#) to assist you. At any point if you have questions, contact our Licensing Executive, Aaron G. Sauers, CLP, 630-840-4432, [asauers@fnal.gov](mailto:asauers@fnal.gov). He will be available to work with you to manage the development, review and approval processes for your license.

### License Plan

Fermilab requires a [Commercialization Plan Worksheet](#) from prospective licensees before licensing its intellectual property. The plan better enables Fermilab and the prospective licensee to determine the business fit between their interests. The type of license depends on the technology, the nature of the organization seeking a license, and the intended use. In addition, you may be required to complete a [Technology Request Questionnaire](#).

### Term Sheet Negotiation

Once we have reviewed and approved your plan to commercialize the technology, we will begin discussing licensing terms. You are encouraged to review the [DOE Licensing Guide](#) and [sample License Agreements](#) prior to beginning negotiations.

The OPTT office will review a term sheet based on your input in your Commercialization Plan and your business plan. Term sheets include financial terms (e.g up-front execution fee, patent cost reimbursement, minimum royalty payments and running royalty payments). [View an example of a Term Sheet](#).

### License Execution

Once we have agreed upon the license terms, we will draft an executable License Agreement for your review and signature. The license will normally become effective when all parties have signed the License Agreement and any execution fee has been received.

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**ATTENTION:** The U.S. Small Business Administration (SBA) updated its Table of Small Business Size Standards adopting the Office of Management and Budget's 2017 revision of the North American Industry Classification System (NAICS) effective October 1, 2017. The revised NAICS Codes and their corresponding size standards are available for use in FBO. The updated table of size standards is available on SBA's website at [www.sba.gov/size](http://www.sba.gov/size).

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## LAB PARTNERING SERVICE

Connecting investors with experts and resources for energy technologies.

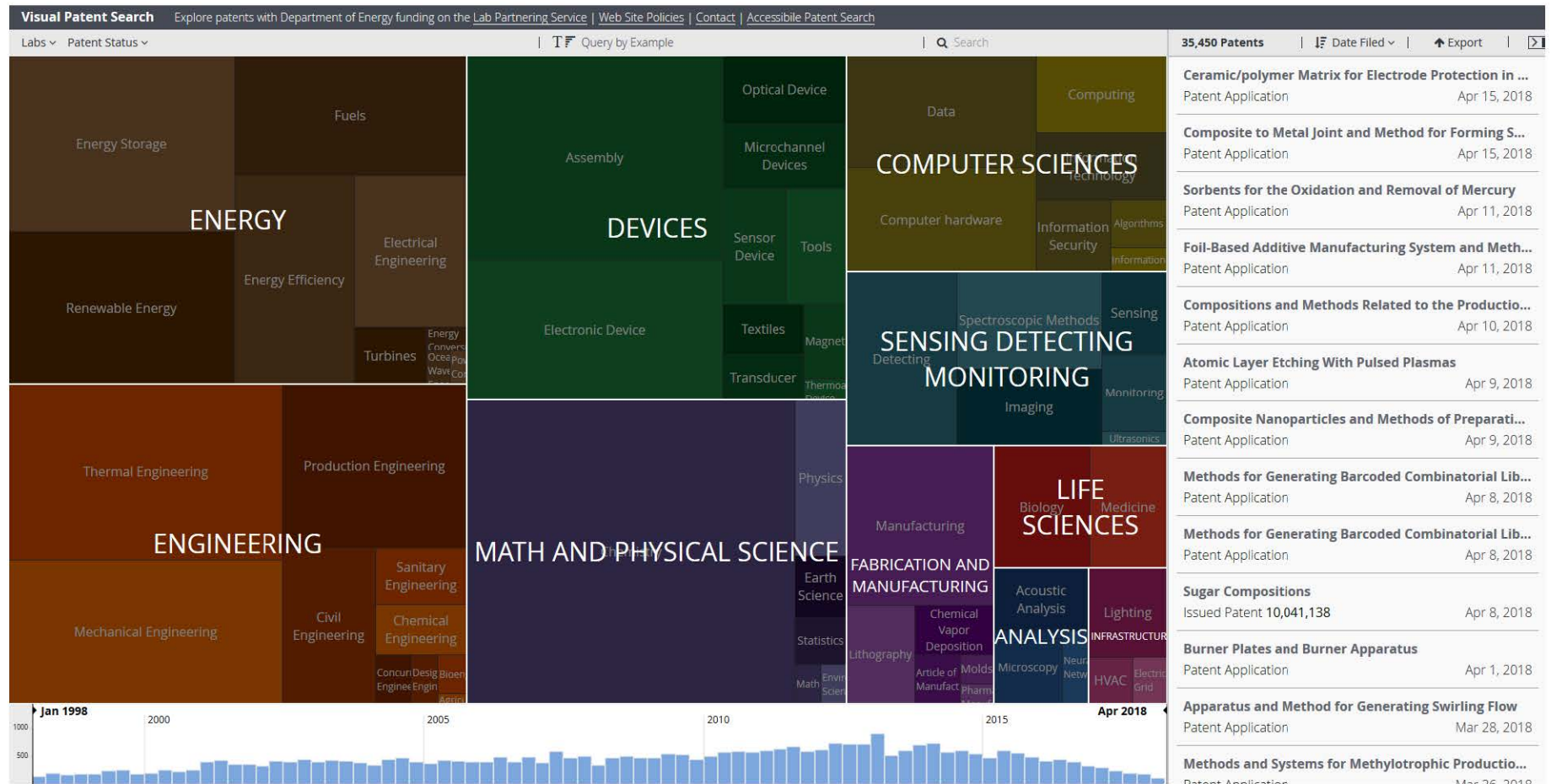
The Lab Partnering Service is a service of the U.S. Department of Energy's (DOE) Energy Investor Center. The service provides investors, and other parties looking to advance energy innovation, a single location to connect with leading DOE national laboratory technical experts to quickly answer innovation questions, as well as discover opportunities for building partnerships. Our goal is to increase access to the information needed to make informed decisions. [Learn more.](#)

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# Office of Partnerships & Technology Transfer (OPTT)

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**Aaron Sauers**

Patent & Licensing Executive  
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asauers@fnal.gov

# Thank you!

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# Technology Transfer Mechanisms at DOE Facilities



Agreement	Use	Funding	Subject Inventions	Generated Data	U.S. Competitiveness	Cost	Highlights
Cooperative Research and Development Agreement (CRADA)	Collaborative research between DOE Labs and public and/or private entities for the mutual benefit of the parties	Private and/or Federal funds	Lab and Participant may elect their own inventions and Participant has right to negotiate exclusive license to Lab inventions	Protected for up to 5 years	Products embodying IP resulting from CRADA shall be manufactured substantially in the U.S.	Lab and Participant may share costs or Participant pays 100% funds-in	<ul style="list-style-type: none"> <li>✓ Collaborative research</li> <li>✓ 5 year data protection</li> <li>✓ Designed for multi-party collaborative research</li> </ul>
Strategic Partnership Project (SPP)	Work for businesses and other non-federal entities using highly specialized or unique DOE facilities, services or technical expertise	Private funds	Sponsor may elect title to Subject Inventions <sup>1</sup>	Protected as Sponsor's proprietary data w/limited exceptions <sup>1,2,3</sup>	U.S. Preference: Sponsor agrees not to grant any party exclusive right to use or sell products embodying Subject Inventions in the U.S. unless products are manufactured substantially in the U.S.	Sponsor pays full cost recovery	<ul style="list-style-type: none"> <li>✓ Sponsor typically retains right to elect title to subject inventions</li> <li>✓ Generated data treated as proprietary</li> <li>✓ Option for limited Gov. R&amp;D license<sup>3</sup></li> </ul>
		Federal funds (e.g. grantee)	Lab may elect title to Subject Inventions of the Lab	Unlimited Gov. rights	U.S. Preference (see above)	Sponsor pays full cost recovery	<ul style="list-style-type: none"> <li>✓ Access to unique facilities and expertise using federal funds</li> </ul>
Agreements for Commercializing Technology (ACT)	Work for businesses and other non-federal entities using highly specialized or unique DOE facilities, services or technical expertise	Private funds	Initial title to the designated IP Lead. (ACT Participant or Lab Contractor)	Protected as proprietary data w/limited exceptions <sup>1,2,3</sup>	U.S. Preference (see above)	Participant pays full cost recovery <u>plus</u> additional negotiated compensation to the Contractor	<ul style="list-style-type: none"> <li>✓ Flexible terms for IP, indemnity, adv. payment</li> <li>✓ Optional performance guarantee</li> <li>✓ Negotiable IP terms</li> <li>✓ Option for limited Gov. R&amp;D license<sup>3</sup></li> </ul>
Proprietary User Agreement	User may access designated facilities to conduct its own proprietary research	Private funds	User may elect title to its Subject Inventions	User may protect as proprietary	n/a	User pays approved user rate	<ul style="list-style-type: none"> <li>✓ Generated data treated as proprietary</li> <li>✓ Merit based access to unique facilities</li> </ul>
Non-Proprietary User Agreement	Non-proprietary research at designated facilities	n/a	Lab and User may elect their own Subject Inventions	Unlimited Gov. Rights	U.S. Preference (see above)	Each party covers own cost	<ul style="list-style-type: none"> <li>✓ Merit based access to unique facilities</li> </ul>

**Certification:** The Lab provided this DOE technology transfer matrix and explained all the options available including the availability of WFO agreements and CRADAs. The Lab has also disclosed in writing the relative cost differential between performing the proposed scope of work under ACT, a non-federal WFO agreement, and a CRADA (including any additional compensation to the Contractor under ACT).

By: \_\_\_\_\_ (Sponsor/Participant/User Name)

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

<sup>1</sup> Certain exceptions or restrictions may apply (e.g. foreign SPP Sponsors may be granted the right to elect title to inventions and receive proprietary data protection but only after the approval of DOE field patent counsel and confirmation from DOE Patent Office). <sup>2</sup> Proprietary data protection may not be available at all facilities. <sup>3</sup> If the limited Gov. R&D license is utilized, data protection will be limited to 5 years.