Technology Transfer at Jefferson Lab

Overview

Tuesday, May 01, 2018
Overview of Jefferson Lab

- An FFRDC created to build and operate the Continuous Electron Beam Accelerator Facility (CEBAF), world-unique user facility for Nuclear Physics

- Conducts basic nuclear physics research: to gain a deeper understanding of the structure of matter
  - Through advances in fundamental research in nuclear physics
  - Through advances in accelerator science and technology

- Facilities include 12 GeV SRF-based electron beam particle accelerator, 4 experimental halls and FEL*

- In operation since 1995

- Managed for DOE by Jefferson Science Associates, LLC (JSA)

Jefferson Lab by the numbers:
- ~725 employees
- FY2016 Costs: $184.1M
- FY2017 Costs: $162.1M
- 169 acre site
- 72 buildings/trailers; 880k SF
- 1,530 Active Users
- 26 Joint faculty
- 600+ PhDs granted to-date (200 in progress)
Impact

• Tell the numbers:
  • Inventions
  • Commercialization / TT Agreements

• Tell the reach:
  • FEL
  • Start-ups
  • Large and small business

The Story

• Rally the stakeholder: inventors, licensees, SB, BB, public
• Social media
• Workshops
• Open houses
Technology Transfer & Commercialization

JLab has generated to-date:

- 53 CRADAs
- 34 SPPs (work for others)
- 435 Invention Disclosures
- 151 Patents
- 24 (14) Licenses
  - to 14 (9) companies
- 58 SBIR/STTR support letters (FY2016)
- Entrepreneurial Leave (3)

Industries that have licensed JLab Technology:

- Nuclear medicine imaging (small and large businesses)
- High vacuum technology
- Gas technology
- Specialty technologies for research
- Safety industry
- Academic publisher
Jefferson Lab's cryogenics group helped NASA scientists design and commission a cryogenics plant to cool the Webb telescope’s components to temperatures its instruments will experience in space, to within 30 degrees Fahrenheit of absolute zero. Ganni cycle a licensed patent

- **tripled the capacity** of the refrigeration system.
- cut the **liquid nitrogen consumption in half**
- helium refrigerator system now **maintains peak efficiency**
- **46%** energy savings

Ganni cycle technology was also employed to save money and increase efficiency at DOE national labs, resulting in savings of:
- $1000 a day at Jefferson Lab
- $50,000/week at RHIC at Brookhaven
Detector Spin-Off Advances Patient Care

Nuclear physics detector technology developed to explore the structure of matter at Jefferson Lab leads to new and advanced tools for better patient care.

Tools for nuclear physics research: photomultiplier tubes, silicon photo multipliers, scintillator and detector electronics

Tools for better patient care: Compact gamma camera for breast cancer detection

Dilon 6800 Gamma Camera
Dilon Technologies, Inc.
Newport News, Virginia
~30 employees, ~200 cameras worldwide
BNNT is lightweight, very strong, electrically insulating, thermally conductive, likely not cytotoxic

- Maintains strength to > 900°C vs. carbon at 400°C
- Fibril; few defects, NO metal catalyst impurities vs. carbon (not fibril)
- Possible applications: biomedical - scaffolding for living tissue; chemical - aircraft, aerospace, jet engine parts, fire retardant cabling, electrical insulation, athletic equipment and more.
- BNNT Intellectual Property (IP) developed from research conducted at JLab with NASA Langley Research Center (LaRC) and National Institute of Aerospace (NIA).
- Adopted DOE-approved JLab Entrepreneurial Leave Program for JSA/JLab employees to advance technology to commercialization.
- BNNT, LLC factory producing BNNT now in Newport News, Virginia. [www.bnnt.com](http://www.bnnt.com)
- CRADA with JLab
“Beside the comfort of knowledge, every science is auxiliary to every other.”

Thomas Jefferson

August 26, 1786