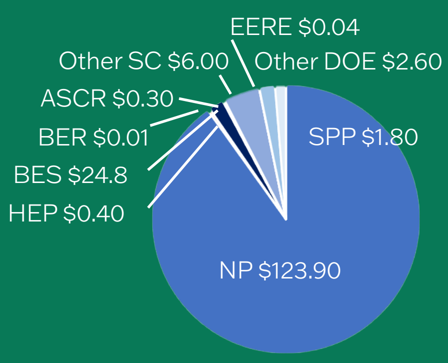
AT A GLANCE: THOMAS JEFFERSON NATIONAL ACCELERATOR FACILITY

Jefferson Lab

Thomas Jefferson National Accelerator Facility (TJNAF) is the preeminent laboratory in precision studies of the fundamental nature of confined states of quarks and gluons, including the protons and neutrons that make up the mass of the visible universe. Central to that is the Continuous Electron Beam Accelerator Facility (CEBAF), the first large-scale application of superconducting radiofrequency technology. Tools, techniques, and technologies developed in pursuit of the laboratory's scientific mission enable an ever-increasing array of applications—from detectors for medical and biological use, to advanced particle accelerators for environmental remediation.

FUNDING BY SOURCE

FY 2019 (Costs in $M)
Total Laboratory Operating Costs: $159.9
DOE/NNSA Costs: $158.1
SPP (Non-DOE/Non-DHS) Costs: $1.8
SPP as % of Total Laboratory Operating Costs: 1.1%
DHS Costs: $0.0



HUMAN CAPITAL

693 FTE employees
28 joint faculty
33 postdoctoral researchers
20 undergraduate students
42 graduate students
1,630 facility users
1,491 visiting scientists

CORE CAPABILITIES

Accelerator S&T
Large-Scale User Facilities/Advanced Instrumentation
Nuclear Physics

MISSION UNIQUE FACILITIES

Continuous Electron Beam Accelerator Facility

FACTS

Location: Newport News, Virginia
Type: Program-dedicated, Single-purpose Laboratory
Contractor: Jefferson Science Associates, LLC
Site Office: Thomas Jefferson Site Office
Website: jlab.org

PHYSICAL ASSETS

169 acres and 69 buildings
883,000 GSF in buildings
Replacement plant value: $480M
0 GSF in excess facilities
66,289 GSF in leased facilities

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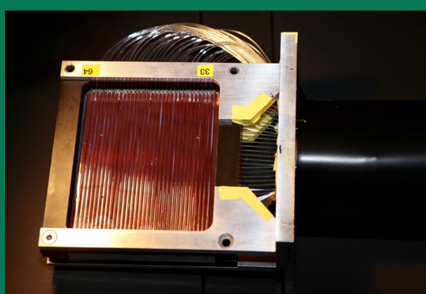
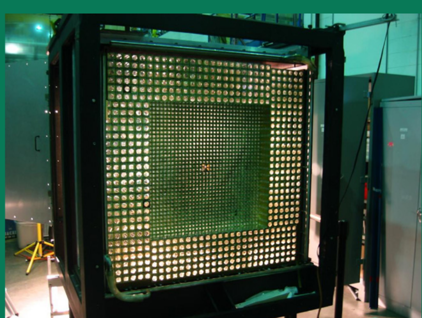
ACCOMPLISHMENTS

Unique Facility: CEBAF - The centerpiece of TJNAF's research program is the CEBAF—an electron accelerator based on SRF technology—which produces a stream of charged electrons that scientists use to probe the nucleus of the atom. As the first large-scale application of SRF technology in the world, CEBAF is the world's most advanced particle accelerator for investigating the quark structure of the atom's nucleus. The CEBAF's energy has been upgraded from 6 GeV to 12 GeV to expand the scientific reach of Jefferson Lab in support of the highest-energy experiments. The laboratory is a world leader in CEBAF-enabled SRF accelerator technology—and continues to advance accelerator technology as well as expand its applications beyond scientific research.



Tech-to-Market Highlight: Scintillating Medical Imaging - In 2018, a new cancer treatment monitoring system, built by Radiadyne with detector technologies developed for Jefferson Lab's nuclear physics (NP) program, won an R&D 100 Award and the Medical Device Engineering Breakthrough Award. The OARtrac© monitoring system allows clinicians to monitor and adjust radiation delivered to patients through a novel application of scintillating fiber material used in NP to identify experiment-produced particles. The FDA cleared the system to use patient-specific Plastic Scintillating Detector sensors utilized during cancer treatments. Jefferson Lab's Cynthia Keppel, staff scientist and Halls A and C leader, collaborated with Radiadyne early in developing this technology—nearly a decade in moving from laboratory to market. This is the latest in a number of medical imaging applications based on Jefferson Lab particle detection technologies developed into successful products that are impacting cancer detection and treatment.



Research Highlight: The Size of the Proton - All ordinary matter, from the sun that powers our solar system to the Earth we inhabit, is built on protons inside the atom's nucleus. In the early 2010s, new experiments measuring the size of the well-studied proton, in terms of its charge radius, yielded a smaller size than expected. Nuclear physicists carefully re-measured this basic quantity using a new experimental technique and the high-quality electron beam at TJNAF, finding an even smaller proton size of approximately .83 femtometers.