# Acronym and Vocabulary List

**Owner: Jefferson Lab Communications Office**
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Jefferson Lab

# Introduction

Love them or not, acronyms and abbreviations are an indispensable part of many jobs here at Jefferson Lab and within the Department of Energy national laboratory complex. To help you get acquainted with this alphabet soup, we've compiled a handy reference list touching many different areas of the lab. Each item is clickable, with the link taking you to a general definition of the spelled-out term.

Beyond the acronyms (and initialisms, but we don't need to get into that), we've defined a few nuclear physics words and phrases you may have heard during your time here. Some more-familiar items are also included, with guidance on Jefferson Lab's editorial style.

But this catalog is by no means exhaustive. For example, the lab's Environment, Safety and Health Division maintains its own safety-specific glossary and acronym list, which can be found here. Some other offices also have their own department-centered glossaries.

Meanwhile, this guide is a broad brush. If you have an acronym or term you think should be included, please email the Jefferson Lab Communications Office at jlab_communications-office@jlab.org.

**Disclaimer:** The following acronyms and definitions are for reference purposes and are only intended to convey the nature of the topic. Also, some acronyms may have more than one meaning, depending on the context. If you spot an error, please send it to Matt Cahill for correction (cahill@jlab.org).

Enjoy!

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# Acronyms & Abbreviations

## A

**ADC**
analog-to-digital converter

**AHJ**
authority having jurisdiction

**ALARA**
as low as reasonably achievable

**ANL**
Argonne National Laboratory

**AOD**
Accelerator Operations Directives

**APS**
Advanced Photon Source

**ARC**
Applied Research Center

**ARDAP**
Accelerator R&D and Production

**ARW**
Accelerator Reliability Workshop

**ASCR**
Advanced Scientific Computing Research

**ASE**
Accelerator Safety Envelope

**ASME**
American Society of Mechanical Engineers

**ATLAS**
Argonne Tandem Linac Accelerator System

**AWP**
Annual Work Plan

**AWS**
Alternate Work Schedule
or:
Amazon Web Services

## B

**BEAMS**
Becoming Enthusiastic About Math and Science

**BNL**
Brookhaven National Laboratory

## C

**CAD**
computer-aided design

**CAS**
Contractor Assurance System

**CASA**
Center for Advanced Studies of Accelerators

**CATS**
Corrective Actions Tracking System

**CCI**
Community College Internships

**CDR**
conceptual design report

**CEBAF**
Continuous Electron Beam Accelerator Facility

**CED**
CEBAF Element Database

**CERN**
Conseil Européen pour la Recherche Nucléaire (aka The European Organization for Nuclear Research)

**CFR**
Code of Federal Regulations

**CHL**
Central Helium Liquefier

**CIS**
Center for Injectors and Sources

**CLAS**
CEBAF Large Acceptance Spectrometer

**CLAS12**
CEBAF Large Acceptance Spectrometer for 12 GeV

**CM**
cryomodule

**CMTF**
Cryomodule Test Facility

**COB**
close of business

**CRADA**
Cooperative Research and Development Agreement

**CREX**
Calcium Radius Experiment

**CST**
Computational Sciences and Technology

**CSU**
Cold Start Up

**CTF**
Cryogenic Test Facility

**CW**
continuous wave

## D

**DAQ**
data acquisition

**DEAR**
Department of Energy Acquisition Regulation

**DIS**
deep inelastic scattering

**DVCS | DDVCS**
deeply virtual Compton scattering | double deeply virtual Compton scattering

**DVMP**
deeply virtual meson production

**DOE**
U.S. Department of Energy

**DSC**
Director's Safety Council

**DSO**
division safety officer

## E

**EAP**
Employee Assistance Program

**ECP**
Employee Concerns Program
or:
Exascale Computing Project

**EEL**

Experimental Equipment Lab

**EIC**
Electron-Ion Collider

**EMC**
European Muon Collaboration

**EMS**
Environmental Management System

**ePAS**
Electronic Permit Administration System

**EPEAT**
Electronic Product Environmental Assessment Tool

**ERL**
energy-recovering linac

**ES&H**
Environment, Safety & Health

**ESAF**
Experimental Safety Assessment Form

**ESR**
End Station Refrigerator

**ESS**
Employee Self-Service System: aka, Costpoint

## F

**FEL**
free-electron laser

**FEL-ODS**
Free-Electron Laser Operations Directives Supplement

**FM&L**
Facilities Management & Logistics

**FPGA**
field-programmable gate array

**FRIB**
Facility for Rare Isotope Beams

**FOA**
funding opportunity announcement

**FSAD**
Final Safety Assessment Document

**FWP**
field work proposal

## G

**GEM**
gas electron multiplier (detector)

**GeV**
giga-electron volt

**GIDEP**
Government-Industry Data Exchange Program

**GlueX**
Gluonic Excitations Experiment

**GNN**
graph neural network

**GPD**
generalized patron distribution

**GSA**
U.S. General Services Administration

**GSS**
Government Scientific Source

## H

**HPC**
high-performance computing

**HPDF**
High Performance Data Facility

## I

**ICP**
Individual Career Profile

**IH**
industrial hygiene

**INL**
Idaho National Laboratory

**ISM**
Integrated Safety Management

**ISMS**
Integrated Safety Management System

**IPCC**
Intel Parallel Computing Center

**IRI**
Integrated Research Infrastructure

## J

**JAG**
Jefferson Lab Activities Group

**JLDC**
Jefferson Lab Data Center

**JRT**
Job Related Training

**JSA**
Jefferson Science Associates, LLC

**JSAT**
Jefferson Lab Science Activities for Teachers

**JTA**
Job Task Analysis

## K

## L

**LBNL**
Lawrence Berkeley National Laboratory

**LCLS | LCLS-II | LCLS-II-HE**
Linac Coherent Light Source

**LCW**
low-conductivity water

**LDRD**
Laboratory Directed Research and Development program

**LERF**
Low Energy Recirculatory Facility

**LHC**
Large Hadron Collider

**LINAC**
linear accelerator

**LLRF**
low-level radiofrequency

**LMS**
Learning Management System

**LOTO**
lockout/tagout

**LRP**
Long Range Plan

**LSOP**
Laser Standard Operating Procedure

**LWOP**
Leave Without Pay

## M

**M&O**
Management & Operations

**MCC**
Machine Control Center

**MOLLER**
Measurement of a Lepton-Lepton Electroweak Reaction Experiment

**Mya**
MySQL Archiver

## N

**NEO**
New Employee Orientation

**NFPA**
National Fire Protection Association

**NLO**
next-to-leading order (in perturbation theory)

**NNSA**
National Nuclear Security Administration

**NP**
nuclear physics

**NPS**
Neutral Particle Spectrometer (in Hall C)

**NREL**
National Renewable Energy Laboratory

**NSAC**
Nuclear Science Advisory Committee

**NSF**
National Science Foundation

## O

**ODH**
oxygen deficiency hazard

**OFI**
opportunity for improvement

**OIG**
Office of the Inspector General

**OM**
Occupational Medicine

**ORFP**
Optics Restoration and Finalization Plan

**ORNL**
Oak Ridge National Laboratory

**ORPS**
Occurrence Reporting & Processing System

**OTT**
Office of Technology Transitions

## P

**PA**
Performance Assurance
or:
Public Affairs

**PAC**
Program Advisory Committee

**PAE**
Pacific Architects and Engineers

**PDF**
parton distribution function/parton density

**PEMP**
(Contractor) Performance Evaluation and Measurement Plan

**PERT**
Procurement Evaluation and Re-Engineering Team

**PMT**
photomultiplier tube

**PNNL**
Pacific Northwest National Laboratory

**PPE**
personal protective equipment

**PPPL**
Princeton Plasma Physics Laboratory

**PSSs**
Pathway Summer Schools

**PV**
process variable

**PVDIS**
parity-violating deep inelastic scattering

**PVES**
parity-violating electron scattering

## Q

**QA**
Quality Assurance

**QCD**
quantum chromodynamics

## R

**R&D**
research and development

**RF**
radiofrequency

**RHIC**
Relativistic Heavy Ion Collider

**RPP**
Radiation Protection Program

**RSAD**
Radiation Safety Assessment Document

**RTPO**
Research and Technology Partnerships Office

## S

**S/CI**
suspect/counterfeit items

**S&T**
Science & Technology

**SAM**
Scheduled Accelerator Maintenance
(previously SAD, for Scheduled Accelerator Down)

**SBIR**
Small Business Innovation Research

**SC**
Shorthand for the DOE's Office of Science

**SCGSR**
Office of Science Graduate Student Research

**SciDAC**
Scientific Discovery through Advanced Computing

**SIDIS**
semi-inclusive deep inelastic scattering

**SLAC**
Stanford Linear Accelerator Center

**SME**
subject matter expert

**SNL**
Sandia National Laboratories

**SoLID**
Solenoidal Large Intensity Device

**SOMD**
Site Occupational Medical Director

**SOP**
standard operating procedure

**SPF**
spin-polarized fusion

**SQL**
structured query language

**SRF**
superconducting radiofrequency

**SRL**
Skill Requirements List
or
Shipping & Receiving Log

**SSC**
Support Service Center (formerly the VARC building)

**SSL**
self-supervised learning

**STEM**
Science, Technology, Engineering, and Mathematics

**STTR**
Small Business Technology Transfer

**SULI**
Science Undergraduate Laboratory Internships

**SURA**
Southeastern Universities Research Association

**SWISS**
Site-Wide Information System Screens

## T

**TAC**
technical advisory committee (for the PAC)

**TCS**
timelike Compton scattering

**TED**
Technology and Engineering Development building

**TEDF**
Technology and Engineering Development Facility Project

**TJNAF**
Thomas Jefferson National Accelerator Facility (Jefferson Lab)

**TJSO**
Thomas Jefferson Site Office

**TFF**
transitional form factor

**TIAA**
Teachers Insurance and Annuity Association of America

**TMD**
transverse-momentum dependent PDF or fragmentation function

**TNs**
technical notes

## U

**UFV&A**
Unclassified Foreign Visits and Assignments

**UITF**
Upgraded Injector Test Facility

**UOM**
units of measurement

## V

**VARC**
Virginia Associated Research Campus

**VFP**
Visiting Faculty Program

## W

**WBS/AWP**
Work Breakdown Structure/Annual Work Plan

**WDTS**
Workforce Development for Teachers and Scientists

**WSHP**
Worker Safety and Health Program

## X

**XFEL**
X-ray free-electron laser

## Y

## Z

# Glossary

## A

**absolute zero**
Defined by scientists as the complete absence of heat. Measured at -273.2° Celsius, 0° Kelvin and -459.7° Fahrenheit. At absolute zero, particles stop moving and thus do not generate heat. Absolute zero has never been achieved, though scientists have come within millionths of a degree.

**accelerator**
A machine that pushes or accelerates particles such as electrons (or protons or neutrons) to high kinetic energies near the speed of light. These particles are used to explore nuclear or sub-nuclear phenomena. Also known as an atom smasher in colloquial parlance.

**Accelerator Operations Directives**
A comprehensive, detailed document that describes how business is conducted in the MCC Control Room. The major sections of the document are Program Control, Accelerator Operations, and Maintenance and Tracking. The document defines how we do business at the lab and is an invaluable source of information pertaining to accelerator operations.

**Accelerator R&D and Production**
This DOE program's mission is to support U.S. leadership in physical sciences R&D by coordinating and making accelerator R&D and production investments that are aimed at addressing Accelerator Science and Technology needs and strengthening domestic production capabilities.

**Accelerator Reliability Workshop**
ARWs provide a venue for individuals from accelerator communities worldwide to meet and share their experiences in operating reliable facilities.

**Accelerator Safety Envelope**
The Accelerator Safety Envelope refers to the bounding conditions and limitations within which the lab must operate the accelerator to assure the safety of workers, the environment and the public. The ASE not only informs the procedures that operators follow to run the machine but also serves as an input against which the halls and the LERF conduct experimental reviews. See CEBAF.

**Advanced Photon Source**
A high-energy X-ray light source facility located at Argonne National Laboratory.

**Advanced Scientific Computing Research**
A DOE program to discover, develop, and deploy computational and networking capability to analyze, model, simulate and predict complex phenomena important to the Department of Energy and the advancement of science. HPDF will be an ASCR facility.

**Alternate Work Schedule**
An approved, recurring, static work

schedule other than 8 hours/day, 5 days/week.

**American Society of Mechanical Engineers**
Founded in 1980, the ASME is a professional association that develops engineering codes standards for mechanical devices while promoting, in its own words, "the art, science & practice of multidisciplinary engineering and allied sciences around the globe." Many ASME standards are cited by government agencies as tools to meet their regulatory objectives.

**Amazon Web Services**
A cloud computing service owned by Amazon.

**analog-to-digital converter**
An ADC converts continuous analog signals into proportional, discrete digital values. These converters play a fundamental role in accelerator operations and are used for various functions such as beam diagnostics, data acquisition, control and feedback systems, and beamline instrumentation.

**Annual Work Planning**
Helps guide the lab and its management as a world-leading research institution for exploring the nature of matter in depth, providing unprecedented insight into the details of the particles and forces that build our visible universe inside the nucleus of the atom.

**Applied Research Center**
Built in 1996 by the City of Newport News and acquired by the U.S. Department of Energy in 2023, the Applied Research Center (ARC) provides housing, laboratories, office space, advanced computer facilities and a technical library for scientists and inventors from CEBAF and neighboring universities. The building is labeled ARC on the Jefferson Lab Campus Site Map.

**arc**
A magnetically guided turn in the racetrack-shaped CEBAF – as opposed to the linear accelerators or linacs.

**Argonne National Laboratory**
A DOE Office of Science research facility in Lemont, Illinois. It is home to the Argonne Tandem Linac Accelerator System (ATLAS).

**Argonne Tandem Linac Accelerator System**
ATLAS is a superconducting linear accelerator at Argonne National Laboratory for studies of nuclear structure and nuclear astrophysics in the vicinity of the Coulomb barrier.

**as low as reasonably achievable**
A philosophical concept related to radiation exposure. It is an integral part of all activities that involve the use or production of radiation or radioactive materials, includes the design, construction, and operation of existing and future facilities here at Jefferson Lab.

**artificial intelligence**
The theory and development of computer systems able to perform tasks that normally require human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.

**atom**
A unit of matter consisting of a nucleus orbited by one or more negatively charged electrons.

**authority having jurisdiction**
An organization, office or person who enforces codes and standards. An AHJ may also approve equipment, materials, installations or procedures.

## B

**baryon**
A composite subatomic particle with half-integer spin (i.e., a fermion) built from quarks and gluons; the particles making up atomic nuclei — protons and neutrons — are the most familiar baryons.

**beam**
Shorthand for the particle beam, whether electron or photon, that the CEBAF puts on targets (i.e., into the experimental halls). The phrase "taking beam" refers to the experiment halls' activity when the accelerator is operating.

Related terms:

**beam permit** refers to the safety-system for the CEBAF that allows beam to be generated.
**beam dump** refers to a radiologically protected location to terminate the beam.
**beam-position monitor** refers to a linear accelerator device that monitors the position of the beam.
**Beam Switchyard** refers to the place in the accelerator enclosure (i.e., tunnel) where the accelerator splits to send beam to Halls A, B, and C.

**Becoming Enthusiastic About Math and Science**
Jefferson Lab's long-running math and science enrichment program for students.

**boson**
A quantum mechanical particle with integer spin (i.e., 0, 1, 2); the force carriers of the Standard Model, including photons and gluons, are all bosons, as is the Higgs; pions and other mesons are bosons, as are nuclei built from even numbers of nucleons, such as the deuteron and helium-4.

**bottom quark**
One of the six different masses or "flavors" of quark, along with top, down, up, strange, and charm.

**Brookhaven National Laboratory**
A DOE Office of Science research facility in Upton, New York. It is

home to the Relativistic Heavy Ion Collider (RHIC).

## C

### Calcium Radius Experiment
The Calcium Radius Experiment CREX ran in 2019-2020 in Hall A at Jefferson Lab. The experiment measured the parity-violating asymmetry in the elastic scattering of longitudinally polarized electrons from a 48Ca nucleus at an energy of 2.18 GeV and a scattering angle of 4.7 degrees.

### calorimeter
A detector that measures the total energy of a particle. Some calorimeters, like the Forward Calorimeter in Hall D, use lead glass blocks or other types of crystals made of high-density materials. Others, like the Barrel Calorimeter in Hall D, use a lead/scintillating fiber sandwich-style arrangement in which the scintillator is the active part of the detector.

### cavity
A fabricated device at the “heart” of the accelerator that carries the superconducting radiofrequency fields needed to accelerate the particle beam. At Jefferson Lab, such cavities are typically made of niobium, a silvery metal that becomes superconducting at temperatures near absolute zero, thereby enabling it to harness and sustain the aforementioned high-energy fields. CEBAF has 418 superconducting radiofrequency (SRF) cavities.

### CEBAF Element Database
The CEBAF Element Database (CED) captures information from magnets, SRF cavities, diagnostics, vacuum systems, safety systems and machine models.

### CEBAF Large Acceptance Spectrometer
The CEBAF Large Acceptance Spectrometer (CLAS) operated in Hall B from 1997 to 2012, permitting researchers to study and measure photo- and electro-induced nuclear and hadronic reactions. It could detect both neutral and charged particles from various angles.

### CEBAF Large Acceptance Spectrometer 12
The CEBAF Large Acceptance Spectrometer for 12 GeV (CLAS12) was completed in Hall B in 2017 as part of the Jefferson Lab 12 GeV upgrade project. The detector is similar to the CLAS detector that it replaces, but was built to study higher-energy reactions at higher event rates compared to the original CLAS detector.

### Center for Advanced Studies of Accelerators
The Center for Advanced Studies of Accelerators (CASA) pursues a broad program of theoretical and experimental research in accelerator and beam physics. The organization's primary mission is to generate, to investigate deeply, and to distribute forefront knowledge about advanced accelerator and beam physics, especially that knowledge generated as

a result of work with Jefferson Lab accelerators.

**Center for Injectors and Sources**
The Center for Injectors and Sources (CIS) builds and operates high-performance beam sources for injectors and accelerators. Its primary mission is the operation of a polarized electron source for the 12 GeV CEBAF. The CIS specializes in DC high-voltage photoguns operating at extremely low pressures, using high power lasers to reliably producing intense polarized or unpolarized electron beams from photocathodes, and developing instrumentation and diagnostics to characterize these beams.

**Central Helium Liquefier**
Also known as Bldg. 8, it is the cryogenics plant located above ground in the center of the accelerator site, that stores and pipes liquid helium down at 2 degrees Kelvin into the accelerator's cryomodules. The CHL building houses two separate large cryogenic plants, CHL1 and CHL2. See cryogenics. You can find it on Jefferson Lab's Campus Site Map here.

**close of business**
The end of the business day.

**Code of Federal Regulations**
The CFR is the official legal codification of the general and permanent rules published in the Federal Register by the departments and agencies of the U.S. government.

**cold box**
See Kelvin.

**Cold Start Up**
A Cold Start Up follows a Scheduled Accelerator Down and involves a long startup process that steps the beam through the accelerator, adjusting hardware along the way until everything is back to normal running conditions. A CSU establishes the base setup of the beam, encompassing only the first pass around the accelerator.

This contrasts with a regular startup where the accelerator may shut down for a minor maintenance shift or for a holiday period of a few days (up to a week and a half for the Christmas Shutdown).

**collider**
A particle accelerator in which two beams of particles moving in opposite directions are made to collide at a chosen point. Examples include CERN's Large Hadron Collider and the future Electron-Ion Collider at Brookhaven National Lab.

**Community College Internships**
An internship program offered by DOE's Workforce Development for Teachers and Scientists program.

**Compton scattering**
A process in which a real photon scatters elastically off a target such as a nucleon, where the photon serves the role of an external electromagnetic field; such a process can be used to probe the polarizabilities of the nucleon.

**Computational Sciences and Technology**
A Jefferson Lab division that focuses on scientific computing and information technology.

**computer-aided design**
A design, often graphic, that is created, modified, analyzed or optimized using computers.

**conceptual design report**
A document that outlines the preliminary design and concept for a project.

**confinement**
In particle physics, confinement is property of quantum chromodynamics whereby isolated quarks cannot exist, nor can any other isolated particles that carry color charges, such as gluons. The term can also refer to a quark never being detected outside of a macroscopic particle, such as a proton – hence the full term "quark confinement." In plasma physics, confinement refers to the restriction of a hot plasma to a given volume as long as possible, by such means as magnetic mirrors and pinch effect.

**Congress**
Capitalize U.S. Congress and Congress when referring to the U.S. Senate and House of Representatives. However, lowercase congressional, congresswoman, etc. – unless paired with a proper name.

**continuous beam**
A beam of particles that travels in a steady stream, as opposed to large pulses separated by significant periods of time. A constant stream of electrons ensures a steady flow of distinct nuclear collisions, enabling scientists to effectively record each collision.

**Continuous Electron Beam Accelerator Facility**
This term refers to the particle accelerator and experimental halls at Jefferson Lab.

**continuous wave**
An electromagnetic wave of constant amplitude and frequency. The CEBAF is a CW recirculating linac.

**Contractor Assurance System**
The set of processes that allow Jefferson Lab management to provide reasonable assurance that our systems are effective and efficient in accomplishing objectives.

**Cooperative Research and Development Agreement**
An agreement between a government agency and another government agency, a private company, nonprofit or university to work together on research and development.

**Corrective Actions Tracking System**
Jefferson Lab's CATS is used to monitor the progress to completion of Issues and related Corrective Actions identified by Events.

**Counting House**

Also known as Building 97, it's the "operations center" for Experimental Halls A, B and C. Its roles include collecting the computer data from the halls' experiments, central to which is the literal counting of subatomic events of beam colliding with the target. You can find it on the Jefferson Lab Campus Site map here.

### cryogenics
The branch of physics related to the production and effects of very low temperatures. The cryogens we use at Jefferson Lab include liquid helium in the cryomodules, to keep the niobium cavities at -456 degree Fahrenheit (or 2 Kelvin) – colder than deep space – to enable the superconducting radiofrequencies that help accelerate the beam. We also use liquid helium and nitrogen for both the magnets and targets.

### Cryogenics Test Facility
Built in 1989, the Cryogenic Test Facility is the oldest cryogenic plant at TJNAF. Also known as Building 57, it supports the cryogenic needs at the Test Lab by supplying liquid helium to the Vertical Test Area, the Cryomodule Test Facility, and the Upgrade Injector Test Facility. You can find it on the Jefferson Lab Campus Site Map here.

### cryomodule
A modular unit housing eight SRF accelerator cavities – one among scores of such units that make up the linear portions of the accelerator. Liquid helium is piped into the modules to maintain the near-absolute zero temperatures needed for the niobium cavities to "superconduct." See accelerator.

### Cryomodule Test Facility
Located within the Test Lab (Bldg. 58), the Cryomodule Test Facility is a facility for high- and lower-power RF testing of cryomodules. Here, cavity strings are built in a Class 10 cleanroom environment and assembled into cryostats before being integrated with all cryomodule parts for assembly and testing.

### cryounit
A refrigeration container that encases the liquid helium around a pair of cavities, maintaining the low temperature required for them to be superconductive.

### cybersecurity
One word. Not cyber security.

## D

### data acquisition
The process of collecting, measuring and digitalizing data from physical conditions.

### deep inelastic scattering
A high-energy scattering process in which an electron (or muon or neutrino) interacts with a constituent of the nucleon, such as a single quark.

### deeply virtual Compton scattering
One of the cleanest electromagnetic probes to study single parton interactions, DVCS is a process in which

an electron is scattered off a nucleon target, producing a photon and allowing scientists to learn about the internal structure of the target. In double deeply virtual Compton scattering (DDVCS), a lepton pair (electron and positron) is produced.

**deeply virtual meson production**
A process involving the exchange of a virtual photon between the incident electron and the target particle, leading to the production of a meson in the final state.

**Department of Energy**
Spell out on first reference. It's not necessary to include DOE in parentheses after first reference as it will be understood.
Aside from our using "U.S. Department of Energy" in news releases and web features, adding "U.S." there in other materials is unnecessary if understood in context.

Same applies to Department of Defense and Department of Homeland Security.

**Department of Energy Acquisition Regulation**
The DOE's supplement to the federal requirements for the acquisition process. It provides for the issuance of additional internal agency guidance, including designations and delegations of authority, assignments of responsibilities, work-flow procedures, and internal reporting requirements.

**detector**
Shorthand for a particle detector, of which there are different systems at Jefferson Lab. These serve to observe subatomic particles emitted from the collision of the particle beam with a target.

**deuteron**
A particle made up of a neutron and a proton. It can exist on its own, or as the core of deuterium, an isotope of hydrogen.

**Director's Safety Council**
The Director's Safety Council reviews and to takes responsibility for the structure and performance of Environmental, Safety and Health (ES&H)-related efforts at Jefferson Lab.

**division safety officer**
Ensures work planning and control processes are being followed.

**down quark**
One of the six different masses or "flavors" of quark, along with top, bottom, up, strange and charm.

**Dr.**
Use "Dr." in front of a name only if the person is an actual medical doctor.

## E

**electron**
The smallest of the leptons or light particles, which do not participate in the strong (i.e., nuclear) interaction as protons and neutrons do. Negatively charged – and containing no quarks – they orbit the nucleons (i.e., protons and neutrons).

**Electron-Ion Collider**
The polarized EIC is a future scientific research facility at Brookhaven National Lab designed to accelerate both electrons and ions at high ranges of energy and luminosity. The machine will be used to address several outstanding questions of how quarks are bound together by the "strong force."

**Electronic Permit and Administration System**
Hazard identification and hazard mitigation support software for work permits.

**Electronic Product Environmental Assessment Tool**
The devices that meet these standards are more energy-efficient, less toxic, longer-lasting and easier to recycle than typical electronics.

**electron volt (eV)**
A measure of the amount of energy gained by one electron when it traverses a potential of one volt. The design energy of CEBAF's accelerator is 12 GeV (12 billion eV).

**elementary particle**
A particle that cannot be further divided.

**email**
No hyphen. (This is one of the latest examples of words that, as they become more common, tend to lose their hyphen and close up to become one word). Also, lowercase. However, e-newsletter, e-book, e-commerce, etc.

**Employee Assistance Program**
A counseling service contracted by Jefferson Lab to provide confidential support, resources and information from personal to work-life issues.

**Employee Concerns Program**
A risk-free way to anonymously and confidentially report activities that may involve unsafe, fraudulent, unethical, or otherwise inappropriate behavior in violation of Jefferson Lab's policies, Code of Ethics and Standards of Conduct.

**Employee Self-Service System: aka, Costpoint**
A system for documenting and managing time, pay, expenses, leave, planning and business intelligence.

**End Station Refrigeration**
Also known as Building 102, the ESR maintains cryogenic supply to targets and detectors in Experimental Halls A, B and C. ESR2 is nearby at Building 104. You can find them on the Jefferson Lab Campus Site Map here.

**energy-recovering linac**
In an ERL such as Jefferson Lab's Low Energy Recirculator Facility (Bldg. 18), the electron beam is re-cycled back through the accelerator out of phase with the accelerating field, so that the beam energy generated in its first trip through the accelerator is returned to the SRF cavities.

**Environment, Safety & Health**
This Jefferson Lab division helps staff, users, and subcontractors understand

and meet their responsibility to perform their work safely and in an environmentally sound manner in an atmosphere of continuous improvement. The division is based in Building 52. For a list of ES&H-specific terms and acronyms, click here.

**Environmental Management System**
Manages risk to the environment in a similar fashion as risk to the workers and public. This achieved by incorporating planning, operational controls, and continual improvement into existing site programs where practical.

**European Muon Collaboration**
Established in 1973, the EMC was a collaborative effort involving multiple European research institutions and physicists designed with the goal of studying the internal structure of protons and neutrons. The collaboration was responsible for finding the EMC Effect, which indicates that the distribution of quarks inside a nucleus was different from original predictions, challenging existing theories and leading to further exploration of the "strong force" and quark behavior.

**European Organization for Nuclear Research**
CERN, aka the Conseil Européen pour la Recherche Nucléaire, is an intergovernmental institution that operates the largest particle physics laboratory in the world – the Large Hadron Collider.

**events**
Be sure to distinguish in text whether "events" referred to are natural, subatomic, safety, educational, recreational, vocational, financial or even accelerator in nature. All have appeared in Jefferson Lab communications. Without a descriptor, the generic word events could prompt great confusion.

**exascale**
Refers to software and supercomputers that are capable of executing a billion-billion calculations per second.

**Exascale Computing Project**
The DOE project aims to prepare scientists and computing facilities for exascale.

**experimental hall**
The location of the target and all related equipment (detector system, etc.) for the target to take beam – including the above-ground counting house, where the resulting computer data is collected for study. Jefferson Lab has four halls: the original three, dubbed A, B and C, plus the fourth – D – added in the 12 GeV Upgrade. You can find them on the Jefferson Lab Campus Site Map here.

**Experimental Equipment Lab**
Also known as Building 90, the EEL includes Jefferson Lab's shipping and receiving, the property department, the machine shop, and physics support. You can find it on Jefferson Lab's Campus Site Map here.

**Experimental Safety Assessment Form**
Describes the identified hazards of an experiment and the measures taken to eliminate, control or mitigate them.

**experiments**
Names of experiments and collaborations such as GlueX or LHCb do not need to be written out on first reference in certain internal communications materials – where the unique monikers are well-known in the nuclear physics community. However, for audiences – especially external ones – that may not know what a "GlueX" is, explain them simply as need be.

## F

**Facilities Management & Logistics**
This Jefferson Lab division is responsible for performing or specifying performance of all Jefferson Lab facility maintenance, construction, security, property, and facility services.

**Facility for Rare Isotope Beams**
A superconducting linac at Michigan State University that can accelerate nuclei as heavy as uranium to 200 MeV per nucleon or over half the speed of light.

**federal**
Never capitalize federal in the body of a sentence, unless it refers to an agency that includes "federal" in the name, such as the Federal Trade Commission.

**fermion**
A quantum mechanical particle with half-integer spin (e.g., 1/2, 3/2, 5/2); the quarks and leptons of the Standard Model are all fermions; baryons such as the proton and neutron are fermions, as are all atomic nuclei containing an odd number of nucleons, such as helium-3.

**field-programmable gate array**
A configurable integrated circuit that can be repeatedly programmed after manufacturing.

**field work proposal**
A mechanism used by the DOE to authorize funding to national labs and facilities. It outlines a project and provides information on planning, budgeting and documenting project work.

**Final Safety Assessment Document**
The document containing the results of a safety analysis for the Jefferson Lab accelerator facility pertinent to understanding the risks of the proposed undertaking. This document includes formal limits for exposures to radiation and addresses oxygen deficiency hazards.

**fiscal year**
Write out on first reference in lowercase (e.g., "fiscal year 2020"; note that there's no need to hyphenate the phrase). Abbreviate thereafter as "FY" but write out the full year, with a space between then (e.g., "FY 2020" not "FY2020"). Where necessary, as in a report with a multiplicity of FY references, it's okay to abbreviate the year too and close it up ("FY20").

Only in certain internal communications is it okay to abbreviate fiscal years and their quarters as "FY19, Q1" (fiscal year 2019, first quarter). However, in all external communications, write those out clearly, a la "first quarter of FY 2019."

**form factors**
Functions that characterize the distribution of, for example, charge or current inside a hadron or nucleus, as measured by elastic scattering from that hadron or nucleus; form factors depend on the momentum transfer Q2 to that particle.

**free-electron laser**
A device in which a beam of relativistic electrons passes through a static periodic magnetic field to amplify a superimposed coherent optical wave and thereby produce a powerful beam of coherent light. Jefferson Lab housed the world's highest-power tunable infrared laser, which primarily produced laser light in the Terahertz, ultraviolet, visible and infrared spectra. That facility is now the Low Energy Recirculator Facility.

**Free-Electron Laser Operations Directives Supplement**
Describes compliance with applicable guidelines, including operations programs, procedures, and documentation.

**funding opportunity announcement**
A U.S. federal grant-funding opportunity. FOAs are public documents that contain official information about grants along with their goals, deadlines, eligibility and reporting.

## G

**gas electron multiplier (detector)**
A type of particle detector used in high-energy physics experiments that tracks charged particles.

**generalized parton distribution**
A generalization of the parton distribution functions (PDFs) to consider the distribution not only of momentum in the direction of motion of the hadron or nucleus but also of the transverse spatial structure.

**giga-electron volt**
The unit of measurement for billions of electron-volts, versus MeV (millions). CEBAF was originally built to operate at up to 4 GeV. The 12 Gev Upgrade has enabled experiments up to that energy.

**Gluonic Excitations Experiment**
Designed to produce and study hybrid mesons – specifically the strong force or "glue" binding those quarks together.

**gluon**
The electrically neutral, massless boson that mediates the strong force in quantum chromodynamics (QCD); it carries color charge and cannot be directly observed due to confinement.

**Government-Industry Data Exchange Program**
A cooperative activity between

government and industry participants seeking to reduce or eliminate expenditures of resources by sharing technical information essential during research, design, development, production and operational phases of the life cycle of systems, facilities and equipment.

**Government Scientific Source**
A distributor of laboratory products and equipment dedicated to serving federal, state, and local governments.

**graph neural network**
GNNs provide a machine learning framework for defining a deep neural network on arbitrary graph data.

## H

**hadron**
A composite subatomic particle made from quarks and gluons that have no net color; all hadrons are either a baryon or a meson.

**hall**
See experimental hall.

**Headquarters (DOE reference only)**
Capitalize "Headquarters" (but do not use "HQ") when referring to the proper noun of the two buildings that DOE operates in the D.C. region. Lowercase other references.

**high-performance computing**
The most-powerful and largest-scale computing systems in operation by the U.S. Department of Energy's Office of Science.

**High Performance Data Facility**
A future DOE Office of Science user facility that will be hosted Jefferson Lab in partnership with Lawrence Berkeley National Laboratory. The new resource for data science and research promises to transform data analysis, networking and storage for the scientific and engineering community.

**hyperon**
A baryon containing at least one strange valence quark; examples include the Λ and Σ baryons, which are somewhat heavier than the proton and neutron.

## I

**Idaho National Laboratory**
Located in Idaho Falls, Idaho, INL is home to more than 6,100 researchers and support staff focused on innovations in nuclear research, renewable energy systems and security solutions that are changing the world.

**Individual Career Profile**
A tool for employees to communicate their own career development aspirations.

**industrial hygiene**
IH provides accurate characterization of employee exposure to chemical and physical agent hazards in the workplace. The program is designed to reduce or eliminate exposure to these hazards.

**Injector**
The injector or "gun" produces beam

for experiments by shining laser light onto a metallic material, energizing its electrons and causing them to fly off their atoms and into the magnets that form them into the beam.

**Integrated Research Infrastructure**
A DOE initiative to empower researchers to meld DOE's world-class research tools, infrastructure, and user facilities seamlessly and securely in novel ways to radically accelerate discovery and innovation. HPDF falls under the IRI umbrella.

**Integrated Safety Management**
A DOE safety program that requires safety and environmental protection are "planned in" to every activity at Jefferson Lab.

**Integrated Safety Management System**
Jefferson Lab's ISMS integrates the requirements of 10 CFR 851 and the ES&H requirements of the JSA contract with DOE into the mission and operation of the lab.

**Intel Parallel Computing Center**
A collaboration with computer chip manufacturer Intel that helps Jefferson lab produce modernized code on Intel's architectures.

**internet**
The internet is, to quote AP, "a decentralized, worldwide network of computers" and other communicative devices. Always lowercase. Ditto for the web, which is a subset of the internet.

**Isotope**
An atom with a number of neutrons that is different from other atoms of the same element. Hydrogen, for example, with an extra neutron is deuterium—making it an isotope of hydrogen.

## J

**Jefferson Lab**
Not Jefferson Labs, Jeff Lab or Jeff Labs; neither is it Jefferson Laboratory or Laboratories. To the public, Jefferson Lab encompasses the entire campus and all of its people, equipment and resources – so, to most, in any context, "Jefferson Lab" is synonymous with Thomas Jefferson National Accelerator Facility, or TJNAF.

In certain formal internal communications, however, TJNAF sometimes refers to the physical site alone, and Jefferson Lab refers to the integrated team there – all the DOE staff, JSA employees and scientific Users. See Names of Jefferson Lab for more.

Naming hierarchy:

In internal publications:
Facility, first reference: Thomas Jefferson National Accelerator Facility
Facility, second reference: TJNAF

Lab, first reference: Thomas Jefferson National Accelerator Facility
Lab, second reference: Jefferson Lab
Lab, limited reference (casual): JLab

In external publications:
Lab, first reference: Thomas Jefferson National Accelerator Facility
Lab, second reference: Jefferson Lab
Lab, limited reference: JLab

**Jefferson Lab Activities Group**
The JAG was formed to enhance employee morale through various recreational, social and athletic activities. Part of JAG's overall function is to promote and implement new ideas in support of DOE and DC policies. JAG also monitors new and existing recreational programs to ensure benefit to the greatest cross section of the lab community.

**Jefferson Lab Data Center**
The building that will house the High Performance Data Facility at Jefferson Lab.

**Jefferson Lab Science Activities for Teachers**
An afternoon science program for 5th, 6th and 8th grade teachers that provides STEM (science, technology, engineering and mathematics)-focused ideas, activities and projects to take back to their classrooms.

**Jefferson Science Associates**
The contractor that runs Jefferson Lab on behalf of the DOE. It's a partnership between the Southeastern Universities Research Association, Inc., or SURA, and PAE. Spell out on first reference and use JSA thereafter as need be.

**Job Related Training**
A training, workshop or conference to enhance your skills or to maintain a certification.

**Job Task Analysis**
A tool for reviewing and updating skill requirements lists.

## K

**kaon**
The lightest meson containing a single strange or antistrange valence quark; it has a little more than three times the mass of the lightest meson without strange quarks, the pion.

**Kelvin**
A thermometric scale on which the unit of measurement equals the Celsius degree and absolute zero is 0 K – the equivalent of -273.15 degrees C. The cryogenics equipment at Jefferson Lab includes "4 K cold boxes," for example.

**klystron**
A device that generates radiofrequency power for cryomodules in the CEBAF accelerator.

## L

**lab, laboratory**
Capitalize "Lab" only when used with the proper noun of "Jefferson Lab." Lowercase all other references (e.g., "… inside the lab complex" not "the Lab complex").

The lab and laboratory are acceptable secondary references to Jefferson Lab. "JLab" can be used on second reference in some public-facing materials (e.g., for branding), and in

informal internal communications, but is never used in formal internal communications. See Jefferson Lab.

### Laboratory Directed Research and Development program

Jefferson Lab launched the Laboratory Directed Research and Development program in 2013 to foster the innovative spirit, encourage individuals research initiatives, find new strategic directions, and support such directions already established.

### Large Hadron Collider

Beneath the France-Switzerland border near Geneva, it's the world's largest particle collider with a circumference of 27 kilometers (17 miles).

### Laser Standard Operating Procedure

Addresses all aspects of safety and conduct specific to the operation and maintenance of the lasers.

### Latin and other foreign terms:

Do not hyphenate foreign phrases used as modifiers, such as "ab initio calculation," "in vivo reactions" or "in situ operations."

### lattice QCD

Lattice quantum chromodynamics (QCD) is a version of QCD that describes quarks' interactions with gluons, computed on a space-time grid.

### Lawrence Berkeley National Laboratory

A DOE Office of Science national laboratory in Berkeley, California.

### Learning Management System

A Jefferson Lab training resource tool.

### Leave Without Pay

Time off work without compensation, an option for employees not willing or able to use paid leave such as vacation or sick leave.

### lepton

Based on the Greek for "light particle," leptons include electrons and muons – particles that do not participate in strong interactions (as protons and neutrons do).

### life cycle

Two words. Not lifecyle.

### linac

Pronounced "lin-ack," this abbreviated term for linear accelerator refers to the two straight sections of CEBAF (as opposed to the turns or arcs) – the north and south linacs.

### Linac Coherent Light Source

Linac Coherent Light Source was the first laser in the world (and one of just two now in operation) to produce "hard" or very high-energy X-rays, to take snapshots of atoms and molecules at work. The process involves – and the particle accelerator resides at – SLAC (Stanford's LINAC). The upgrade has been dubbed LCLS-II, with another called LCLS-II-HE in the works.

### liquid helium

Helium, one of the lightest elements known, is a gas at room temperature. When its temperature is reduced to nearly absolute zero, it becomes a liquid. Liquid helium is used at CEBAF

to maintain the cavities at low, superconducting temperatures.

### lockout/tagout
The approved method for securing hazardous energy sources and thereby making them safer for work.

### Long Range Plan
The LRP for Nuclear Science provides a road map for advancing the nation's nuclear science research over the next decade.

### low-conductivity water
Low conductivity water is water that contains very low levels of inorganic/organic substances found in solution water, as these substances conduct electrical current. This characteristic of low conductivity is obtained by distillation, reverse osmosis, and deionization. Low conductivity water is used for a variety of reasons at Jefferson Lab, primarily for cooling purposes.

### Low Energy Recirculator Facility
When it was called the Free-Electron Laser, this facility (Bldg. 18) housed the world's highest-power tunable infrared laser, which primarily produced laser light in the Terahertz, ultraviolet, visible and infrared spectra. The new name encompasses future missions with potentially broader scope – the development of which includes the LERF's unique ability to generate electrons' energy then recover it using a superconducting energy recovering linac or ERL. You can find it on the Jefferson Lab Campus Site Map here.

### low-level radiofrequency
Low-level radiofrequency (LLRF), in the context of particle accelerators, refers to the precision control of the RF fields in any accelerating cavity (normal and superconducting) or a deflecting cavity (separator, crab, bunching etc.). LLRF is necessary to maintain the desired beam parameters, such as energy, intensity and focus throughout the accelerator's operation.

## M

### M&O Contract
Refers to the so-called Management and Operating Contract that each of the 17 U.S. national labs has with the Department of Energy. For Jefferson Lab, our M&O Contract is between DOE and Jefferson Science Associates, a limited liability company. See Appendix B.

### Machine Control Center
Also known as Building 85, this Jefferson Lab facility houses the computer system used to control all accelerator operations. The MCC tracks, manages and responds to tens of thousands of simultaneous signals and hardware control points. Accelerator operators work 24 hours a day to maintain and improve all the various systems necessary for beam operations. You can find it on the Jefferson Lab Campus Site Map here.

**magnet**
CEBAF's magnets guide the beam from one linac to the next by generating a magnetic field. Other magnets focus and steer the beam, and are used in experiments.

**Majorana fermion**
A fermion that is its own antiparticle.

**Management & Operations**
A contract that each of the 17 U.S. national labs has with the Department of Energy.

**mass**
The measure of a body's resistance to acceleration.

**matter**
An entity displaying gravitation and inertia when at rest, as well as when in motion.

**measurement**
See units of measurement.

**meson**
A composite particle with integer spin (i.e., a boson) built from quarks and gluons; the simplest mesons have a valence structure of one quark and one antiquark.

**Measurement of a Lepton-Lepton Electroweak Reaction Experiment**
Proposes to measure the parity-violating asymmetry in electron-electron scattering.

**Monte Carlo** (analysis)
A computer-based method of analysis developed in the 1940s that uses statistical sampling techniques to obtain a probabilistic approximation to the solution of a mathematical equation or model.

**MySQL Archiver**
A system for archiving EPICS signals within the Jefferson Lab accelerator control system.

**muon**
A fundamental lepton, closely related to the electron but with a mass 207 times higher.

## N

**names of Jefferson Lab**
While each of our formal names have their own entries, we assembled them all here – starting with their use in one sentence:
"The Continuous Electron Beam Accelerator Facility or CEBAF resides at the Department of Energy's Thomas Jefferson National Accelerator Facility, known more widely as Jefferson Lab."

To be clear and consistent in using each of those, adhere to the following (which Appendix B presents even more fully in a chart):

- **The Department of Energy's Thomas Jefferson National Accelerator Facility.** To the public, the names TJNAF and Jefferson Lab are likely synonymous – the latter being the more popular name. TJNAF can therefore be used to refer to the entire lab, with all of its

people and parts – with Jefferson Lab as the second reference – in public-facing writings.

However, a real distinction between the two terms exists in internal communications here at the lab, where TJNAF means the physical site but Jefferson Lab encompasses the employees, DOE staff and Users. See Part II.

Other acceptable second references are the lab, the laboratory, or the User facility.

Examples "The CEBAF is located at TJNAF." CORRECT (or "…located at Jefferson Lab") "TJNAF produced these reports last year." INCORRECT (rather, to be accurate, "Jefferson Lab produced…")

- **Jefferson Science Associates.** JSA is the managing and operating contractor of TJNAF/Jefferson Lab for the Department of Energy's Office of Science. Employees of Jefferson Lab are employees of JSA. JSA is composed of SURA and PAE.

- **Jefferson Lab.** As noted above, in public communications this name refers to everything and everyone here on campus (including the physical site) – from the JSA and DOE employees to the scientific Users, the postdocs and interns to the subcontractors. See Part I for more.

In formal internal communications, however, the name Jefferson Lab encompasses only the team of JSA employees, DOE site-office employees and the scientific Users. See Part II for more.

Examples
Brian Wilson, a professor emeritus at William & Mary, led the Cherenkov detector construction effort for the GlueX Collaboration at Jefferson Lab.

The GlueX Collaboration at Jefferson Lab constructed the Cherenkov detector.

A Jefferson Lab collaboration of more than 100 scientists and students built the detector.

**National Fire Protection Association**
A codes and standards organization whose mission is to provide information and knowledge designed to minimize the risk and effects of fire.

**National Nuclear Security Administration**
NNSA is a semi-autonomous Department of Energy agency responsible for enhancing national

security through the military application of nuclear science.

**National Renewable Energy Laboratory**
Located in Golden, Colorado, NREL is dedicated to the research, development, commercialization, and deployment of renewable energy and energy efficiency technologies.

**National Science Foundation**
An independent federal agency that Congress created in 1950, the NSF strives to promote the progress of science and national health. It is second only to DOE as the major source of funding for nuclear/high energy physics research in the U.S.

**next-to-leading order (in perturbation theory)**
The next level of refinement beyond leading order calculations. It involves including additional terms and loop corrections to improve the accuracy of theoretical predictions, particularly in processes involving strong interactions like those in quantum chromodynamics.

**Neutral Particle Spectrometer (in Hall C)**
A specialized detector system used to measure neutral particles (particles with no net electric charge) in experimental nuclear and particle physics research. The system is designed to detect and measure the properties of these neutral particles as they emerge from interactions within the nuclei of atoms.

**neutrino**
A lepton with very small mass and no electric charge; each charged lepton (electron, muon, and tau) has a corresponding neutrino.

**neutrino flavor conversion**
Neutrino oscillations among the three neutrino flavors predicted by the Standard Model (electron, muon, and tau).

**neutron**
A baryon with a mass only slightly larger than the proton (but without an electric charge) that is present in all atomic nuclei except for hydrogen and is composed of three valence quarks (two down quarks and one up quark) and a sea of quark–antiquark pairs and gluons; free neutrons are unstable with a lifetime of about 15 minutes, but they can be rendered stable when they are embedded in an atomic nucleus.

**New Employee Orientation**
Initial training for new hires to help them get acquainted with Jefferson Lab's expectations and resources.

**niobium**
A silvery metal that becomes superconducting at temperatures near absolute zero, thereby enabling it to, in the form of cavities within cryomodules, harness and sustain the high energy fields. Also see SRF.

**nuclear pasta**
A phase of nuclear matter, the signatures of which have been observed in objects such as neutron

stars; this matter phase is characterized by dense structures resembling various forms of pasta.

### Nuclear Physics
Generally refers to the global community involved in nuclear physics. Specifically refers to DOE's NP program, which supports three scientific user facilities, including CEBAF. Also, DOE NP distinguishes between nuclear physics and high-energy physics – the latter having its own High-Energy Program. In HEP materials, therefore, one might come across reference to nuclear versus particle physics.

### Nuclear Science Advisory Committee
The Nuclear Science Advisory Committee is an advisory committee providing official advice to DOE and the NSF on the national program for basic nuclear science research.

### nucleon
This frequent reference to both the proton and the neutron as a single type of particle stems from their similarities in many respects.

### nucleus
The positively charged central part of an atom. The nucleus is composed of one or more nucleons, such as protons and neutrons.

## O

### Oak Ridge National Laboratory
A DOE Office of Science national lab in Oak Ridge, Tennessee.

### Occupational Medicine
A Jefferson Lab office that provides wellness assessments, first-aid and other limited emergency care for injuries and illnesses that occur on-site. The office is housed in the Support Service Center (Bldg. 28).

### Occurrence Reporting & Processing System
Jefferson Lab notifies the DOE's Thomas Jefferson Site Office of any occurrence that could adversely affect the health and safety of the public, its workers and the environment. Occurrence reporting promotes organizational learning consistent with DOE's Integrated Safety Management System goal of enhancing mission safety and sharing effective practices to support continuous improvement and adaptation to change.

### Office of Science
Write out on first reference and, if referring more than once to the office, introduce "SC" parenthetically directly behind the first reference, for the subsequent references. This is an exception to the AP rule we're using for abbreviations in external communications (see Part I).

### Office of Science Graduate Student Research
A DOE WDTS program offering a pathway to advance Ph.D. thesis research while working at a national lab.

**Office of Technology Transitions**
Supports the commercialization of energy technologies developed at the national labs and facilities.

**Office of the Inspector General**
The oversight division of a federal or state agency aimed at preventing inefficient or unlawful operations within their parent agency.

**opportunity for improvement**
A chance to improve an existing situation, solve a problem, or take advantage of a new trend or technology.

**Optics Restoration and Finalization Plan**
An Optics Restoration and Finalization Plan follows a Cold Start Up after a Scheduled Accelerator Down. It is in the ORFP that the various optics of the beam are checked and adjusted as it is threaded around for the full five passes.

**oxygen deficiency hazard**
A hazard due to the potential elimination of or reduction in oxygen available to breathe.

## P

**Pacific Architects and Engineers**
PAE partnered with Southeastern Universities Research Association to form Jefferson Science Associates LLC, the managing and operating contractor of Jefferson Lab for the U.S. Department of Energy's Office of Science.

**Pacific Northwest National Laboratory**
A DOE Office of Science laboratory in Richland, Washington.

**parity symmetry**
A symmetry in which a system is indistinguishable from its mirror image.

**parity-violating deep inelastic scattering**
The violation of parity symmetry in the weak force is specifically tested in this is high-energy scattering process, in which an electron (or muon or neutrino) interacts with a constituent of the nucleon, such as a single quark.

**parity-violating electron scattering**
An experimental technique that allows for measurements where parity symmetry is not obeyed in the scattering of electrons from unpolarized targets, for unique insights into the properties of matter.

**particle accelerator**
See accelerator.

**parton**
Generic term for any fundamental particle constituent within a hadron; includes valence quarks and antiquarks, sea quarks and antiquarks, and gluons.

**parton distribution function/ parton density**
Functions that describe how the parton's momentum is distributed parallel to the overall momentum of the hadron or nucleus.

**Pathway Summer Schools**
A DOE WDTS program that creates innovative pathways for students with

the goal of diversifying a STEM talent pool with a focus on building science identify, enhancing STEM efficacy, and sense of belonging.

**pentaquark**
Exotic, short-lived particles that consist of five quarks.

**Performance Assurance**
An office at Jefferson Lab whose primary responsibility is to prove to JSA and the government that the lab is meeting contractual obligations.

**Performance Evaluation and Measurement Plan**
Serves as DOE's Quality Assurance/Surveillance Plan (QASP) for the evaluation of Jefferson Science Associates' performance regarding the management and operations of the Thomas Jefferson National Accelerator Facility.

**personal protective equipment**
Equipment that is intended to be worn or held by a person to protect that person from harm.

**perturbative quantum chromodynamics**
A theoretical technique taking advantage of the fact that the strength of the strong force decreases at high energies or short distances; when the coupling constant is small enough, a well-defined approximation scheme exists, allowing calculations of quark and gluon interactions to be carried out.

**Ph.D., Ph.D.s**
Per AP, the preferred form is to say a person holds a doctorate in… (then name the specialty), but the abbreviation is perfectly acceptable in any form of writing. Note that it's never PhD; always use the periods.

Also in AP, only actual medical doctors are referred to by the title doctor – not holders of Ph.D.s.

**photomultiplier tube**
A highly sensitive photon detector used to amplify and detect very low levels of light or other forms of electromagnetic radiation.

**photon**
Massless boson that mediates the electromagnetic force.

**pion**
The lightest known hadron, a meson with a mass about 270 times that of an electron.

**polarimeter**
A scientific instrument used to measure the polarization of light, especially for determining the effect of a substance in rotating the plane of the polarization. (Not to be confused with polarized, which in nuclear physics can refer to the state of a beam or target, if the spin axis of the particles within it are aligned in some direction.)

**polarizability**
Response of a nucleon to an external electromagnetic field.

**positron**
Antiparticle of the electron, with the same mass but opposite charge.

**President**
Capitalize the title either when paired with a proper name (e.g., President Truman) or when used alone (e.g., "… from the President himself…") in formal internal communications.

In most cases, the first name of a current or former U.S. president is not necessary on first reference. Lowercase the first president of the United States and presidential.

This also applies to vice president and other civil titles.

**Princeton Plasma Physics Laboratory**
A DOE Office of Science laboratory in Princeton, New Jersey.

**process variable**
The measured value of a parameter that is being monitored or controlled in a process.

**Procurement Evaluation and Re-Engineering Team**
Provides support to the DOE's Acquisition Council. The program's review process serves as the DOE's methodology for contractor purchasing reviews and peer review for the contractor community.

**Program Advisory Committee**
The Program Advisory Committee consists of distinguished members from the nuclear physics community who offer guidance on the lab's experimental program.

**proton**
The nucleus of the hydrogen atom (having positive electric charge equal in magnitude to that of the electron but opposite in sign), composed of three valence quarks (two up quarks and one down quark) and a sea of quark-antiquark pairs and gluons; atomic nuclei are composed of protons and neutrons, and the proton is believed to be stable.

**proton-emission threshold**
The minimum energy that a state in a nucleus needs before it becomes unstable to decay by the emission of one proton.

**Public Affairs**
Now known as the Communications Office, this Jefferson Lab department manages internal and external communications along with creative services and event services.

## Q

**Quality Assurance**
A process that adds value to the work being conducted by ensuring that ethical and compliant business practices are adhered to; customer requirements are met or exceeded; and reasonable standards of formality are met, along with the requirements and standards specified in the contract between Jefferson Science Associates (JSA) and DOE.

**quantum chromodynamics**
The theory of the strong interaction between quarks mediated by gluons, analogous to the quantum theory of electricity and magnetism in many ways, with color charge instead of electric charge; it forms part of the Standard Model of particle physics, describing the binding of quarks and gluons inside composite hadrons (such as the proton, neutron, and pion) and all strong interactions between hadrons (such as those needed to bind protons and neutrons into atomic nuclei).

**quark**
Elementary structureless particles of the Standard Model that carry electric and color charge and interact strongly through gluon exchange, electromagnetically through photons, and weakly through weak bosons; they are never observed in isolation, only as constituents in hadrons, and are currently believed to comprise six flavors (in order of increasing mass: up, down, strange, charm, bottom, and top, with nuclear physics primarily concerned with the lightest two flavors).

**quark-gluon plasma**
An equilibrated state of matter in which quarks and gluons are freed from confinement in hadrons, believed to have existed in the early universe and recreated in high-energy collisions.

**quark-lepton universality**
A property of the Standard Model which requires that quarks and leptons experience the weak force with equal strength, up to the effect of the CKM matrix.

## R

**Radiation Protection Program**
The goals of the program are to (1) prevent any exposure of workers to ionizing radiation without the expectation of an overall benefit from the activity causing the exposure and (2) optimize radiological activities such that dose to personnel is kept as low as reasonably achievable.

**Radiation Safety Assessment Document**
Specifically addresses radiation and activation issues associated with the delivery of beam to an experiment.

**radiofrequency**
One word, stemming from DOE and Jefferson Lab's coining of the term "SRF."

**recombiner**
A recombiner brings together multiple particle beams into a single, more coherent beam. The combination of the beams enhances the intensity and energy of the resulting beam, leading to more effective interactions and measurements. There are 10 recombiners located throughout the CEBAF track.

**Relativistic Heavy Ion Collider**
The RHIC at Brookhaven National Laboratory is the only collider with dedicated running for heavy ion research and the only polarized proton collider ever built.

**research and development (R&D)**
Eliminate spaces on either side of the ampersand. "R&D" as a collective noun should be paired with a singular verb, a la "R&D last week found that…."

**Research and Technology Partnerships Office**
A Jefferson Lab office that facilitates the transfer of technology and scientific discoveries via productive partnerships among laboratory research programs, universities, government agencies, and industry. The office is housed in the Support Service Center (Bldg. 28).

## S

**Sandia National Laboratories**
Headquartered in Kirtland Air Force Base in Albuquerque, New Mexico, SNL is one of three research and development laboratories of DOE's National Nuclear Security Administration (NNSA).

**Scheduled Accelerator Maintenance**
A scheduled period of accelerator downtime and maintenance during which no experiments are run. Previously, this period was referred to as Scheduled Accelerator Down (SAD).

**science and technology (S&T)**
Eliminate spaces on either end of the ampersand. "S&T" as a collective noun should be paired with a singular verb.

**science, technology, engineering and mathematics (STEM)**
The acronym for "science, technology, engineering and mathematics" is acceptable on first reference; however, write it out shortly thereafter for audiences that may not know the term. Only use in the context of education.

**Science Undergraduate Laboratory Internships**
An internship program offered by DOE's Workforce Development for Teachers and Scientists program.

**Scientific Discovery through Advanced Computing**
A DOE program created to bring together many of the nation's top researchers to develop new computational methods for tackling some of the most challenging scientific problems.

**scintillator**
A material – sometimes liquid, sometimes plastic – that produces light when a particle passes through it.

**sea quarks**
Quark-antiquark pairs that are created and destroyed on very short timescales; hadrons have sea quarks in addition to their valence quarks.

**self-supervised learning**
A machine-learning technique that can pre-train a model on a large set of unlabeled data.

**semi-inclusive deep inelastic scattering**
Semi-inclusive deep inelastic scattering (DIS) is a process that focuses on studying the internal structure of protons and neutrons by examining the products of high-energy electron or

muon scattering off these target particles.

**separator**
A separator splits a single electron beam into multiple distinct beams. The four separators in CEBAF allow researchers to explore different interactions in particle experiments.

**Shipping & Receiving Log**
A searchable database of all received and shipped items at Jefferson Lab.

**Site Occupational Medical Director**
Leads the Occupational Medicine office at a DOE site such as Jefferson Lab.

**Site-Wide Information System Screens**
These video monitors throughout Jefferson Lab communicate information across the campus.

**Skill Requirements List**
Job-specific training modules for Jefferson Lab employees.

**Small Business Innovation Research**
A program that encourages U.S. small businesses to engage in Federal Research/Research and Development (R/R&D) with the potential for commercialization.

**Small Business Technology Transfer**
A program that encourages U.S. small businesses to engage in Federal Research/Research and Development (R/R&D) with the potential for commercialization.

**solenoidal magnet**
The magnet surrounding the Hall D target that draws the photon beam into the "coil" of detectors there.

**Solenoidal Large Intensity Device**
(planned detector in Hall A)
A large acceptance detector system that can handle high luminosity. Once built, SoLID will be used in an experiment with the initiative to consider a broader approach to a number of different measurements using a large solenoid.

**Southeastern Universities Research Association**
Southeastern Universities Research Association partnered with PAE to form Jefferson Science Associates LLC, the managing and operating contractor of Jefferson Lab for the Department of Energy's Office of Science.

Spell out on first reference—unlike PAE, which can be used on first reference.

**spectrometer**
An instrument that can measure the momentum of charged particles emerging from a subatomic decay or reaction. At Jefferson Lab, Hall A has two High Resolution Spectrometers, the Super BigBite spectrometer, and the SoLID spectrometer; Hall B contains the CLAS and CLAS12; Hall C holds both a High Momentum Spectrometer and a Super High Momentum Spectrometer; and Hall D has the GlueX spectrometer.

**spin polarization**
The degree to which the spin vector of

a particle in a beam or a target is aligned with a given direction.

**spin-polarized fusion**
A concept in fusion energy research in which particles are spun parallel to the magnetic field to increase the chances ignition (i.e., a net energy gain).

**standard model of particle physics**
The theory that describes the fundamental particles, such as quarks and gluons, and their interactions.

**standard operating procedure**
A set of step-by-step instructions for performing a routine activity. SOPs should be followed the same way every time to guarantee that the organization remains consistent and in compliance with industry regulations and business standards. SOPs provide the policies, processes and standards needed for an organization to succeed. They reduce errors, increase efficiency and enhance profitability. They also create a safe work environment and produce guidelines for how to resolve issues and overcome obstacles.

**Stanford Linear Accelerator Center**
A prominent research facility located in California with one of the longest linear particle accelerators in the world. In addition to collaboration and knowledge-based sharing, Jefferson Lab works with SLAC for cryomodule procurement and assembly.

**structured query language**
A computer programming language designed for managing data in a relational database management system.

**subject matter expert**
A professional with academic credentials, recognized work experience, or expertise in the field of application.

**superconducting radiofrequency**
SRF, a term that DOE and Jefferson Lab coined, refers to the radiofrequencies used in the supercooled cavities of the cryomodules through which passes the electron beam of CEBAF. Such "super speeds" allow for pure energy and hence pure data (no energy lost through heat, for example, to be accounted for in the data). Jefferson Lab is the first physics laboratory to employ large-scale SRF technology.

**superconductivity**
A unique condition in which certain substances lose all resistance to the flow of an electric current.

**Support Service Center**
Also known as Building 28, the Support Service Center at Jefferson Lab provides various services to facilitate the workings of the lab. These services include conference room space, individual counseling, IT support services, badging and many others. You can find it on the Jefferson Lab Campus Site Map here.

**suspect/counterfeit items**
An item that does not does not conform to established government or industry-accepted specifications or

national consensus standards. Investigation of S/CIs is performed to determine whether the indications are the result of a quality control problem or is actually fraudulent.

# T

**target**
The destination – be it liquid nitrogen, a metallic particle, etc. – for the beam in any one of the four experimental halls. The collision of beam and target produces subatomic-level events that detectors capture and convert into computer data.

**Teachers Insurance and Annuity Association of America**
The financial services organization that manages retirement plans for Jefferson Lab.

**technical advisory committee (for the program advisory committee)**
A group of experts and scientists who provide technical guidance and evaluation for research proposals and experiments.

**technical notes**
Internal notes used to document work informally as intermediate milestones are met.

**Technology and Engineering Development building**
Also known as Building 55, the TED building is a 74,600-square-foot facility designed to provide workspace for 200 people. This state-of-the-art facility is where research in nuclear physics, accelerator science, applied nuclear science and technology, and advanced instrumentation is conducted. The building is part of the lab's larger Technology and Engineering Development Facility. You can find it on Jefferson Lab's Campus Site Map here.

**Technology and Engineering Development Facility Project**
Completed in 2014, the Technology and Engineering Development Facility was a $70 million project supporting the upgrade and expansion of the Technology and Engineering Development building (Bldg. 55).

**technology transfer**
Jefferson Lab's work with university and industry partners to leverage the lab's investments in scientific research to move technologies to the market – to address a problem (environmental, medical, homeland security, etc.).

**Thomas Jefferson National Accelerator Facility**
The official name of Jefferson Lab. In communications, it refers to the physical site, but Jefferson Lab encompasses the employees, DOE staff and users.

**Thomas Jefferson Site Office**
The DOE site office at Jefferson Lab is housed in the CEBAF Center (Bldg. 12).

**timelike Compton scattering**
A process in which a photon is scattered off a target producing a lepton pair (such as electron-positron). The process is fundamental in

understanding the electromagnetic interactions of particles and is important for studying the internal structure of protons and neutrons.

**top quark**
One of the six different masses or "flavors" of quark, along with bottom, down, up, strange and charm.

**transitional form factor**
A mathematical function that describes the probability amplitude of a particle undergoing a transition from one quantum state to another. These form factors are particularly important in processes such as electron scattering.

**transverse-momentum dependent PDF or fragmentation function**
A mathematical description used to characterize the distribution of quarks and gluons within a nucleon, considering their transverse momentum (momentum perpendicular to the direction of the nucleon's motion). Mainly used to determine the spatial distribution of quarks or gluons within the nucleon.

**12 GeV Upgrade**
The upgrade to the CEBAF – going from 4 to 12 Gev – included adding 10 new cryomodules, upgrading the three existing halls and adding a fourth (Hall D). It took more than a decade to plan, build and install, and became operational in 2017.

# U

**Unclassified Foreign Visits and Assignments**
A program for unclassified foreign national access to Department of Energy (DOE) sites, information, technologies, and equipment.

**units of measurement**
The abbreviations mm (millimeter) and cm (centimeter) are widely recognized and do not need to be spelled out. Also, do not use periods with those. Other UOMs not requiring periods are mpg, mph, hp, rpm.

**United States/U.S.**
Spell this out as a noun. As an adjective, the term is abbreviated with no space between the letters, as shown above and below. Use periods in the abbreviation U.S. within texts. In headlines, it's US (no periods).

> Examples:
> U.S. nuclear arsenal
> U.S. military

**Upgraded Injector Test Facility**
Located within the North-West side of the Test Lab (Bldg. 58), the Upgraded Injector Test Facility provides ground for a variety of accelerator technologies and a venue to perform low-energy physics experiments.

**up quark**
One of the six different masses or "flavors" of quark, along with top, bottom, down, strange and charm.

**URL**
Uniform Resource Locator – written in all caps, no periods.

**user**
In external and internal communications, lowercase the term user when referring to the scientific users from all over the country and the world who participate in the lab's R&D and experiments. This guideline is a recent change designed to be more inclusive of the staff, faculty, etc., whose roles are never capitalized but play key roles in the lab community.

One exception here: Per DOE Public Affairs, we will capitalize that reference for news releases, to read "DOE Office of Science User Facility" (or "Facilities").

**U.S. General Services Administration**
GSA provides workplaces by constructing, managing, and preserving government buildings and by leasing and managing commercial real estate. GSA's acquisition solutions offer private sector professional services, equipment, supplies, and IT to government organizations and the military. GSA also promotes management best practices and efficient government operations through the development of governmentwide policies.

## V

**valence quarks**
The quarks and antiquarks required to describe the properties of a hadron; for example, the valence quarks in the proton are "uud" (two up quarks and one down quark).

**Virginia Associated Research Campus**
The Virginia Associated Research Center was originally established as a research laboratory by NASA in 1962 under the guise of the University of Virginia, Virginia Polytechnic Institute, and the College of William & Mary to operate a NASA-built Space Radiation Effects Laboratory. Now the Support Services Center (Bldg. 28), the building has been under the control of the U.S. Department of Energy since 1983.

**Visiting Faculty Program**
A DOE WDTS program designed for full-time faculty members designed to fun collaborative experiences with a Department of Energy (DOE) national laboratory.

## W

**weak interaction (also known as weak force)**
One of the fundamental interactions (or forces) of the Standard Model.

**web** (and webpage, etc.)
Shorthand for the World Wide Web – note the capitalization only when written out; otherwise, it's web. Regardless, it's a subset of the internet.

Neither should we confuse it with an intranet or internal website (e.g., "Put it on the web") – whether for an organization's intranet or their external website. Be sure the distinction is clear in the text or context of your writing.

Lowercase web within a sentence even when referring on second reference to the World Wide Web. Also, note the one-word terms webmaster, website, webpage, etc. – except web address and web browser.

**Work Breakdown Structure/ Annual Work Plan**
An organizational chart for planning, managing and reporting project activities.

**Worker Safety and Health Program**
The WSHP applies to the design, construction, operation and maintenance of the facilities on the Jefferson Lab site. The health and safety program allows employees, subcontractors and visiting scientists to work safely at Jefferson Lab.

**Workforce Development for Teachers and Scientists**
A comprehensive suite of workforce development programs that prepare a highly skilled DOE workforce of tomorrow.

## X

**X-ray** (n., v., and adj.)
Use the term for both the photographic process and the electromagnetic radiation itself.

**X-ray free-electron laser**
XFELs produce ultra-bright, ultra-short pulses of X-ray light. They're used capture the behavior of molecules, atoms and electrons on natural timescales – and in extraordinary detail.

## Y

## Z

**To download the latest updates, click here.**