

ATPESC 2026 Intro and Orientation

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ATPESC Program Director, ANL

ATPESC

Founded by Paul Messina in 2013. ATPESC 2026 is #14 !

- Welcome
- Argonne National Laboratory
- ATPESC Logistics
- Tour

Welcome!

ATPESC 2026

47 Institutions

ANL
Brown U
CEA
City College of NY
Cornell U
Fed U of Rio Grande do Sul
FSU
General Atomics
Georgia Tech
Johns Hopkins
KAUST
KTH
LANL
LBNL
Metacomp Technologies
Michigan State

NC State
Northwestern University
Ohio State
ORNL
Penn State
PNNL
Purdue
Rensselaer Polytechnic
Rice
SNL
Texas A&M
U Arkansas
U Chicago
U College London
U Iowa
U Kansas

U Maryland
U Michigan
U Nevada Las Vegas
U Wisconsin-Milwaukee
U Zaragoza
UC Berkeley
UC Merced
UI Chicago
UIUC
UMN Twin Cities
USC
UT Austin
Utah State
Virginia Tech
Wake Forest

Argonne National Laboratory

Argonne – part of the DOE National Laboratory System

Office of Science Laboratories

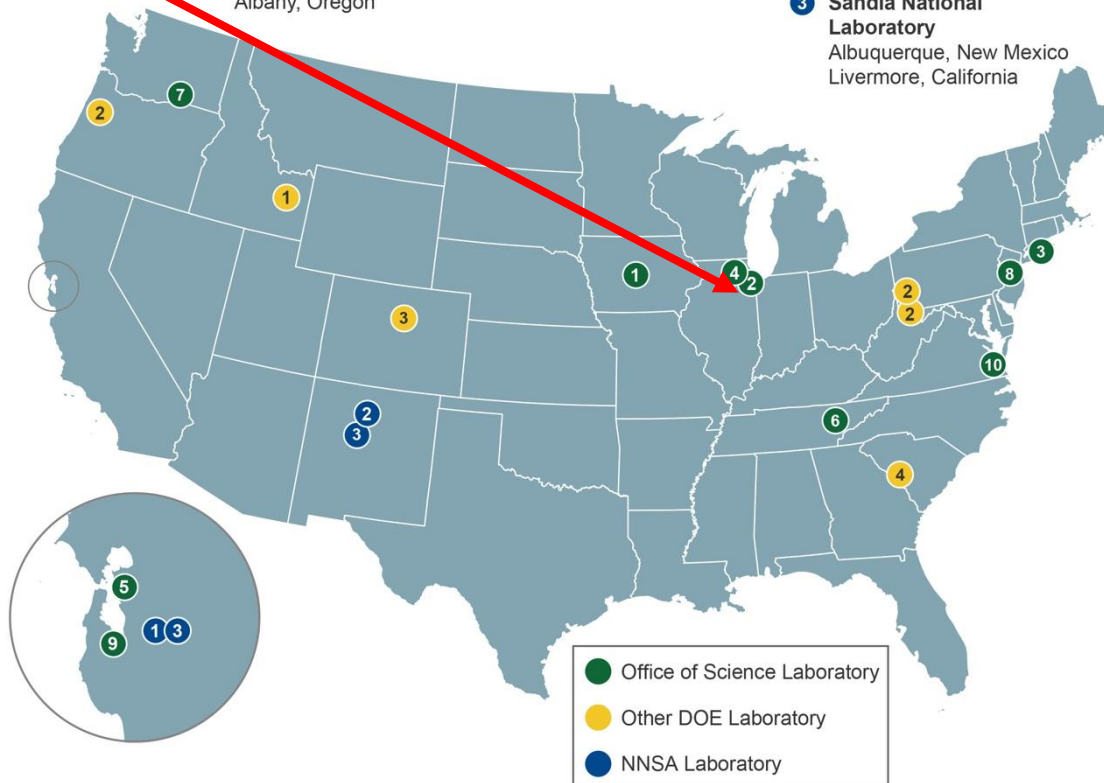
- 1 Ames Laboratory
Ames, Iowa
- 2 Argonne National Laboratory
Argonne, Illinois
- 3 Brookhaven National Laboratory
Upton, New York
- 4 Fermi National Accelerator Laboratory
Batavia, Illinois
- 5 Lawrence Berkeley National Laboratory
Berkeley, California
- 6 Oak Ridge National Laboratory
Oak Ridge, Tennessee
- 7 Pacific Northwest National Laboratory
Richland, Washington
- 8 Princeton Plasma Physics Laboratory
Princeton, New Jersey
- 9 SLAC National Accelerator Laboratory
Menlo Park, California
- 10 Thomas Jefferson National Accelerator Facility
Newport News, Virginia

Other DOE Laboratories

- 1 Idaho National Laboratory
Idaho Falls, Idaho
- 2 National Energy Technology Laboratory
Morgantown, West Virginia
Pittsburgh, Pennsylvania
Albany, Oregon
- 3 National Renewable Energy Laboratory
Golden, Colorado
- 4 Savannah River National Laboratory
Aiken, South Carolina

NNSA Laboratories

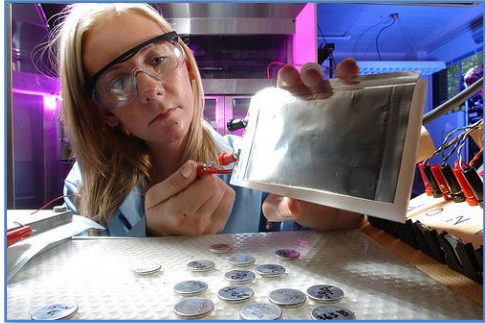
- 1 Lawrence Livermore National Laboratory
Livermore, California
- 2 Los Alamos National Laboratory
Los Alamos, New Mexico
- 3 Sandia National Laboratory
Albuquerque, New Mexico
Livermore, California



Together, the **17 DOE laboratories** comprise a preeminent federal research system, providing the Nation with strategic scientific and technological capabilities. The laboratories:

- Execute long-term government scientific and technological missions, often with complex security, safety, project management, or other operational challenges;
- Develop unique, often multidisciplinary, scientific capabilities beyond the scope of academic and industrial institutions, to benefit the Nation's researchers and national strategic priorities; and
- Develop and sustain critical scientific and technical capabilities to which the government requires assured access.

Argonne's mission – Provide science-based solutions to pressing global challenges



Energy Science



Environmental Sustainability



Nuclear and National Security

RESEARCH DIVISIONS

Computing, Environment and Life Sciences

BIO	Biosciences
EVS	Environmental Science
MCS	Mathematics and Computer Science

Energy and Global Security

ES	Energy Systems
GSS	Global Security Sciences
NE	Nuclear Engineering

Photon Sciences

ASD	Accelerator Systems
AES	APS Engineering Support
XSD	X-ray Science

Physical Sciences and Engineering

CSE	Chemical Sciences and Engineering
HEP	High Energy Physics
MSD	Materials Science
NST	Nanoscience and Technology
PHY	Physics

FACILITIES, CENTERS, AND INSTITUTES

User Facilities

APS	Advanced Photon Source
ALCF	Argonne Leadership Computing Facility
ATLAS	Argonne Tandem Linear Accelerator System
ARM	ARM Southern Great Plains
CNM	Center for Nanoscale Materials

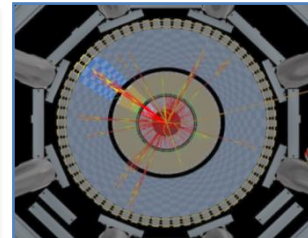
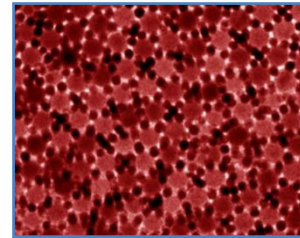
Centers and Joint Institutes

AAI	Argonne Accelerator Institute
ACCESS	Argonne Collaborative Center for Energy Storage Science
ADW	Argonne Design Works
ALI	Argonne Leadership Institute
CEES	Center for Electrochemical Energy Science
CTR	Center for Transportation Research
CRI	Chain Reaction Innovations
CI	Computation Institute
IACT	Institute for Atom-Efficient Chemical Transformations
IGSB	Institute for Genomics and Systems Biology
IME	Institute for Molecular Engineering
JCESR	Joint Center for Energy Storage Research
MCSG	Midwest Center for Structural Genomics
NSP	National Security Programs
NAISE	Northwestern-Argonne Institute for Science and Engineering
RISC	Risk and Infrastructure Science Center
SBC	Structural Biology Center

*Use-Inspired Science and Engineering ...
... Discovery and transformational Science and Engineering*



Major User Facilities



Science and Technology Programs

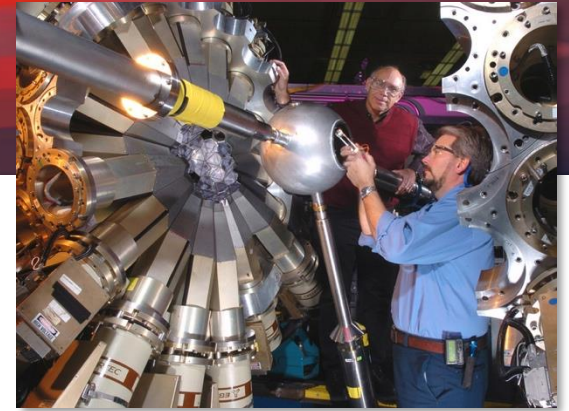
<https://www.anl.gov>

Major Scientific User Facilities at ANL

**Advanced
Photon
Source**



**Argonne Tandem Linear
Accelerator System**



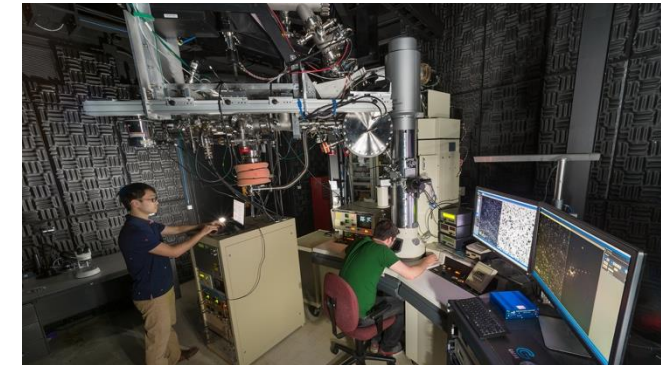
**Center for
Nanoscale Materials**



**Argonne
Leadership
Computing
Facility**



**Intermediate
Voltage Electron
Microscope**



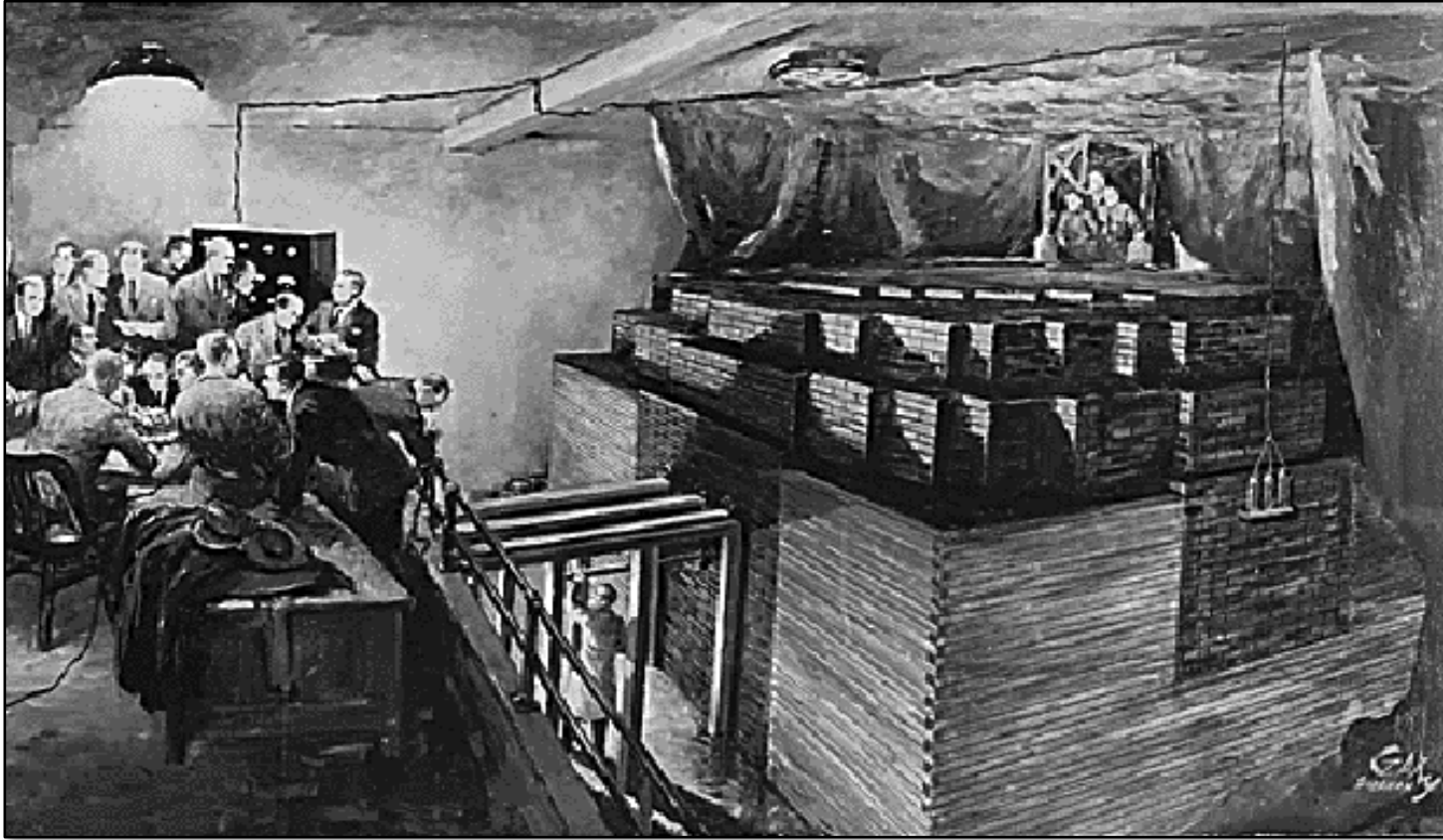
**Atmospheric
Radiation
Measurement**



extremecomputingtraining.anl.gov

The origin of Argonne National Laboratory

CP-1 under the bleachers of Stagg field at U. Chicago

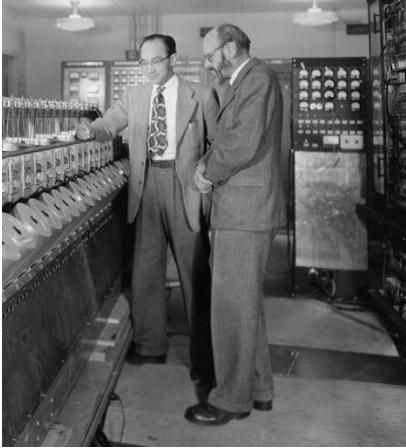


Chicago Pile-1 was the world's first artificial nuclear reactor. The first man-made self-sustaining nuclear chain reaction was initiated on December 2, 1942

See also

[*Chicago Pile-1: A Brick History*](#)

Early Computing at Argonne



Donald "Moll" Flanders, Director
Jeffrey Chu, Chief Engineer

- **AVIDAC (1949-1953)**: based on a prototype at the Institute for Advanced Study in Princeton
 - 100,000 times as fast as a trained "Computer" using a desk calculator



Mathematician Margaret Butler (ANL)
and ORNL Engineer Rudolph Klein

- **ORACLE (1953)**
 - Designed at Argonne, constructed at Oak Ridge.
 - World's fastest computer, multiplying 12-digit numbers in .0005 seconds (2Kop/s)

ALCF Timeline

2006-2008 Blue Gene/L

2008-2013 Blue Gene/P – Intrepid

2012-2019 Blue Gene/Q – Mira

2017-2023 Theta (KNL)

2022- Polaris

2023- Aurora

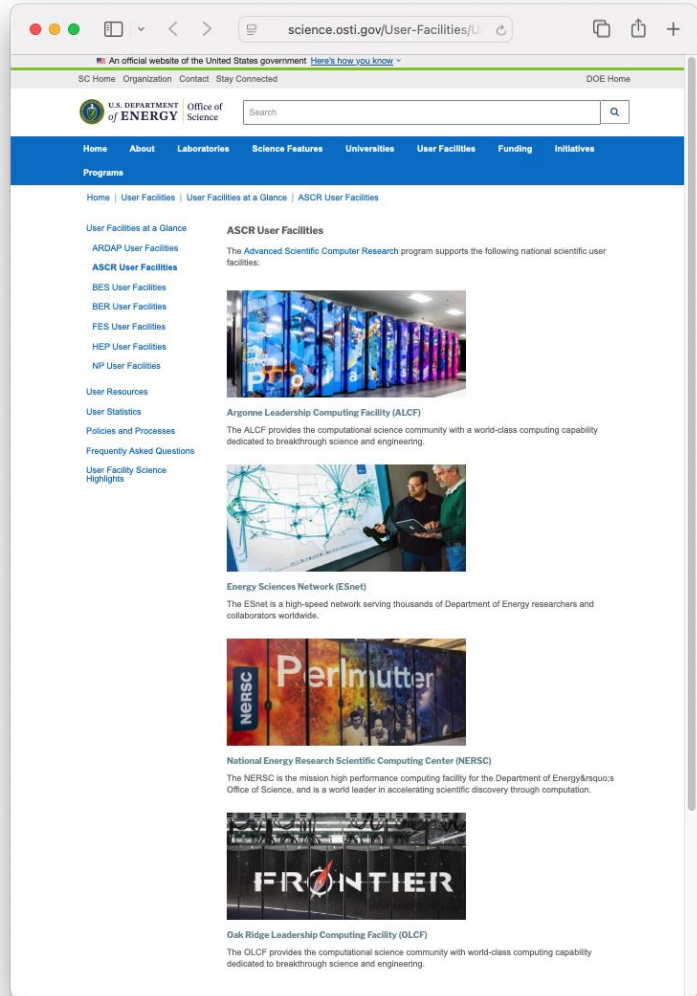
[TOP500 \(May 2024\):](#)

#2 HPL 1.012 EFlop/s

#1 HPL-MxP 10.6 EFlop/s



ATPESC Computing Resources



- **ALCF** – Aurora, Polaris, Sambanova/Metis, Cerebras, Graphcore, Groq
- **OLCF** – Frontier
- **(NERSC – Perlmutter system outage)**

<https://science.osti.gov/User-Facilities/User-Facilities-at-a-Glance/ASCR>

Curriculum Tracks and their leaders

- **Track 1:** Hardware Architectures – Kalyan Kumaran, Vitali Morozov
- **Track 2:** Programming Models and Languages – T. Applencourt, T. Mattson, R. Thakur, H. Zhou
- **Track 3:** Visualization and Data Analysis – Joseph Insley and Silvio Rizzi
- **Track 4:** Numerical Algorithms and Software for Extreme-Scale Science – Todd Munson
- **Track 5:** Performance Tools and Debuggers– JaeHyuk Kwack
- **Track 6:** Quantum Computing [NEW] – Laura Schulz
- **Track 7:** AI and Machine Learning [EXPANDED] – Shilpika
- **Track 8:** Software Productivity and Sustainability – David Bernholdt
- **Track 9:** Data-intensive Computing and I/O – Rob Latham
- **Track 10:** Vibe Coding [NEW] – Rick Stevens

<https://extremecomputingtraining.anl.gov/2026-agenda>

The screenshot shows a web browser window displaying the '2026 Agenda | ATPESC' page. The browser's address bar shows the URL 'extremecomputingtraining.anl.gov/2026-agenda'. The page has a blue header with navigation links: 'ATPESC', 'About', 'Apply', 'Attend', '2026 Agenda', and 'Past Programs'. The 'Argonne NATIONAL LABORATORY' and 'ALCF' logos are in the top right. Below the header, a breadcrumb trail reads 'HOME / 2026 AGENDA'. The main heading is '2026 Agenda'. There are two filter buttons: 'TOPIC' and 'TYPE'. The agenda is for 'Sun, Jul 26'. The schedule is as follows:

Time	Event
1:00 p.m.	Machine reservations: https://anl.box.com/s/g7jflgwvyptdiqlqo3w53r8edg94d0h Registration Opens
2:00 p.m.	Welcome and Introduction to ATPESC Ray Loy , Argonne National Laboratory
2:30 p.m.	Quick Start on Computing Resources with Hands-On JaeHyuk Kwack , Argonne National Laboratory
3:15 p.m.	Break
4:30 p.m.	Participant Introduction Section
6:30 p.m.	Dinner
7:30 p.m.	Adjourn

At the bottom, there is a search bar with the text 'thang' and search options: 'Highlight All' (checked), 'Match Case', 'Match Diacritics', and 'Whole Words'. It indicates '1 of 1 match'.

ATPESC Slack

- alcf-workshops.slack.com
- #announce
- #atpesc-2026-general for general discussion and Q&A during the program
- Topic-related channels (e.g. #atpesc-2026-track-1-hw)
 - See #announce channel pinned items for a list
 - Or Channels + option to browse
- Help
 - #atpesc-2026-helpdesk - general ATPESC administrative issue (not machines!)
 - #atpesc-2026-alcf-systems-help – LOGIN/MACHINE help for ALCF systems
 - #atpesc-2026-olcf-systems-help – LOGIN/MACHINE help for OLCF systems
- Try to not DM me unless you can't avoid it 😊
 - You will get help faster via #atpesc-2026-helpdesk

Help!

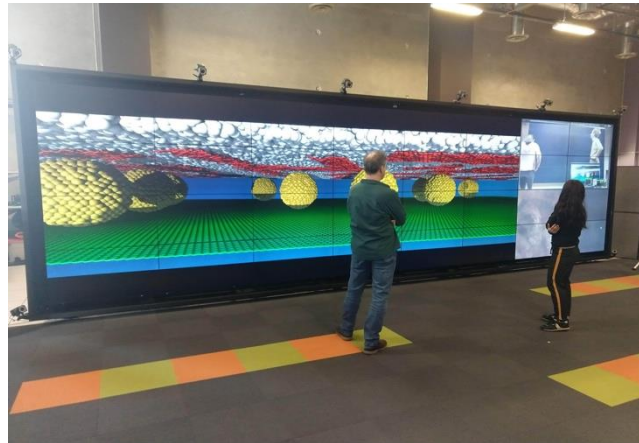
- ALCF accounts (Aurora, Polaris, Inference, Metia/SambaNova, Cerebras, Graphcore)
 - support@alcf.anl.gov (put ATPESC in subject) and slack #atpesc-2026-alcf-systems-help
- OLCF accounts (Odo)
 - Token issues, call: 865-241-6536 (24/7). Other questions, email: help@olcf.ornl.gov (put ATPESC in subject)
- ~~NERSC accounts (Perlmutter)~~
 - ~~accounts@nersc.gov (put ATPESC in subject) or call 1-800-666-3772~~
- ATPESC general support (not machines)
 - support@extremecomputingtraining.anl.gov
 - #atpesc-2026-helpdesk

ATPESC Conduct

- Over 70 speakers have taken time out to travel and speak ***for your benefit.***
 - *Please give them your attention.*
- You are expected to be present when we are in session
 - *You should not be leaving ATPESC to participate in other meetings, telecons, phonecalls*
- Please arrive in the morning promptly and be seated ***prior to the start.***
- *In case of illness or other unexpected problems – please talk to me.*

Argonne National Laboratory Tour (Sat 8/1)

- **APS – Advanced Photon Source (synchrotron)**
- **Nuclear Engineering Exhibit**
- **Data Center (Machine Room) in the Theory and Computing Sciences Building (TCS)**
 - **Aurora, Polaris, and others**
- **ALCF Visualization Lab**



Aerial view of Argonne National Laboratory

Advanced
Photon
Source
(APS)

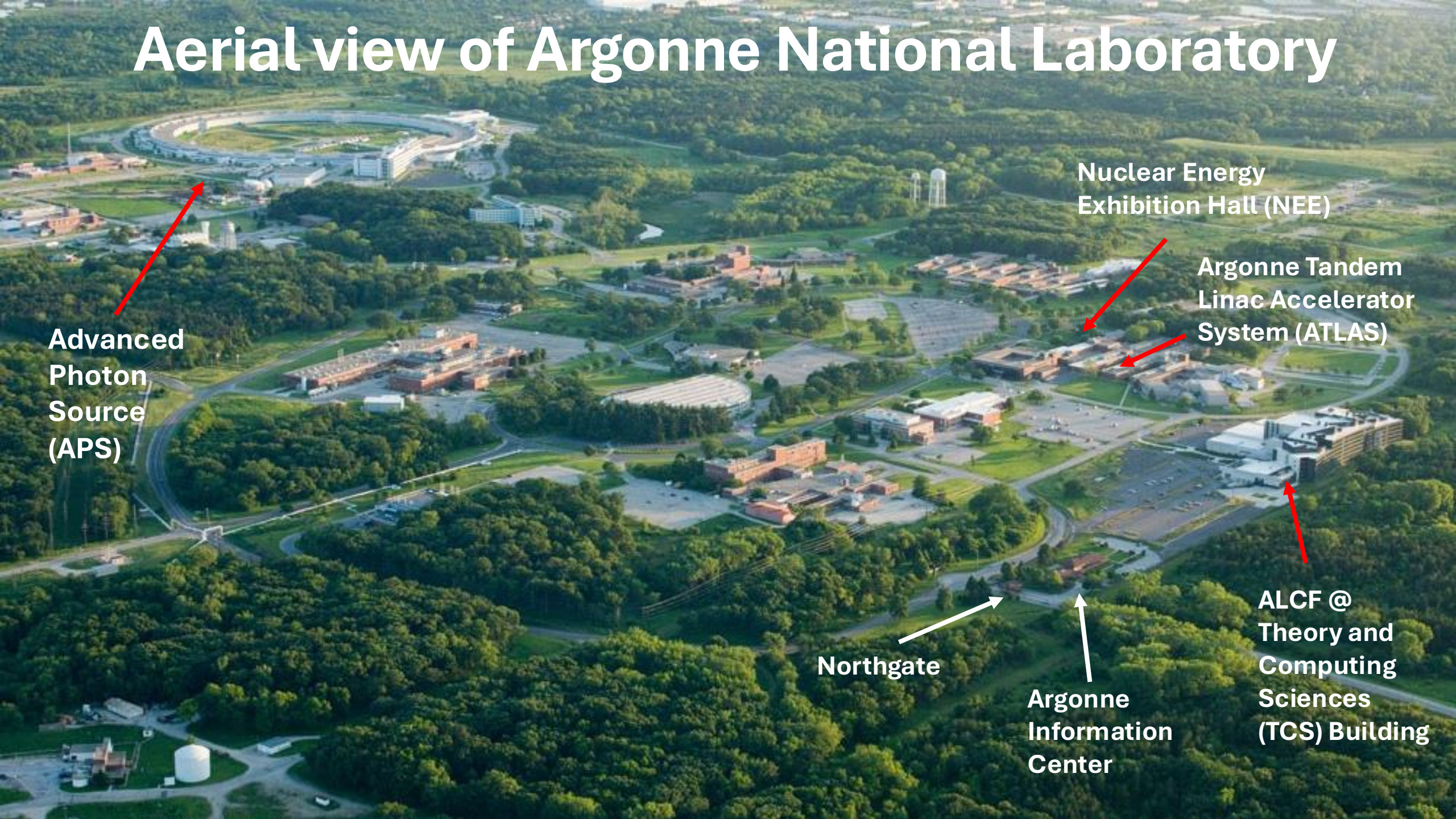
Nuclear Energy
Exhibition Hall (NEE)

Argonne Tandem
Linac Accelerator
System (ATLAS)

ALCF @
Theory and
Computing
Sciences
(TCS) Building

Northgate

Argonne
Information
Center



ARGONNE ATPESC2026 EXTREME - SCALE COMPUTING

ARGONNE TRAINING PROGRAM ON EXTREME-SCALE COMPUTING

Produced by Argonne National Laboratory, a U.S. Department of Energy Laboratory managed by UChicagoArgonne, LLC under contract DE-AC02-06CH11357.

Special thanks to the National Energy Research Scientific Computing Center (NERSC) and Oak Ridge Leadership Computing Facility (OLCF) for the use of their resources during the training event.

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