

28 May 2026

AI at Fermilab

Genesis Mission & Mission Support

Strategy, Tools and Solutions

Nhan Tran / Tammy Whited



U.S. DEPARTMENT
of **ENERGY**

Fermi National Accelerator Laboratory is managed by
FermiForward for the U.S. Department of Energy Office of Science



Topics

- The Genesis Mission
- Fermilab AI and Genesis
- Fermilab AI for Mission Support
- Open Discussion



PRESIDENTIAL ACTIONS

LAUNCHING THE GENESIS MISSION


Executive Orders

November 24, 2025

By the authority vested in me as President by the Constitution and the laws of the United States of America, it is hereby ordered:

Section 1. Purpose. From the founding of our Republic, scientific discovery and technological innovation have driven American progress and prosperity. Today, America is in a race for global technology dominance in the development of artificial intelligence (AI), an important frontier of scientific discovery and economic growth. To that end, my Administration has taken a number of actions to win that race, including issuing multiple Executive Orders and implementing America's AI Action Plan, which recognizes the need to invest in AI-enabled science to accelerate scientific advancement. In this pivotal moment, the challenges we face require a historic national effort, comparable in urgency and ambition to the Manhattan Project that was instrumental to our victory in World War II and was a critical basis for the foundation of the Department of Energy (DOE) and its national laboratories.



 Genesis Mission

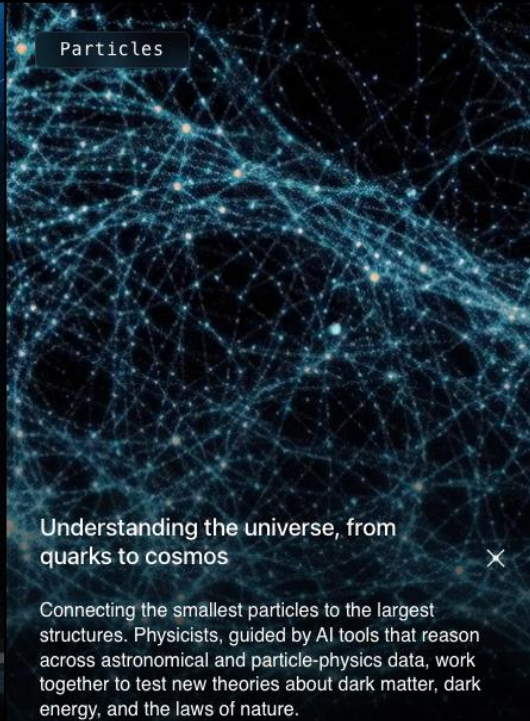
A National Mission to Accelerate Science Through Artificial Intelligence

Discovery Science

Molecules



Particles



Quantum





AI for Scientific Discovery



HEP and Neutrino
(DUNE, CMS, experiments)



Accelerator & Beam
Physics



Quantum Systems &
Algorithms (SQMS)



Microelectronics/
Devices

Frontier Models from Deep Domain Knowledge

Edge Intelligence • Surrogate Models • Foundational Models • Agents



Fermi Data Platform

Access • Curation • Network and Storage

Connected to
American Science
Cloud



World-leading Facilities and Experiments

Neutrino • CMS • Accelerator Complex •
Cosmic • SQMS



Expertise Across Scientific Lifecycle

Design • Control • Data • Simulation •
Theory • Discovery



Fermilab and Genesis Mission

<https://news.fnal.gov/2026/03/fermilab-drives-progress-for-national-ai-genesis-mission/>

“The Genesis Mission represents a once-in-a-generation opportunity to transform how America does science.”

Fermilab Director Norbert Holtkamp

Through these initiatives and more, Fermilab will help tackle ambitious, world-shaping challenges — and it comes to this work prepared. The lab brings decades of experience navigating complex challenges through large-scale collaborations with national laboratory partners, academia and industry.

“We’re also excited for what AI can mean for our operations at Fermilab,” Holtkamp added. “I believe AI can dramatically enhance the quality and efficiency for work across the laboratory. Not only will Fermilab help drive DOE’s Genesis Mission, but I believe Fermilab can also serve as a strong example in how AI can benefit the operations of the full U.S. national lab complex.”

Advancing accelerator science

Fermilab will contribute to a seven-lab collaboration known as the Multi-Office particle Accelerator Team, or MOAT. The initiative focuses on using AI to advance accelerator science by supporting more efficient operations and streamlined accelerator research and development. These efforts are expected to shorten commissioning timelines and reduce operating costs while extending the benefits of accelerator technology to a wider range of industry partners.

Speeding up chip design

One of Fermilab’s flagship contributions is AXESS, shorthand for Accelerating eXtreme Environment Specs-to-Silicon. This ambitious project aims to revolutionize custom microelectronics chip design for specialized scientific applications. Fermilab already has deep experience in creating chips that can function in extreme environments, such as cryogenic temperatures or intense radiation. By using AI to compress the design process from months to minutes, AXESS will significantly boost national competitiveness and speed up the pace of innovation.

Supporting American Science Cloud

The lab is also providing the Fermi Data Platform to support the emerging American Science Cloud. Fermilab is leveraging its extensive experience in handling the massive amounts of data created by particle collisions to provide large-scale data storage to the Genesis Mission. This infrastructure will enable researchers from across scientific disciplines to access the datasets needed to accelerate their own discoveries, effectively turning decades of physics data into a national resource.

Quickening theoretical calculations

Fermilab’s work in Lattice Quantum Chromodynamics, or Lattice QCD, will strengthen a multi-lab effort called FemtoMind. Lattice QCD is the framework physicists use to understand the strong force that binds subatomic quarks together to form protons. By applying agentic AI to quicken these complex calculations and uncover new patterns in computer simulations that probe physics at the proton scale, FemtoMind will deepen our understanding of the matter that makes up everything we see around us.

Creating AI-ready data representations

Fermilab will also contribute to the TREASURE initiative, which aims to make vast datasets more accessible for groundbreaking research. This program standardizes data from both current and retired particle colliders, including the Large Hadron Collider at CERN and the Tevatron at Fermilab, to create AI-ready representations of physics data for cross-experiment analysis. TREASURE will also convert research papers, datasets and code into user-friendly forms that can be trusted by scientists as they search for physics beyond the Standard Model.

Applying AI to astronomy

Fermilab’s contributions to the Genesis Mission will extend to astrophysics through the AI Universe effort. Researchers plan to apply advanced uncertainty-quantification methods to a state-of-the-art AI model trained on more than 200 million astronomical observations. This work provides astrophysicists with the tools necessary to make more precise predictions and identify meaningful patterns within large-scale astronomy datasets.

Connecting expertise

“AI is most powerful when it connects expertise across domains and institutions,” said Nhan Tran, head of AI coordination at Fermilab. “Through the Genesis Mission, we can integrate data, tools and expertise from all 17 national labs, creating a unified AI ecosystem that accelerates breakthroughs far beyond what any single lab could achieve.”



AI in Fermilab Mission Support

Policy and Ethics

Transparency and Accountability

When using AI to generate texts or graphics, clearly indicate that the material was created by AI. All AI-generated content must be reviewed for accuracy and checked against official and reliable sources.

AI as an Assistant

Use AI as a support tool for summarizing documents and creating informational resources. AI assists with routine tasks but does not replace our expert role or professional judgment.

No Misleading or Unethical Information

When using AI, ensure a balanced approach without distorting facts. All information to be verified, and sources checked to avoid misinformation.

Responsible Data Use

When working with AI, comply with data protection requirements. Use only properly anonymized data, open data, and publicly available documents.

Human Oversight

When using AI, we always ensure human supervision and expert review. All processes adhere to established ethical standards and guidelines for responsible AI use.

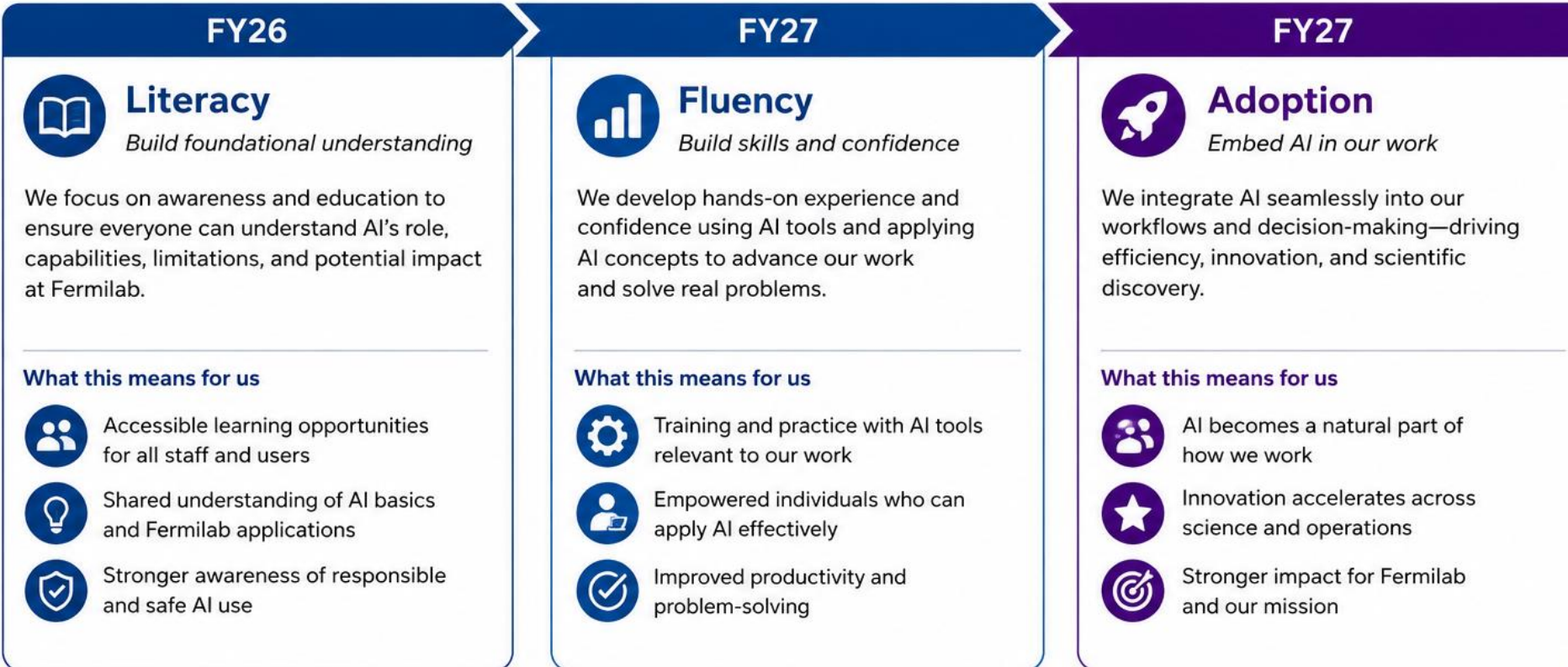
ETHICAL PRINCIPLES FOR WORKING WITH AI

- 1 Transparency and Accountability**
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Fermilab



AI in Fermilab Mission Support – AI Literacy





Enterprise AI Foundation & Tooling Expansion

Building a governed, scalable AI ecosystem that drives efficiency across operations

- **Core AI Platforms**

- **Ask Sage** – Lab-wide enterprise AI for workflow agents, retrieval-augmented guidance, and knowledge automation.
- **Microsoft Copilot** – Activated for leadership and mission-support teams; accelerates writing, synthesis and analysis and team collaboration.
- **Azure Foundry** – Supports advanced modeling, research workflows, and coding.
- **OpenWebUI** – Supports research directions with open-source models and platform dev

- **Extending AI into Tools We Already Own**

- Integrating AI into **Box**, **Zoom**, and other collaboration platforms to leverage existing investments to reduce cycle time, increase transparency, and improve data accessibility.
- Ensures AI is embedded where people already work — accelerating adoption while maintaining governance.

We are positioning AI as a force multiplier across existing platforms, strengthening operational efficiency and aligning with DOE expectations for streamlined operations.



Azure AI Foundry





High-Impact Wins: Developer & User Productivity

AI delivering measurable efficiency and quality improvements

- **Developer Success — Financial BI Dashboard**

- One developer + AI delivered a full production financial dashboard in **4 weeks** (vs. 3–6 months).
- Automated DAX measures, ETL pipeline, and documentation — now a single source of truth for a \$1.3B budget.
- Demonstrates how AI multiplies technical capacity and strengthens financial governance.

- **User-Facing AI Agents**

- **Policy Rollout Agent** -Reduces 8–12 hours of manual review to **~2 minutes**, generating policy briefs, personas, comms, and Q&A.
- **Statement of Work Generator** Saves **2–4 hours per SOW** across ~2,000 annual SOWs — reducing rewrites by ~50%.
- **Travel Assistant (Ask Sage)** Handles ~80% of routine inquiries; saves 2–3 hours/day in repetitive Q&A; provides consistent, policy-aligned responses.

AI is already reducing manual workload, improving consistency, and accelerating decision-quality information.



Operational Impact & Forward Strategy

AI as a catalyst for Lab-wide efficiency and operational excellence

- **Current Impact Across Operations**

- **Major Incident Management:** 100–200 hours/year saved through AI-generated summaries, leadership briefs, and improvement identification.
- **Quality & Compliance Workflows:** Faster, more consistent outputs through automated assessments and document generation.
- **Emerging Tools:** Log analysis bots, EVMS forecasting, project controls automation, Hazard and Work Planning assistant and documentation agents.

- **Forward Strategy (FY26–FY27)**

- Accelerate deployment of agentic AI pilots into operational systems.
- Embed AI into **other collaboration platforms** to unlock automation at scale.
- Expand workforce readiness through training, demos, and clear governance.
- Maintain alignment with DOE goals by emphasizing efficiency, reduced non-value-added work, and improved operational insight.

AI is becoming a foundational capability — improving mission readiness, reducing cycle time, and enhancing the quality of operational insights across the Lab.



Measurement - Trend of Adoption

Microsoft 365 Copilot usage

Filters: Periods: Past 90 days (Feb 3, 2026 - May 3, 2026) ▾

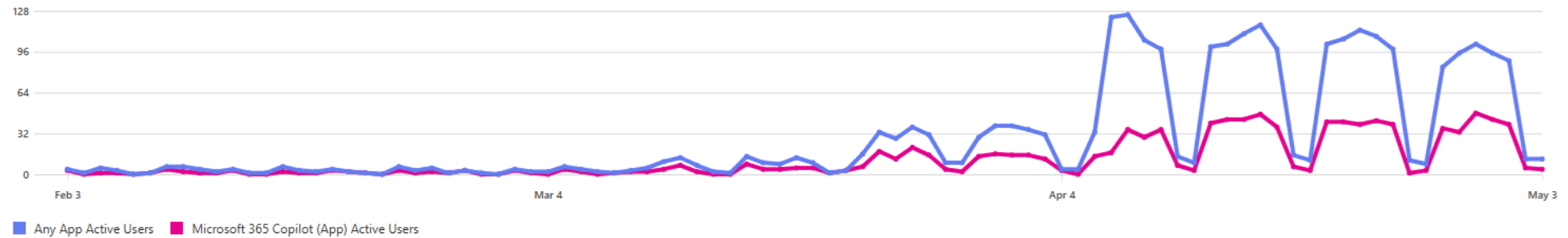
Enabled users **701** | Active users **472** | Active users rate **67.3%** | Total prompts submitted **15,107** | Average prompts submitted per user **32**

Adoption

Adoption by app

Summary **Trend** Apps: Any app, Microsoft 365 Copilot... × Metric: Active users

The number of enabled and active users of Microsoft 365 Copilot apps for the selected period [See metric definitions](#)





How does this benefit the community

Your tax dollars go further - AI helps us get work done faster and with fewer mistakes. That means less waste and more value from every public dollar invested.

Helps us solve problems that benefit everyone - AI speeds up the science that leads to new technologies, medical advances, and innovations that can improve daily life—right here and across the country.

Supports local jobs and education- As we modernize how the lab works, we create more opportunities for local students, teachers, and workers to learn new skills and take part in STEM careers.

Makes science easier to understand - With AI, we can explain complex ideas in simpler ways, helping the public stay better informed about the work being done in their own backyard.



Open Discussion

References available to public

- <https://artificialintelligence.fnal.gov/>
- <https://artificialintelligence.fnal.gov/collaborative-project-opportunities-genesis-mission/>