



AI for Nuclear Fusion Research: Data Protection and Sovereignty on AWS

Alberto Marcos González
Sr Account Manager - Research
AWS





Ciemat



Generative AI
application

Data Foundation

STORAGE

GOVERNANCE
& COMPLIANCE

DATABASES,
ANALYTICS,
& DATA LAKES

DATA
INTEGRATION

OPEN DATA

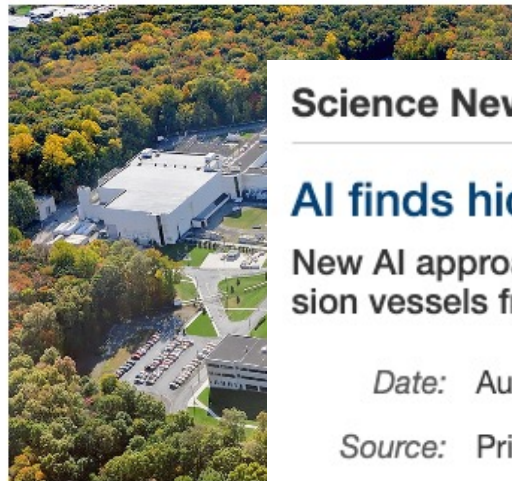


AI can predict and prevent plasma instabilities in

NVIDIA and General Atomics Built a Virtual Sun to Turn Star Power Into Real-Time Insight

written by Jerry Louis-Jeune | October 29, 2025

Mon, Mar 4, 2024, 9:59PM | Nuclear News



The Princeton Plasma Physics Laboratory

Science News

AI finds hidden

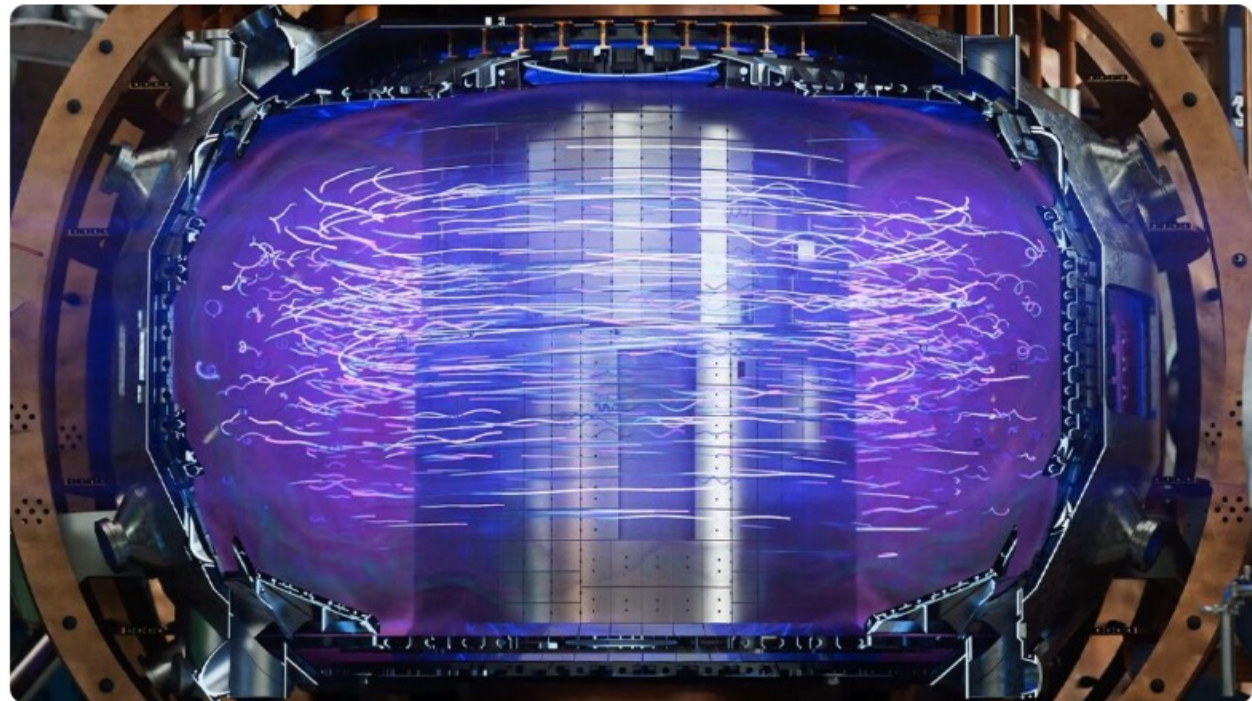
New AI approach
solves vessels for

Date: Aug

Source: Pri

Summary: Sci

A team of engineers, physicists, and computer scientists at the Princeton Plasma Physics Laboratory (PPPL) have developed a new AI approach to predict—and then avoid—plasma instabilities in fusion reactors. The team used a new AI model to predict instabilities in a tokamak reactor, using past experimental data from operations at the Princeton Plasma Physics Laboratory in San Diego, Calif., before proving through real-world experiments that the model could forecast so-called tearing mode instabilities—enough time for an AI controller to adjust or shut down the plasma that could potentially end the fusion process.



TL;DR: NVIDIA, General Atomics, and partners just unveiled an AI-enabled digital twin of the DIII-D National Fusion Facility. It slashes key plasma predictions from weeks down to seconds, letting researchers run interactive “what-if” experiments and iterate way faster toward practical fusion energy. Announced October 28, 2025 at NVIDIA GTC in Washington, D.C.

Generative AI is powered by foundation models

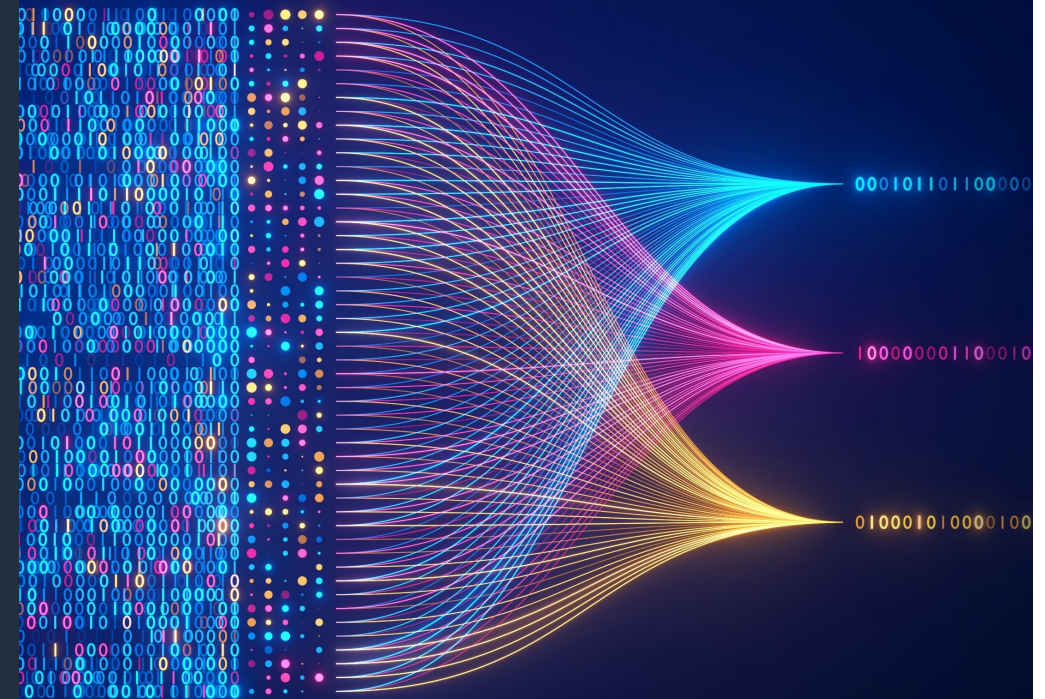
Pretrained on vast amounts of unstructured data

Contain large number of parameters that make them capable of learning complex concepts

Can be applied in a wide range of contexts

Customize FMs using your data for domain specific tasks

Ciemat

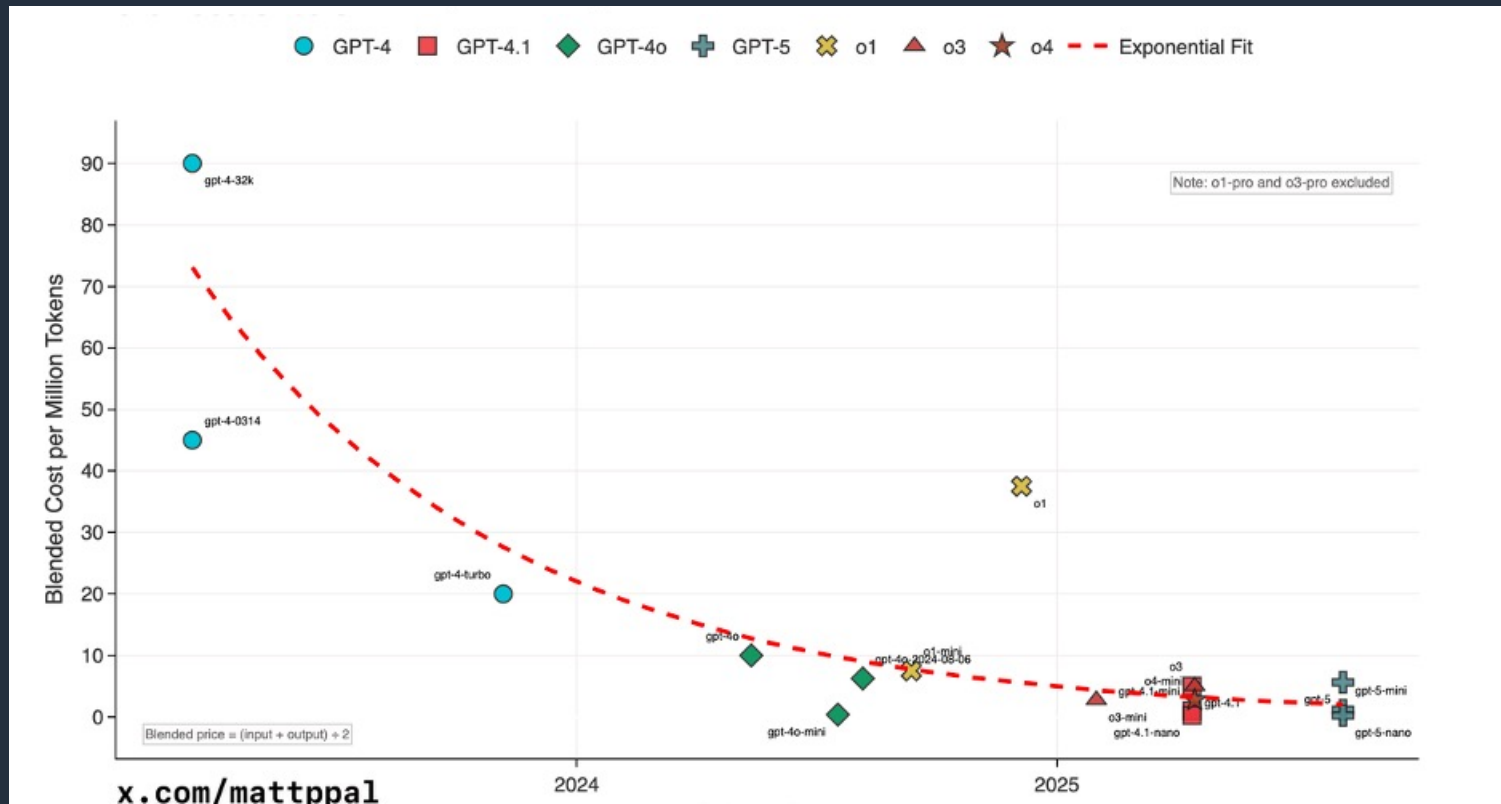


© 2025, Amazon Web Services, Inc. or its affiliates. All rights reserved.

INDRA
GROUP

What's changed? AI/ML trends

Ciemat



Source: NVIDIA



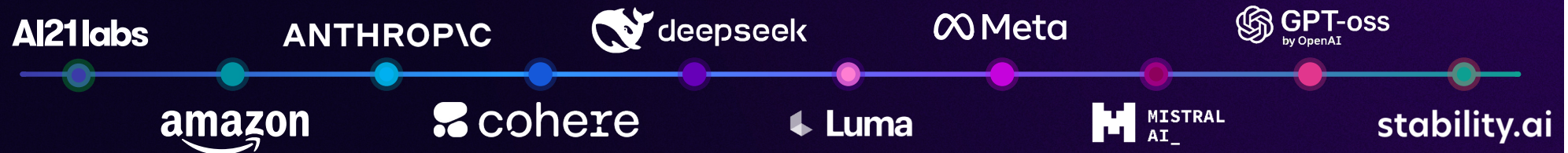
© 2025, Amazon Web Services, Inc. or its affiliates. All rights reserved.



Amazon Bedrock

Ciemat

BROAD CHOICE OF MODELS



Fine-tuning
Continued pre-training
Custom Model Import



Agents
Knowledge Bases (RAG)
Guardrails



Security of your data

None of the data is used to train the underlying model

All data is encrypted in transit and at rest

Data used to customize models remains within your VPC



© 2025, Amazon Web Services, Inc. or its affiliates. All rights reserved.

INDRA
GROUP

AWS Global Infrastructure Regions

Ciemat



N AMERICA

Canada Central
Canada West
GovCloud US-East
GovCloud US-West
Mexico
Northern California
Northern Virginia
Ohio
Oregon



EUROPE

Frankfurt
Ireland
London
Milan
Paris
Spain
Stockholm
Zurich
Germany (European Sovereign Cloud)



ASIA PACIFIC

*Beijing
*Ningxia
Hong Kong
Hyderabad
Jakarta
Malaysia
Mumbai
Osaka
Seoul
Singapore
Thailand
Tokyo
Taipei



S AMERICA

São Paulo
Chile



AFRICA

Cape Town



MIDDLE EAST

Bahrain
Tel Aviv
UAE
Kingdom of Saudi Arabia



AUSTRALIA & NEW ZEALAND

Melbourne
Sydney
Auckland



Available Region



Announced



© 2025, Amazon Web Services, Inc. or its affiliates. All rights reserved. Amazon Confidential and Trademark.



DEMO



© 2025, Amazon Web Services, Inc. or its affiliates. All rights reserved.

