Some (European) initiatives in AI and fundamental physics

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XQCD 2027 in Bielefeld

18-24 July 2027, including 2-day PhD school

23rd international conference on QCD under the extreme conditions of non-zero temperature and/or density

organisers: Christian Schmidt-Sonntag and colleagues

ARTIFICIAL INTELLIGENCE in NUCLEAR and HIGH-ENERGY PHYSICS



Central China
Center for Nuclear Theory
华中核理论中心

one-week workshop
Wuhan, China
6-10 Sept 2027

organisers: Gert Aarts, Tianji Cai, Long-Gang Pang, Jan Pawlowski, Kai Zhou

AIFORIA COST action

- Start date - 09/10/2026
- End date - 08/10/2030
- lead: Christof Weniger (UvA)
- join working groups via website
- European focus

www.cost.eu/actions/CA25172/

Artificial intelligence (AI) is transforming research across science and technology, and its impact on fundamental physics is accelerating. Next-generation European facilities such as the High-Luminosity LHC, FAIR, SKA, CTAO, LISA, the Einstein Telescope and Euclid will rely on AI to manage unprecedented data volumes and complexity. Yet current efforts remain fragmented across domains, infrastructures and career stages. AIFORIA will establish an open, inclusive European platform to coordinate AI activities across particle, astro-, nuclear, gravitational and cosmological physics, linking theoretical, experimental and observational research.

The Action will identify shared scientific challenges—trustworthy, interpretable and uncertainty-aware AI; scalable and energy-efficient architectures; physics-aware models embedding symmetries and causal structure; and FAIR benchmarks and datasets—and define community roadmaps to address them. It will promote interoperability between infrastructures and alignment with European AI and open-science strategies, including RAISE and EOSC. AIFORIA will strengthen research capacity and inclusiveness through training schools, hackathons and Short-Term Scientific Missions, with dedicated measures for Young Researchers and Inclusiveness Target Countries. Three Working Groups will cover scientific methods, shared infrastructure and benchmarking, and training and roadmapping.

Building on the European Coalition for AI in Fundamental Physics (EuCAIF) and connecting related European initiatives in AI for science, AIFORIA will consolidate expertise, establish common standards and benchmarks, and lay the foundation for a sustainable, trustworthy AI ecosystem supporting Europe's leadership in scientific discovery. It will accelerate integration of AI into the full research cycle—from experiment design to data interpretation—establishing a model for AI-driven discovery across scientific disciplines.

European Coalition for AI in Fundamental Physics

fellowships
working groups
annual conference
next one: Paris 13-17 Sept 2027

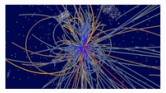
EuCAIF | Home | Activities | People | Material | How to join | Contact

Advancing AI and fundamental physics: A European cross-disciplinary research and training network



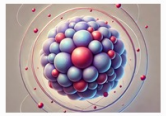
Theoretical physics

Crafting mathematical frameworks to predict and explain the fundamental laws of nature.



Particle physics

Unlocking the secrets of the tiniest building blocks of the universe.



Nuclear physics

Studying atomic nuclei to understand the forces that power stars and shape the elements around us.



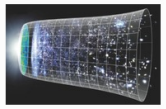
Astroparticle physics

Exploring cosmic rays, neutrinos, and dark matter to reveal the universe's mysteries.



Gravitational waves

Listening to the ripples in spacetime to witness the most violent cosmic events.



Cosmology

Investigating the origins, evolution, and ultimate fate of the universe on the grandest scales.



Accelerator physics

Pushing the frontiers of technology to accelerate particles and probe the structure of matter.

eucaif.org/

SCIANCE: AI in Science

Shaping AI in Science, by Scientists, for Europe

The EU-funded SCIANCE project supports the development of the Resource for AI Science in Europe (RAISE) and coordinates AI-enabled scientific research across Europe through a bottom-up approach. The project mobilises leading European scientific organisations and research infrastructures across five pilot areas together with AI research centres and e-infrastructures. SCIANCE will identify AI-in-science research and innovation priorities and pilot the structure of the RAISE Secretariat for AI in science.



www.sciance.eu/

Scientific Pilot Areas

SCIANCE focuses on five key scientific domains where AI has the strongest potential to transform research and deliver societal impact. These pilot areas represent fields where Europe already demonstrates global scientific leadership, supported by world-class research infrastructures and strong collaborative communities.

By working closely with experts across these domains, SCIANCE identifies shared challenges, explores domain-specific AI applications, and captures cross-disciplinary innovation opportunities. The pilot areas serve as the foundation for defining research priorities in the Strategic Research & Innovation Agenda (SRIA) and for identifying infrastructure needs that will enable AI-driven scientific breakthroughs across Europe.



Astronomy & Fundamental Physics

Coordinated AI adoption will accelerate discoveries in fundamental physics and astrophysics.



Materials Science

AI-driven coordination will speed up innovation and industrial adoption.



Earth Science

Better integration of AI will translate data into actionable knowledge for climate and environmental policies.



Life Sciences

Coordinated AI adoption ensures faster, reproducible research while respecting ethical and legal frameworks.



Social Sciences & Humanities

Collaboration across disciplines enhances insights into society and culture.

Astronomy and Fundamental Physics

SCIANCE co-chairs: Sascha Caron (Nikhef) & Anna Scaife (MU)

- Maria Girone (CERN)
- Pietro Vischia (Departamento de Física and ICTEA, Universidad de Oviedo)
- Rosie Bolton (SKAO)
- Ik Siong Heng (University of Glasgow)
- Manuel Perger (Institut de Ciències de l'Espai (ICE-CSIC))
- Mario Krenn (University of Tübingen)
- Andreas Ipp (TU Wien)
- Gert Aarts (Swansea University/Bielefeld University)
- Marijke Haverkorn (University of Nijmegen)
- Tommaso Dorigo (INFN – Sezione di Padova)
- Daniela Huppenkothen (University of Amsterdam)
- Chris Messenger (Univeristy of Glasgow)
- Manlio De Domenico (University of Padua)
- Caterina Doglioni (University of Manchester)
- Adnan Ghribi (CNRS/GANIL/CEA/CERN)
- Maurizio Pierini (CERN)

experience so far:
input is taken from white papers, reviews, community papers…

need for a community paper on AI/ML for LFT, with European focus