

## **Zoommeeting Digitization Board 6.6.24, 8:30-9:15**

KAT, Andreas Haungs, KFN, Bastian Märkisch, KFS, KFSI, KfB, Erik Bründermann, RDS, Tobias Buck, KHuK, Tobias Stockmanns, Sören Lange, KET, Günter Quast, FI, Matthias Hoeft, Kilian Schwarz, BDA, Jan Steinheimer, RDM, Hans-Georg Steinrück, UI, Pierre Schnizer, Tim Ruhe, KD, Judith Reindl, RPB, EuCAIF, Johan Messchendorp, ErUM-Data-Hub, Angela Warkentin, SP, Martin Erdmann

### **EuCAIF: European Coalition for AI in Fundamental Physics** Johan Messchendorp

The EuCAIF initiative on AI in fundamental physics originates from discussions in Madrid 2022 <https://indico.cern.ch/event/1040535>, Bologna 2023 <https://agenda.infn.it/event/34738>, and had its first dedicated conference in Amsterdam 2024 <https://indico.nikhef.nl/event/4875>. Next: Sardinia 29.4.-2.5.25.

EuCAIF combines efforts of the European Committee for Future Accelerators ECFA, Nuclear Physics European Collaboration Committee NuPECC and Astroparticle Physics European Consortium APPEC. The preliminary EuCAIF structure comprises a **management board** (5 people), a **core group** (40 staff scientists), an **international advisory board**, and **EuCAIF members** (scientists working on AI in fundamental physics). Currently, **five working groups** drive the contents of common interests. Excerpt of Johans Slides can be found below.

The goals of the European EuCAIF appears to be very similar to our national DIG-UM/ErUM-Data initiative. Nationally, we include all research on Universe and Matter at large research infrastructures, i.e. KAT/KET/KfB/**KFN/KFS/KFSI**/KhuK/RDS. *The Digitization Board encourages EuCAIF to take also synchrotron, neutron, and ion research on board.*

In order to foster national-international connections, the *Digitization Board will invite Johan as EuCAIF representative to its forthcoming meetings.*

### **ESFRI, the European Strategy Forum on Research Infrastructures**

The members of the plenary of the ESFRI Forum on 5-6 June, which includes representatives of the Research Ministries of the EU Member States, have appointed our colleague Dr. Astrid Schneidewind from FZJ as the new Chair of the Strategic Working Group (SWG) for the Physical Sciences and Engineering (PSE) domain of ESFRI, which is the most relevant ESFRI domain for the Helmholtz Research Field Matter. Astrid is appointed during the exciting times of the final preparation of the ESFRI Roadmap 2026 and will see the development of the (new) ESFRI projects, as well as the ESFRI landmarks of the PSE domain from the inside. *Congratulations to Astrid on her new role in ESFRI!*

### **Nature Publication without Source Code**, email information by Bridget Murphy

The Nature publication on protein structure predictions “Accurate structure prediction of biomolecular interactions with AlphaFold3” has been published without source code which worries scientists worldwide. Nature’s statement: <https://www.nature.com/articles/d41586-024-01463-0>. This topic will be on the next agenda as no one in the meeting could explain the situation.

### **Next events organized by/supported by the ErUM-Data-Hub**

**10-June-24:** ErUM-Data Connect: Network Day onsite Aachen preparing the ErUM-Data call, Lunch & Dinner. All Topic Groups are invited to introduce themselves (very briefly) and their mailing lists.

About 40 participants are registered. <https://indico.desy.de/event/44471>

**17-June-24:** virtual Sustainability „Pitch & Discussion Workshop“, six 1-Slide Pitches: 3-5 Min/Person, ~15 participants are registered. <https://indico.desy.de/event/44490>

**18-20-June-24:** Analysis Facility Workshop, Garching, <https://indico.desy.de/event/44722>

### **Next Meetings:**

Next Meeting **27-Jun-2024**, 8:30-9:30 **Topic Group Chairs & Deputies**

Next Meeting **11-Jul-2024**, 8:30-9:30 **Digitization Board**

EuCAIF is an European initiative for advancing the use of Artificial Intelligence (AI) in Fundamental Physics. Members are working on particle physics, astroparticle physics, nuclear physics, gravitational wave physics, cosmology, theoretical physics as well as simulation and computational infrastructure.

2019



## Objectives & Activities of EuCAIF

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### Objectives and Key Focus Areas

- Promote Cross-disciplinary Collaboration
- Promote the integration of AI/ML into Data & Computing Infrastructure for Current and Upcoming Experiments
- Promote the development of Novel Algorithms for Physics
- Promote and validate Benchmarks, Open Data and (upcoming) scientific AI systems like question answering machines
- Training and Education and Outreach
- Infrastructure and Resources

### Concrete Activities

- Workshops and Conferences
- Initiate new Research Projects
- Data Challenges and Benchmarks
- Training Programs and Outreach activities
- Networking and Exchange
- Webpage and Online Presence

## Organisation, very preliminary, unofficial yet!

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EuCAIF management board  
(5 people, rotating)

EuCAIF "Core group"  
about 40 staff scientists, organizers of EuCAIF rotating to management board)

+ International  
Advisory Board

**EuCAIF members:** Scientists will be able to ask for membership (members are working on AI in fundamental physics, tasks: coming to the conferences + working groups, system *to be installed*)

# EuCAIF "core group"

## The organizers of EuCAIF

Helena Albers (GSI/FAIR, Germany), Lucio Anderlini (INFN Firenze, Italy), Anastasios Belias (GSI/FAIR, Germany), Valerio Bertone (IRFU, CEA, Université Paris-Saclay, France), Elena Cuoco (European Gravitational Observatory and Scuola Normale Superiore, Italy), Sascha Caron (Radboud University and Nikhef, Netherlands), Stefano Carrazza (Milan University & INFN, Italy), Caterina Doglioni (University of Manchester, endorser, United Kingdom), Tommaso Dorigo (INFN Padova and University of Padova, Italy), Thomas Eberl (ECAP / FAU Erlangen-Nürnberg, Germany), Martin Erdmann (RWTH Aachen University, Germany), Stefano Forte (Milan University, Italy), Julian Garcia Pardinias (CERN), Tobias Golling (University of Geneva, Switzerland), Stephen Green (University of Nottingham, United Kingdom), Eilam Gross (Weizmann Institute, Israel), Will Handley (University of Cambridge, United Kingdom), Lukas Alexander Heinrich (CERN), Ik Siong Heng (University of Glasgow, United Kingdom), Verena Kain (CERN), Gregor Kasieczka (University of Hamburg, Germany), Andreas Ipp (TU Wien, Austria), Johan Messchendorp (GSI/FAIR, Germany), Lorenzo Moneta (CERN), Daniel Nieto (IPARCOS, Universidad Complutense de Madrid, Spain), Adrian Oeftiger (GSI/FAIR, Germany), Hiranya Peiris (University of Cambridge, United Kingdom), Maurizio Pierini (CERN), Annalisa Pillepich (MPI, Heidelberg, Germany), Tilman Plehn (Heidelberg University, Germany), David Rousseau (JCLab, CNRS/IN2P3, U Paris-Saclay, France), Roberto Ruiz de Austri (IFIC/CSIC and University of Valencia, Spain), Veronica Sanz (Sussex&Valencia, United Kingdom & Spain), Steven Schramm (University of Geneva, Switzerland), Steffen Schumann (University of Göttingen, Germany), Nicola Serra (University of Zürich, Switzerland), Roberto Trotta (SISSA and Imperial College London, Italy & United Kingdom), Sofia Vallecorsa (CERN), Pietro Vischia (Universidad de Oviedo and ICTEA, Spain), Benjamin Wandelt (Institut d'Astrophysique de Paris, Sorbonne Université, France), Christoph Weniger (University of Amsterdam, Netherlands), Gabrijela Zaharijas (Center for Astrophysics and Cosmology (CAC), University of Nova Gorica, Slovenia)

If you like to follow the activities of EuCAIF please join the following e-group: [eucaif-info@cern.ch](mailto:eucaif-info@cern.ch)  
—> get membership of CERN e-group, checkout <http://cern.ch/egroups>

30 April 2024 to 3 May 2024  
Amsterdam, Hotel CASA  
Europe/Amsterdam timezone

<b>Overview</b>	<b>Plenary speakers</b>
Timetable	Confirmed plenary speakers for talks & panel discussions
Searchable timetable	<ul style="list-style-type: none"><li>Thea Klæboe Aarrestad (ETH Zurich)</li><li>Amber Boehlein (Jefferson Lab)</li><li>Daniele Bonacorsi (University of Bologna)</li><li>Kyle Cranmer (University of Wisconsin-Madison)</li><li>Miles Cranmer (University of Cambridge)</li><li>Elena Cuoco (European Gravitational Observatory)</li><li>Verena Kain (CERN)</li><li>Gregor Kasieczka (University Hamburg)</li><li>Siddharth Mishra-Sharma (AIFI/Harvard/MIT)</li><li>Anna Scaife (University of Manchester)</li><li>Matthew D. Schwartz (Harvard University)</li><li>Sofia Vallecorsa (CERN)</li></ul>
Mobile phone app	Confirmed speakers for the public evening event
Contribution List	<ul style="list-style-type: none"><li>Caterina Doglioni (Manchester University)</li><li>Michela Paganini (DeepMind)</li><li>Max Welling (University of Amsterdam)</li><li>Moderator: Martijn van Calmthout (Nikhef)</li></ul>
Insert cards	
EuCAIF workgroups	
Zoom broadcast of plenary program	
Scientific advisory board	
<b>Plenary speakers</b>	
Venue & Fee	
Code of conduct	
Wednesday evening event	
Parallel sessions instructions	
<b>Contact</b>	
<ul style="list-style-type: none"><li>cweniger@uva.nl</li><li>scaron@nikhef.nl</li></ul>	

~250 participants

11 plenary talks

4 panel discussion

>160 parallel talks+posters

5 working group meetings

## EuCAIF workgroups

<b>1 Foundation models &amp; discovery</b> <a href="#">Sign up here to WG1</a> Tentative mission/goals: The current pinnacle of AI are so-called foundation models (FMs) as pioneered in LLMs like ChatGPT or image generators like DALL-E. Multimodal FMs centralize information from various data modalities and domains and encode them in a common meaningful latent representation. They offer an opportunity to go from narrow task-centric applications to general-purpose tasks. This session will serve as a platform to discuss the potential transformative impact of FMs for fundamental science and discovery in particular, and how we can as a community foster progress.	<b>3 FAIR-ness &amp; Sustainability</b> <a href="#">Sign up here to WG3</a> Tentative mission/goals: <ol style="list-style-type: none"><li>review existing activities exist in fundamental physics that strive to make ML algorithms Findable, Available, Interoperable and Reproducible (may include ML datasets)</li><li>understand what the barriers to making ML FAIR are - this includes availability of standardised tools and computing facilities for retraining or using someone else's model</li><li>discuss steps to facilitate and promote FAIR ML in fundamental science</li><li>start efforts to review and frame the environmental sustainability of ML algorithms (potential discussion of 'trade-off with performance')</li></ol>
<b>2 AI-assisted co-design of future ground- and space-based detectors</b> <a href="#">Sign up here to WG2</a> Tentative mission/goals: <ol style="list-style-type: none"><li>"Identify existing design paradigms for particle and astroparticle physics instruments which have become obsolete in the AI era, and assemble software strategies and research paths to overtake them"</li><li>"Support the development of simulation tools that constitute enablers of co-design approaches to holistic optimization for detector use cases in HEP, astro-HEP, nuclear and neutrino physics."</li><li>"Understand physical limits of information generated by particle interactions in granular calorimeters and conditions for its lossless extraction, as a preliminary step toward the AI-assisted hybridization of calorimeters and tracking detectors into optimized variable-density systems"</li></ol>	<b>4 JENA WP4: Machine Learning and Artificial Intelligence Infrastructure</b> <a href="#">Sign up here to WG4</a> Tentative mission/goals: The mission of the Joint ECUFA-NuPECC-APPEC (JENA) Computing Initiative's Machine Learning (ML) and Artificial Intelligence (AI) Working Group is to strategize and implement European federated computing solutions for future large-scale research facilities. Through a comprehensive survey, we aim to assess and quantify the resource needs of physicists to run ML workloads effectively.
<b>5 Building bridges: Community, connections and funding</b> <a href="#">Sign up here to WG5</a> Mission/goals: ML in particle physics is a very small field, and the way we usually operate is that we identify field-specific opportunities and challenges and then develop new solutions together with ML-experts from other fields (or based on their work). The obvious questions are (i) how can we make this communication more efficient? And, (ii) how can we organize a proper feedback loop, so our solutions are used by the ML community?	<b>Open for other workgroups</b>

## DIG-UM and EuCAIF

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- **Synergetic objectives for a successful “digital transformation”:**

- Realise community requirements/ambitions w.r.t. budgets/strategies of funding agencies (roadmaps, white papers, strong lobby).
- Harmonise strategies and activities on several scales including institutional, national, European, and international levels with a *domain-driven* basis.
- Provide future prospects for the next generation (talented) “digital-oriented” researchers: education, training, job perspectives, ....

- **DIG-UM and EuCAIF:**

- Similar purpose: promote digitisation in *basic* research.
- DIG-UM: German KAT/KET/KfB/KFN/KFS(I)/KhuK/RDS <—> BMBF.
- EuCAIF: European ECFA/NuPECC/APPEC <—> EU++.
- Commonality in people, institutes, infrastructures, and topics.
- Both consortia founded via a bottom-up approach, EuCAIF just starting.
- *Win-win* to collaborate: share information, synchronise strategies & projects, and commonly organise workshops, schools, etc. reaching a larger community.

