ECFA Chair Report

Plenary ECFA Meeting

CERN, 16th November 2023

Karl Jakobs, ECFA Chair
University of Freiburg / Germany

ECFA
European Committee for Future Accelerators

Outline

1. Brief update on Detector R&D Roadmap Implementation
2. Brief update on the ECFA e^+e^- Higgs/EW/Top factory studies
3. ICFA Seminar 2023 at DESY
4. Joint ECFA-NuPECC-APPEC Activities
5. ECFA Schedule 2024

1. Brief Update on the ECFA Detector R&D Roadmap Implementation

- Five proposals have been submitted (DRD1, DRD2, DRD3, DRD4, DRD6) and are under review by the DRDC

  DRD5 (quantum, emerging technologies) and
  DRD7 (electronics, transversal activity) will submit proposals by the end of this year
  (due to: internal coord. (DRD5), coordination with other DRDs (DRD7))

  DRD8: proposal (integration, mechanics, cooling)
  proposal may be submitted at a later stage

- DRDC is in an intense phase of work

  Aim to express recommendations (or not) for approval in early December → CERN Research Board

  → Report by Th. Bergauer at PECFA meeting on 17 Nov

http://committees.web.cern.ch

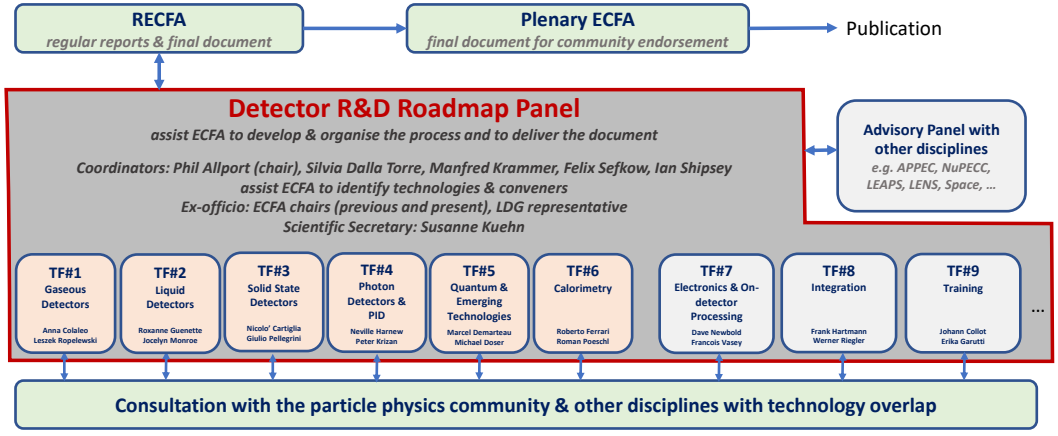
BERGAUER, Thomas	HEPHY, Vienna, **Chairperson**
TROSKA, Jan	CERN, **Scientific Secretary**
Members - Referees	
BENTVELSEN, Stan	NIKHEF
BRESSLER, Shikma	Weizmann Institute of Science
BUDKER, Dimitry	Helmholtz Institute Mainz and Johannes Gutenberg University
FORTY, Roger	CERN
GEMME, Claudia	INFN and University, Genoa
GIL BOTELLA, Ines	CIEMAT
MERKEL, Petra	Fermilab
PESARESI, Mark	Imperial College
SERIN, Laurent	IJCLab - Laboratoire de physique des 2 infinis
Members Ex-officio	
ALLPORT, Phil	ECFA Detector Panel (EDP) Co-Chair
CONTARDO, Didier	ECFA Detector Panel (EDP) Co-Chair

Brief Update on the ECFA Detector R&D Roadmap Implementation (cont.)

Issues to be addressed:

- Organisational structure of DRDs
  (Spokesperson(s), management, Institute Board, …)
- Memoranda of Understanding (→ CERN)
- Involvement of Funding Agencies (→ CERN)
  RRB-like structure to be set up

Detector R&D Roadmap Panel



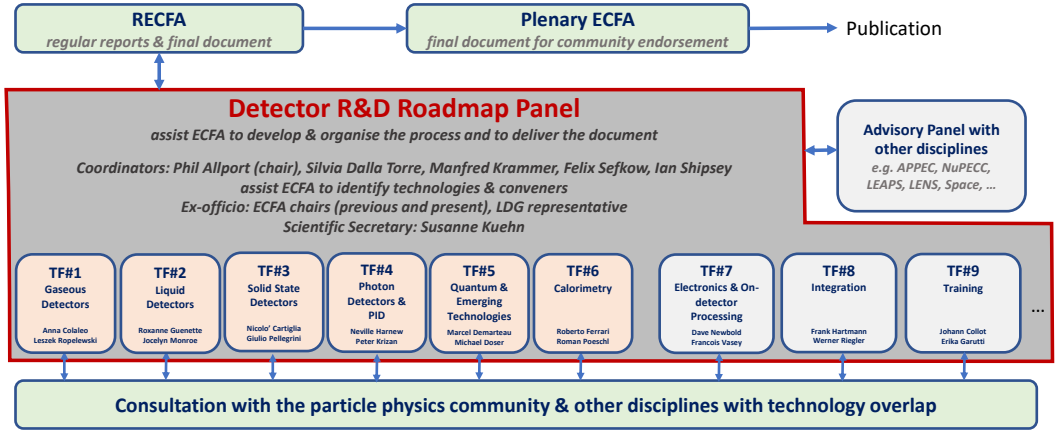
- The full roadmap process (development of the **ECFA Detector R&D Roadmap** and its **implementation towards a structured R&D programme**) have been coordinated by the ECFA Detector Roadmap Panel and in particular by the Coordination group (see above)
  Chair: Phil Allport (Birmingham)

- Given that the work is accomplished, there is no need to organise further meetings;
  DRDs are the new units, review and monitoring process is under the umbrella of the DRDC / EDP

- If needed, the ECFA Detector Panel (EDP) will organise meetings of common interest across DRDs in the future and provide a forum for the DRD leaders to meet

- In addition, the EDP can organise work and prepare input for the next Strategy Update

Detector R&D Roadmap Panel



Thanks to the **Coordination Group** and the **Task Force Leaders and members** for their excellent work over the past years in defining the roadmap and its implementation

Special Thanks to **Phil Allport** for his leadership throughout the entire process and for his dedication!

ECFA Detector Panel (EDP)

The ECFA Detector Panel (EDP) is a subcommittee of ECFA, hosted at DESY
https://ecfa-dp.desy.de/

Mandate:

- Direct input on DRD proposals, through the appointment of members to the DRDC;
- Assists, particularly via topic-specific expert members, in the conduct of annual DRDC reviews;
- Monitors the overall implementation of the ECFA detector roadmap follows up targets and achievements in the light of evolving specifications from experiment concept groups, as well as proto-collaborations for future facilities
- Helps plan for future updates to the Detector R&D Roadmap.

Composition:

Co-Chairs:	**Phil Allport (Birmingham)** **Didier Contardo (IP2I Lyon)**
Scientific Secretary:	Doris Eckstein (DESY)
Gaseous Detectors:	Silvia Dalla Torre (Trieste)
Liquid Detectors:	Inés Gil Botella (CIEMAT, Madrid)
Solid State Detectors:	Doris Eckstein (DESY)
PID & Photon Detectors:	Roger Forty (CERN)
Quantum and em Tech.	Steven Hoekstra (Groningen)
Calorimetry:	Laurent Serin (IJCLab)
Electronics:	Valerio Re (Bergamo)
Ex Officio:	Thomas Bergauer (DRDC) Karl Jakobs (ECFA Chair) Ian Shipsey (ICFA Detector Panel)
Observer:	Aldo Ianni (APPEC, LNGS) Eugenio Nappi (NuPECC, Bari)

Detector R&D Roadmap: General Strategic Recommendations

GSR 1 - Supporting R&D facilities

GSR 2 - Engineering support for detector R&D

GSR 3 - Specific software for instrumentation

GSR 4 - International coordination and organisation of R&D activities

GSR 5 - Distributed R&D activities with centralised facilities

GSR 6 - Establish long-term strategic funding programmes

GSR 7 - Blue-sky R&D

GSR 8 - Attract, nurture, recognise and sustain the careers of R&D experts → ECFA Training Panel

GSR 9 - Industrial partnerships

GSR 10 - Open Science

ECFA-LDG Working group to address the remaining General Strategic Recommendations has started its work
Chairs: Stan Bentvelsen (Nikhef) and Marko Mikuz (Ljubljana) → report in PECFA tomorrow

In addition: GSR5 needs to be addressed (DRD7 and LDG are working on a first proposal)

“TF9” on “Training”

The conclusions of the detector R&D roadmap document (https://cds.cern.ch/record/2784893) explicitly stress the need to train and maintain a work force in instrumentation for particle physics, targeting, with the highest priority, graduate students and Early Career Researchers (ECR).

→ **ECFA Training Panel** has been set up;

Chairs: Erika Garutti (Univ. Hamburg), NN (2nd coordinator still to be found)

Goals:

- Enhance the synergies between existing training programmes and stimulate the creation of complementary ones where relevant, in particular multidisciplinary schools or academia-industry-joined training programmes.
- Creation of a European master's degree programme in HEP instrumentation

During the roadmap process it was realised that there was a mutual interest to also involve training in accelerators and to support cross-disciplinary activities with this area. As a result, the recommendations state that the same panel should also coordinate the synergies between HEP instrumentation and accelerator training provision.

Update on the ECFA Detector R&D Roadmap Implementation (cont.)

- First meeting held early October

- Task list defined: (i) Web page (needs financial support)

(ii) Meeting with instrumentation school organisers planned)

(iii) Setting up a European Master programme (longer term)

High priority: find a second co-coordinator to work together with Erika Garutti;

Please send any suggestions you may have to us!
Self nominations from PECFA members are welcome!

(us = Erika Garutti, Patricia Conde Muiño, Karl Jakobs)

2. Brief summary on the 2nd workshop on ECFA e^+e^- activities

2nd ECFA workshop

- Hosted by INFN Napoli & Univ. Napoli
- **A successful workshop**
  - Attended by ~140 participants (including participants from the US and Asia)
  - Good discussions, guided by focus topics

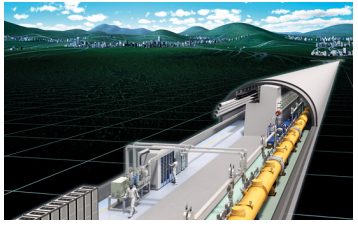
https://agenda.infn.it/event/34841/

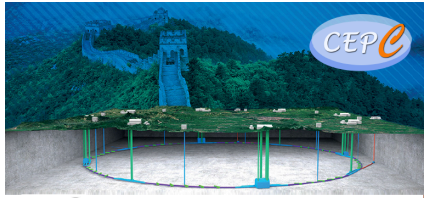
ECFA Study on Physics, Experiments and Detectors at a Future e^+e^- Factory

"ECFA recognizes the need for the experimental and theoretical communities involved in physics studies, experiment designs and detector technologies at future Higgs factories to gather. ***ECFA supports a series of workshops*** *with the aim to* ***share challenges and expertise, to explore synergies in their efforts*** *and to respond coherently to this priority in the European Strategy for Particle Physics (ESPP)."*

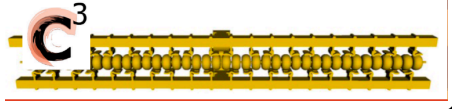
Goal: bring the entire e^+e^- Higgs factory effort together, foster cooperation across various projects; collaborative research programmes are to emerge

Bring together communities & activities, explore synergies, discuss challenges



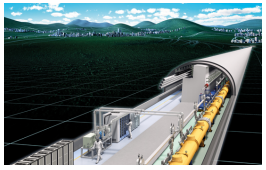


Projects exist, which are technically well advanced



ECFA Study on Physics, Experiments and Detectors at a Future e^+e^- Factory

Why such an inclusive approach?



- Despite there is **world-wide consensus** that an e^+e^- Higgs factory should be the next large collider, **none of the projects is approved!**

- The field is busy with LHC, Belle-II operation and data analysis, and with the challenging HL-LHC detector upgrades!

  → Synergies should be used, and duplication of work for the various projects should be avoided

- **There will – most likely – be only one e^+e^- collider!**

  → The ECFA study also intends to foster a **community building;**

  The support for the next collider must be broad (including the LHC community, …)

The main objectives of the ECFA e^+e^- Study

- Provide a **platform for common developments** of a software infrastructure, simulation, reconstruction and analysis tools

- **Theory**: - Monte Carlo generators
  - Understanding of the theory requirements from physics and detector precision
  - Serve as an experiment – theory interface

- Provide the **interface to the Detector R&D (DRD) collaborations**
  (i.a. transmit developing detector requirements (which may change with time))

- **Physics Studies**: a lot is known already on the physics potential (ESPP studies, Snowmass, …)

  - Extend towards so far uncovered areas
  - Encourage strong theory involvement
  - Encourage involvement of LHC physics community, understand better the HL-LHC potential (e.g. differential cross sections, EFT interpretations, …)

→ Status will be reported tomorrow by Patrick Koppenburg

Where do we stand?

After a rather slow start, the activities are ramping up!

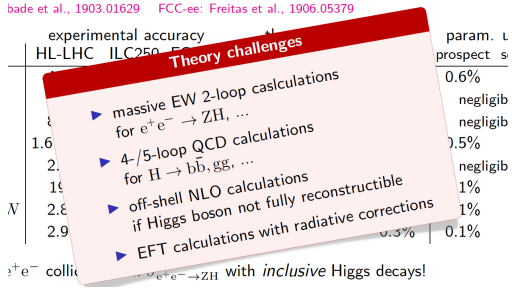
Excellent work of the working group conveners!

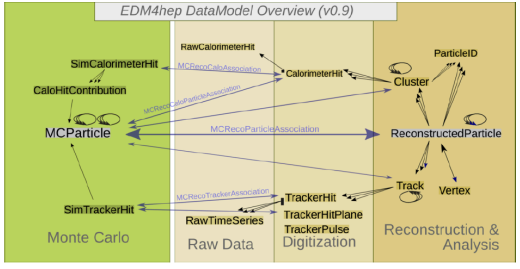
+ **Theory involvement** ramping up, good progress on generators,
  … but still a lot of work required e.g. on precision calculations
  (→ stronger participation welcome, ECFA study provides a forum!)

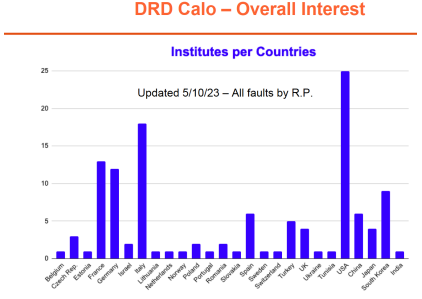
+ Lot of progress on **software tools (key4hep)!**
  Full simulation and reconstruction on the way,
  appreciate tutorials & documentation

+ **Detector interface** group started activities;
  Good to see integration in detector R&D;

+ Definition of **Focus Topics** was a good idea, ramping up,
  but definitely room for more people to join;
  This would also allow to extend the topics and broaden the physics coverage towards the next ESPP.







Where do we stand?

- Despite being busy with LHC data analysis, Phase-II detector upgrades or Belle-II, a stronger engagement of LHC or Belle-II people would be desirable

  → e.g. via mixed thesis projects LHC + future collider e^+e^- studies, …

- Very happy to see participation of non-European colleagues joining (US, Asia, …)
  Not only in DRDs, but also beyond in the ECFA studies!

- To improve the person power situation, we must continue to work on Funding Agencies / Institutes that resources for future collider studies are provided

  → ECFA

3. ICFA Seminar 2023 at DESY / Hamburg

- All participants invited (218 registered, ~10 more expected; despite efforts, not all regions of the world well represented)
- Programme defined and online (ICFA programme committee):
  https://indico.desy.de/event/38293/timetable/#20231128
- Thursday afternoon: **The future of HEP** (Motivation (Gavin Salam) + Regional perspectives
  (Asia (G. Taylor), Americas (H. Murayama) and Europe (K. Jakobs))
- Followed by a **Panel Discussion with Lab Directors**
  (Fabiola Gianotti (CERN), Lia Merminga (FNAL), Masanori Yamauchi (KEK), and Yifang Wang (IHEP Beijing))
- Participation from major FAs for Thursday afternoon have been confirmed (DE, FR, IT, UK, US, …)

Pierluigi Campana (INFN, Italy) has been elected as new ICFA Chair

European representation in ICFA (2024):

- Fabiola Gianotti (CERN)
- Beate Heinemann (DESY Dir. Particle Physics)
- Paris Sphicas (ECFA Chair)

News from other regions of the world

Dear Colleagues,

The 2023 Particle Physics Project Prioritization Panel (P5) report will be released at the upcoming High-Energy Physics Advisory Panel (HEPAP) meeting on December 7-8, 2023. This major update of the 2014 P5 report will be based on input provided by the 2021 Snowmass Community Planning Process, additional input collected by P5, and the recently released report from the International Benchmarking HEPAP subpanel. The report will provide a strategic plan for U.S. high-energy physics over the next 10 years within the context of high-energy physics worldwide over the next 20 years.

This is an open meeting, the P5 presentation can be joined

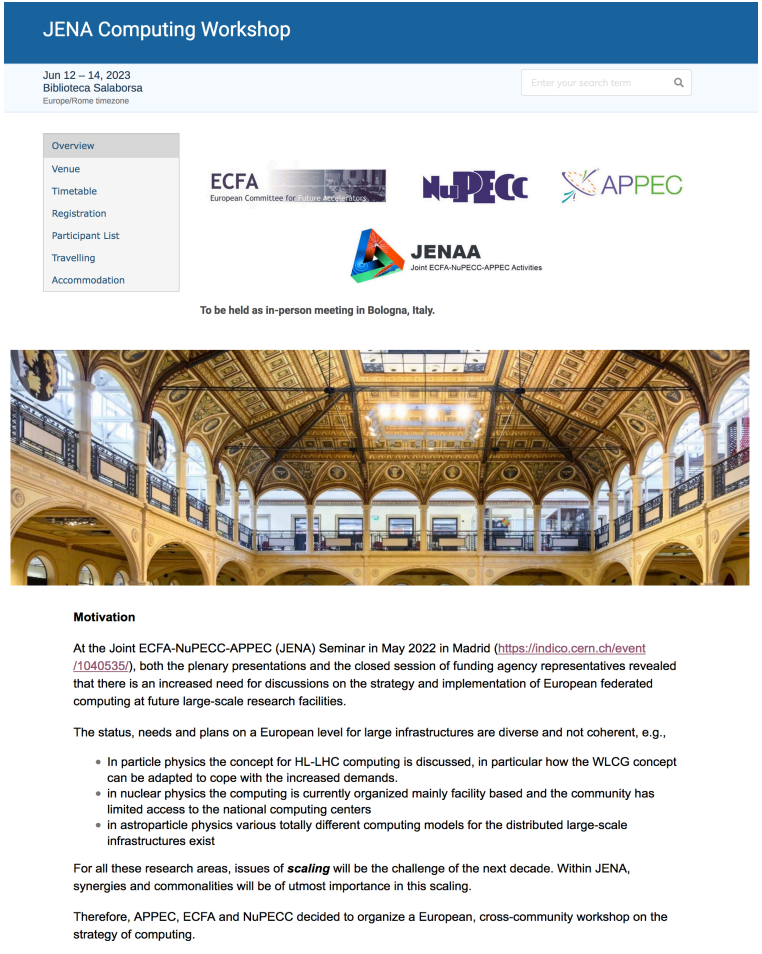
News from other regions of the world

A hybrid town hall meeting hosted jointly by DPF and Fermilab to discuss the P5 report will be held on December 11, 2023 from 1:00 - 6:00 p.m. CT in Wilson Hall at Fermilab. The program will feature a presentation by P5 Chair, Hitoshi Murayama, and Deputy Chair, Karsten Heeger, followed by a Q&A session and a community reception.

Details of the town hall - including information on site access, accessibility, and registration - are available on the event website.

The deadline for in person registration is **December 1**.

4. Joint ECFA-NuPECC-APPEC Computing workshop in Bologna



Conclusions from meeting was to set up working groups in three areas:

(i) High Performance Computing

How can it be shaped to make it more useful for our research areas? (particle, astro-particle and nuclear physics)

Coordinators: Simone Campana, Gonzalo Merino

(ii) Software, heterogenous architectures

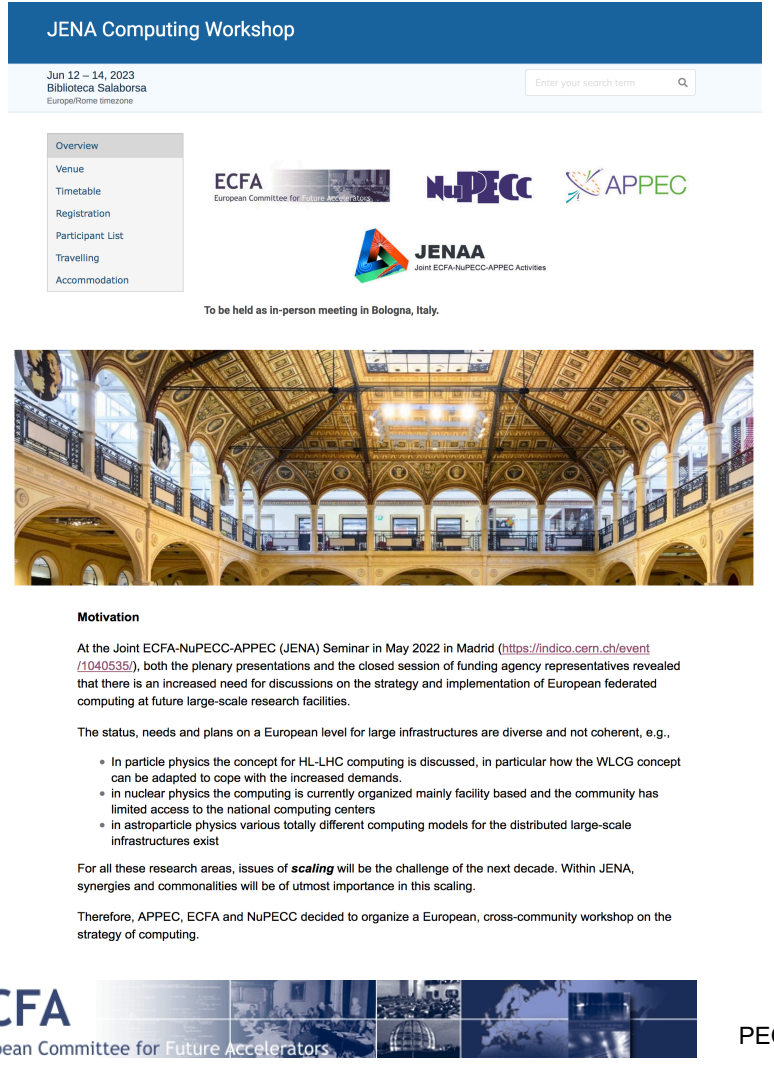
software optimisation + how to adapt software to new architecture

Coordinators: Graeme Stuart, NN

(iii) Machine Learning and Artificial Intelligence

Follow developments, analyse impact and evaluate how the research areas can profit and quantify the resources needs

Coordinators: Sascha Caron, NN



In addition, there was consensus to address the following two topics:

(i) Federated Data Management → suggested to be covered by ESCAPE

(ii) Training

Look what can be done in cooperation with the HEP Software foundation (HSF)

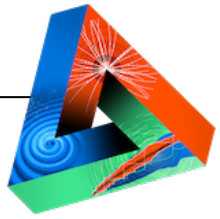
+ ECFA / NuPECC / APPEC

Final goal:

→ "White paper" as input for next JENAS (early 2025);

+ Executive summary paper for Funding Agencies

→ "White paper" can as well be used for for next update of ESPPU or strategy discussions in the other areas



Expression of Interest on
"European Coalition for AI in Fundamental Physics (EuCAIF)"

Expression of Interest

for a synergic research plan of potential interest of the JENA group

Project title:

European Coalition for AI in Fundamental physics (EuCAIF)

Keywords: European Initiative, Machine Learning (ML), Artificial Intelligence (AI), Fundamental Physics, Particle Physics, Astroparticle Physics, Nuclear Physics, Gravitational Wave Physics, Theoretical Physics, Simulation, Computational Infrastructure

Participating individuals and contacts:

Elena Cuoco (European Gravitational Observatory and Scuola Normale Superiore, Italy), elena.cuoco@ego-gw.it

Sascha Caron (Radboud University, Nijmegen and Nikhef, Amsterdam); scaron@nikhef.nl

Tilman Plehn (Heidelberg University), plehn@uni-heidelberg.de

Pietro Vischia (Universidad de Oviedo and ICTEA); vischia@uniovi.es

Roberto Trotta (SISSA and Imperial College London); rtrotta@sissa.it

Tommaso Dorigo (INFN Padova and University of Padova); dorigo@pd.infn.it

Julian Garcia Pardinas (CERN); julian.garcia.pardinas@cern.ch

Ik Siong Heng (University of Glasgow); ik.heng@glasgow.ac.uk

Stefano Forte (Milan University); forte@mi.infn.it

… et al.

6. Summary

The initiative will engage in various activities to foster collaboration, promote research projects, facilitate training programs, organize conferences and workshops, and establish networking and exchange opportunities. These activities aim to drive innovation, knowledge exchange, and the application of ML and AI techniques in fundamental physics research (currently HEP/GW/Astrophysics). The initiative will organize regular workshops and conferences, including the "Yearly/Bi-yearly European Conference on Machine Learning and AI in Fundamental Physics," to encourage collaboration, share research findings, and explore emerging trends. The first conference is scheduled for May 2024 in Amsterdam, serving as a kick-off meeting. To promote interdisciplinary collaboration, the initiative will support research projects that bring together experts from particle physics, astroparticle physics, and gravitational wave research, with a specific focus on ML and AI applications. It will tap funding opportunities and foster cross-disciplinary partnerships. Along with other initiatives, data challenges will be proposed to drive innovation and evaluate the performance of ML and AI algorithms in fundamental physics. These challenges will provide researchers with specific problems or data sets to address to drive algorithm development. Training programs, summer schools, and online resources are encouraged and developed to educate researchers and students on the use of ML and AI techniques in basic physics research. These initiatives will empower individuals with necessary skills and knowledge. Networking and exchange programs will facilitate collaboration and the exchange of ideas and expertise among researchers and institutions. Matchmaking activities, research visits, and joint projects will foster a vibrant community and promote cross-pollination of ideas.
A dedicated webpage, such as www.eucaif.org, will be developed to serve as a central hub for the initiative's activities, resources, and communication.
Through these activities, the European Initiative on Machine Learning and AI in Fundamental Physics aims to foster collaboration, drive research advancements, provide training opportunities, facilitate knowledge exchange, and establish a strong and vibrant community at the forefront of ML and AI in fundamental physics research. Finally, we are aware that this initiative is a challenging project and we greatly appreciate the help of JENAS.

- *Strong common interest of the three research fields*
- *Interesting, timely and important topic*
- *Of relevance as well to the previously discussed JENA-Computing Working Group on ML*

  This initiative may provide the seed for such a working group.

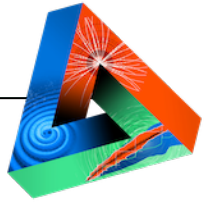
→ *RECFA has endorsed this proposal at its meeting in Lisbon in Sept. 2023*

Proposal has also been endorsed by APPEC

Discussed positively in the NuPECC Management group, endorsement expected at the upcoming NuPECC meeting on 23/24 November

→ ***new Joint ECFA-NuPECC-APPECC activity***

Joint Activities: http://www.nupecc.org/jenaa/?display=eois



1. Dark Matter - iDMEu (https://indico.cern.ch/event/869195/overview)
2. Gravitational Waves for fundamental physics (https://agenda.infn.it/event/22947/overview)
3. Machine-Learning Optimized Design of Experiments - MODE (https://userswww.pd.infn.it/~dorigo/MODE.html)
4. Nuclear Physics at the LHC (https://indico.ph.tum.de/event/4492/)
5. Storage Rings for the Search of Charged-Particle Electric Dipole Moments (EDM) (https://indico.ph.tum.de/event/4482/overview)
6. Synergies between the Electron-Ion Collider and the Large Hadron Collider experiments (https://indico.ph.tum.de/event/7004/)

JENAS EoI Task Force representatives

For ECFA:

- Stan Bentvelsen (2)
- Jana Bielčíková (6)
- Sascha Caron (3)
- Tuomas Lappi (6)
- Isabell Melzer-Pellmann (1)
- Nick van Remortel (2)
- Mike Seidel (5)
- Claude Vallee (1)
- Mikko Voutilainen (3)

For NuPECC:

- Navin Alahari (4)
- Dave Ireland (6)
- Eugenio Nappi (6)
- Franck Sabatié (3,6)
- Hans Stroeher (5)
- Eberhard Widmann (5)
- György Wolf (2,4)

For APPEC:

- Jo van den Brandt (2)
- Jürgen Brunner (3)
- Tomek Bulik (2)
- Francesca Calore (1)
- Fiorenza Donato (4)
- Elena Cuoco (3)
- Uwe Oberlack (1)
- Xin Wu (4)

5. ECFA Plenary Meetings and Country Visits in 2024

2024 Plenary ECFA meetings:

- 4 – 5 July 2024 in Frascati
- 14 – 15 Nov. 2024 at CERN

2024: Country visits	Switzerland	8 – 9 March	(at PSI Villigen)
	Sweden	16 – 17 May	(in Lund)
	United Kingdom	13 – 14 Sept.	
	Serbia	29 – 30 Nov.	

In addition, a first visit to **Ukraine** is on hold