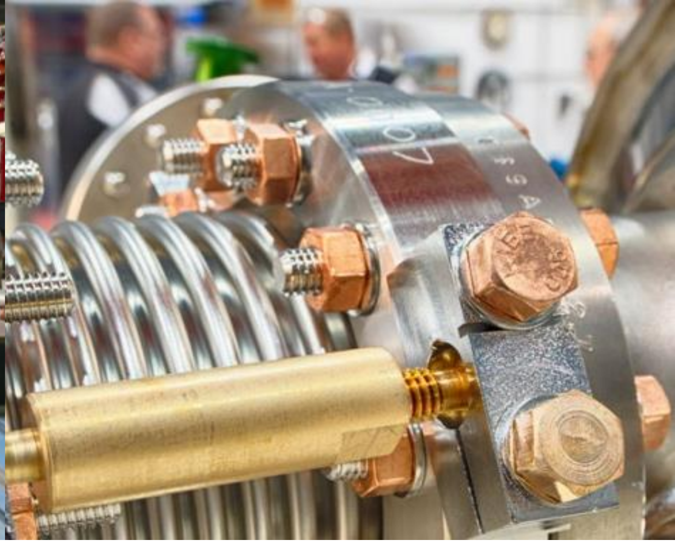


ICFA Report

Pierluigi Campana (INFN Frascati, ICFA chair)

Lepton Photon, Madison, August 25, 2025

https://icfa.hep.net

ICFA

A Standing Committee under IUPAP

ICFA: mandate & membership

ICFA (*International Committee for Future Accelerators*) is an organization, set up in 1976 under IUPAP-C11 (International Union for Pure and Applied Physics - Particles and Field Committee) sponsorship, in which discussions take place on international aspects of particle physics, in particular the large future accelerators

More formally its aims, as redefined in 1985, are as follows:

- To promote international collaboration in all phases of the construction and exploitation of very high energy accelerators
- To organize regularly world-inclusive meetings for the exchange of information on future plans for regional facilities and for the formulation of advice on joint studies and uses
- To organize workshops for the study of problems related to super high-energy accelerator complexes and their international exploitation and to foster research and development of necessary technology

Europe (CERN & member states, 3), USA (3), Japan (2), Russia (2), Canada (1), China (1), Other Countries (3), IUPAP C11 chair (ex-officio) + Chair + Scientific Secretary

All major HEP Lab directors are represented (CERN, FNAL, KEK, IHEP, DESY, …)

ICFA Membership: current status

P. Campana (Chair, Frascati)
T. Schörner (Secretary, DESY)

F. Gianotti (CERN), B. Heinemann (DESY), P. Sphicas (CERN & NU Athens), CERN M.S., OTHER COUNTRIES
S. Dasu (U. Wisconsin), Y.-K. Kim (FNAL), N. Roe (LBNL), USA
R. Teuscher (Toronto), CANADA
G. Gil da Silveria (UF Rio), LATIN AMERICA
Y. Cao (IHEP), CHINA
S. Asai (KEK), T. Nakaya (Kyoto), JAPAN
U. Egede, (Monash), OCEANIA & ASIA
B. Mohanty (NISER), INDIA
I. Koop, V. Obraztsov, RUSSIA

ex officio:

M. Gameiro Munhoz (Univ. S. Paulo), Chair of the IUPAP C11

ICFA Panels

ICFA activity is organized in panels on specific topics concerning accelerator and particle physics, set up to facilitate international discussion and coordination: They organize schools and workshops on their specific topics and often put out bulletins, newsletters and other records of their activities.

- Instrument Innovation and Development (chair S. Soldner-Rembold, Imperial)
- Beam Dynamics (chair Y. He, Lanzhou)
- Advanced and Novel Accelerators (chair P. Muggli, CERN & MPI)
- Sustainable Accelerators and Colliders (chair T. Roser, BNL)
- Data Lifecycle (chair K. Lassila-Perini, Helsinki)

- ILC International Development Team (chair Tatsuya Nakada, EPFL),
  formed in 2002 to facilitate the realization of ILC in Japan, and since 2020 with the mandate to make preparations for the technological developments needed for ILC in Japan

Contributing to keep experts in contact through meetings, etc., is beneficial to advancement in accelerator science of future large (and smaller) infrastructures

For an historical review of ICFA activities, see R. Rubinstein, Int. J. Mod. Phys. A 31 (2016) 1630063

ICFA: role & vision

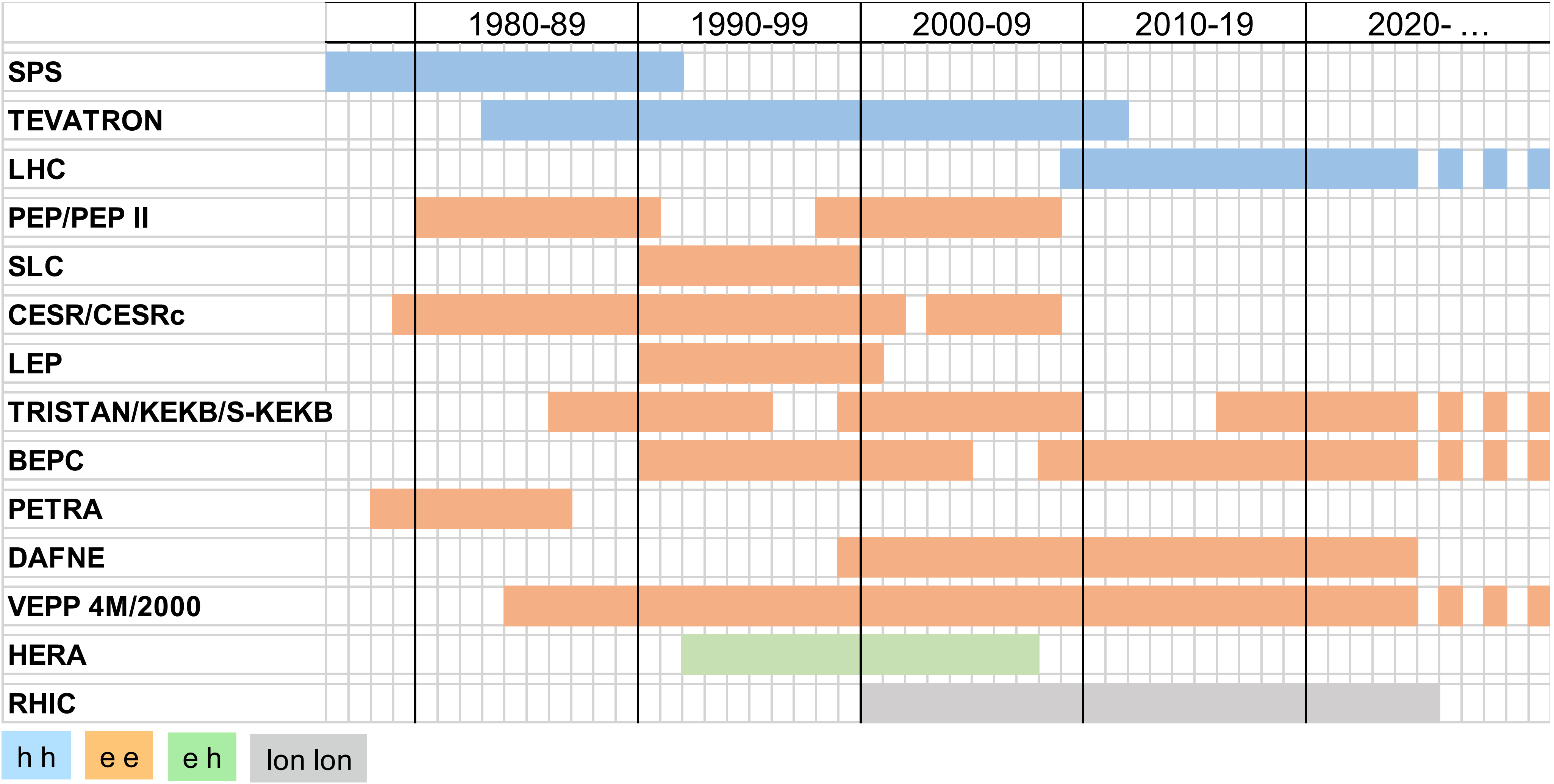
- ICFA is not expected to "*decide on which will be the next global collider*", but to follow and endorse projects having reached a high level of scientific and technical definition, consensus, and help in getting political support

- ICFA should consider and promote, and possibly optimize, the set-up of smaller programs at the differents HEP labs, both in collider-based and in physics beyond collider, to preserve diversity and also education in the field, targeting especially the young generation

- ICFA needs to enlarge its current perspective beyond ILC to other new projects appearing at the horizon with increasing level of maturity: CEPC, FCC, LCF, etc., and future emerging technologies (mu-collider, plasma, HFM, etc.) which may become critical for longer term future colliders, with a look to sustainability

- ICFA meets three times per year, and a triennial ICFA Seminar is organised, an international exchange of information on plans for future facilities in particle physics. It is attended by the directors of the world's major laboratories in our field, particle and accelerator physicists, including young scientists, and officials from funding agencies

The Golden Age of Colliders



A Global Strategy

A general consensus among the HEP community, also in consideration of the available technologies, **is that the study of the Higgs boson** is of utmost importance

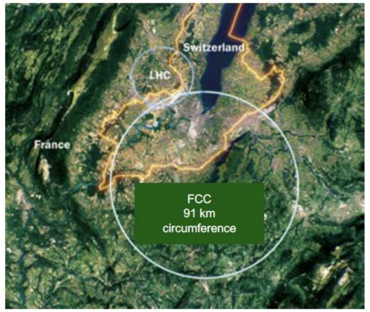
Ongoing strategies at regional level:
Europe (ESPP), US (P5), China (CEPC), Japan (ILC), …
Also considering feasibility of near term and/or future large colliders

HALHF

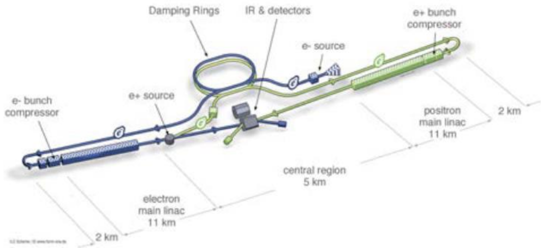
Proposed large-scale projects at CERN, ~ 2045

e^+e^- colliders
("Higgs factories")

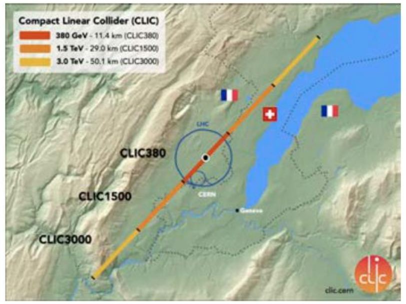
FCC-ee (e^+e^-, circular, 91 – 365 GeV)



LCF (e^+e^-, linear, 91 – 240, 550 GeV)



CLIC (e^+e^-, linear, 380 GeV, 1.5 TeV)

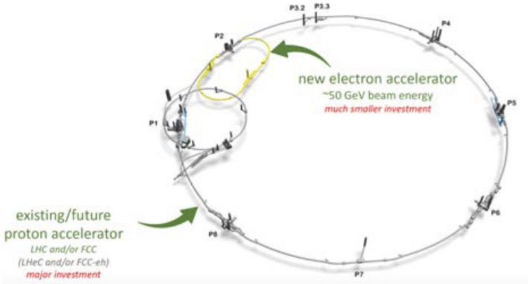


Intermediate projects

(Leave room (time, budget, resources) for further development of THE machine that can probe directly the energy frontier at the 10 TeV parton scale)

LEP3 (e^+e^-, circular, 91 – 230 GeV)

LHeC (ep, circular, electron ERL, 50 GeV e^-, > 1 TeV ep collisions)



from Karl Jacobs, ESG chair

Areas of global discussion within ICFA

- Impact of project size
  - science motivation (when facing other emerging research areas)
  - governance, organisation, cost and availability of funding
  - extra cost/difficulties when collider is built in a green site
  - operation and maintenance
  - life cycle assessment (sustainability, global CO_2 footprint)

- Time span (often 10-15 y after construction approval)
  - evaluation of cost increase during construction
  - HEP sociological aspects (few experiments, many scientists)
  - lack of youngs' interest in far-off in time projects

- HEP "enlarged environment"
  - diversity in science (smaller, shorter time scale Part. Phys. research programs)
  - access to HEP technologies in countries with developing particle physics communities
  - positive actions against gender and nationality disparities

IUPAP, C11 and ICFA

At last IUPAP General Meeting, IUPAP Presidency decided to launch a “rejuvenation procedure”, to achieve a more effective operation of IUPAP Commissions and Working Groups, and to formalize terms and operation of them

Following a request of IUPAP Presidency, ICFA prepared and approved, a document describing the Terms of Reference for the functioning of the Working group

The work consisted in a recollection of ICFA existing rules (~ oral tradition). Meanwhile, it is proposed that ICFA will become a **IUPAP Standing Committee under C11**.

Text discussed in ICFA, and with the endorsement of C11 chair, sent to IUPAP in May

Very positive feedback, some interactions with IUPAP Presidency, and a new version submitted at the end of July

Final approval expected at October IUPAP’s General Assembly

Recent ICFA Activities

ICFA talks strategy and sustainability in Prague

13 November 2024

International collaboration ICFA's 96th meeting took place in Prague in July. Credit: ICFA

July 2024, ICFA meeting, ICHEP 2024, in-person

- Special session on sustainability
- Reports from Regions & Panels
- ICFA statement on sustainable programs in HEP
- ICFA statement on the new ACFA-HEP sub-group of the Asian Committee for Future Accelerators

November 2024, ICFA meeting, CERN, hybrid

- Reports from Regions & Panels

April 2025, ICFA meeting, CERN, hybrid

- Reports from Regions & Panels (including status of FCC, CEPC, ILC-IDT)
- Approval of ICFA Term of Reference

August 2025, ICFA meeting, LP 2025, in-person

- Reports (Physics Beyond Colliders, LCF, Plasma in HEP, ESPP)
- Reports from Regions & Panels
- **Start preparing next ICFA Seminar in fall 2026**

ICFA Statements

October 2024

- Statement on the new HEP sub-group of the Asian Committee for Future Accelerators (ACFA)
- Statement on sustainable programs in HEP

May 2024

- Statement on the importance of testbeam facilities and their availability

April 2024

- Statement on the outcome of the US P5 process

January 2024

- Statement on the new ICFA Panel on the Data Lifecycle

April 2022

- Statement Regarding Higgs Factory Development and the ILC

Concluding remarks

Nearly 50 years ago ICFA was conceived as an international forum to discuss, promote and support large collider infrastructures for HEP. This task is conducted through regular meetings, workshops, triennial Seminars, statements

Bottom-up community support represents a key element in deciding which will be the next (very large) machines: a solid community consensus must be shown to policy makers

ICFA (together with the HEP community) must be ready to facilitate and to support programs which keep vibrant and innovative our science, and to leave open a platform where different regional interests can be confronted and discussed

ICFA Panels are key tools to support these initiatives

Despite difficult times in which we live, we all still believe international scientific collaboration remains one relevant GLOBAL asset for helping in Universe laws deciphering

Nothing truly valuable can be achieved except by the unselfish cooperation of many individuals (A. Einstein)