



Report on ICFA activity

Pierluigi Campana (INFN Frascati, ICFA chair)

Thomas Schörner (DESY, Secretary)

C11 meeting, ICHEP 2024, 21.7.2024



ICFA: mandate & membership

ICFA is an international organization, set up in 1976 under IUPAP-C11 sponsorship, in which discussions can 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

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

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

ICFA: current members

P. Campana (Chair, Frascati) since 1.1.2024, past chair S. Henderson (JLAB)

T. Schörner (Secretary, DESY)

F. Gianotti (CERN), B. Heinemann (DESY), P. Sphicas (CERN & NU Athens), CERN MEMBER STATES,
OTHER COUNTRIES

S. Dasu (Wisconsin), L. Merminga (FNAL), N. Roe (LBNL), USA

R. Teuscher (Toronto), CANADA

G. Gil da Silveria (UF Rio), LATIN AMERICA, OTHER COUNTRIES

Y. Wang (IHEP), CHINA

S. Asai (KEK), T. Nakaya (Kyoto), JAPAN

U. Egede, (Monash), OCEANIA-ASIA, OTHER COUNTRIES

B. Mohanty (NISER), INDIA, ASIA, OTHER COUNTRIES

I. Koop, V. Obraztsov, RUSSIA

ex officio: F. Canelli (UZH), IUPAP C11 chair

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 Ian Shipsey, Oxford)
- Beam Dynamics (chair Yuan He, Lanzhou)
- Advanced and Novel Accelerators (chair Patric Muggli, CERN & MPI)
- Sustainable Accelerators and Colliders (chair Thomas Roser, BNL)
- Data Lifecycle (chair Kati Lassila-Perini, Helsinki)

- ILC International Development Team (chair Tatsuya Nakada, EPFL), *formed in 2002 to facilitate the realization of the International Linear Collider (ILC), and since 2020 with the mandate to make preparations for the ILC Pre-Lab in Japan, which is the next step in the ILC project*

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 needs to enlarge its current perspective beyond ILC to other new projects appearing at the horizon with increasing level of maturity: CEPC, FCC, etc ...
- 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, at a level of lesser resources and political complexity, should consider and promote, and possibly optimize, the set-up of smaller programs at the different 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 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. The seminar is attended by the directors of most of the world’s major laboratories in our field, senior particle and accelerator physicists, and government science officials from several countries

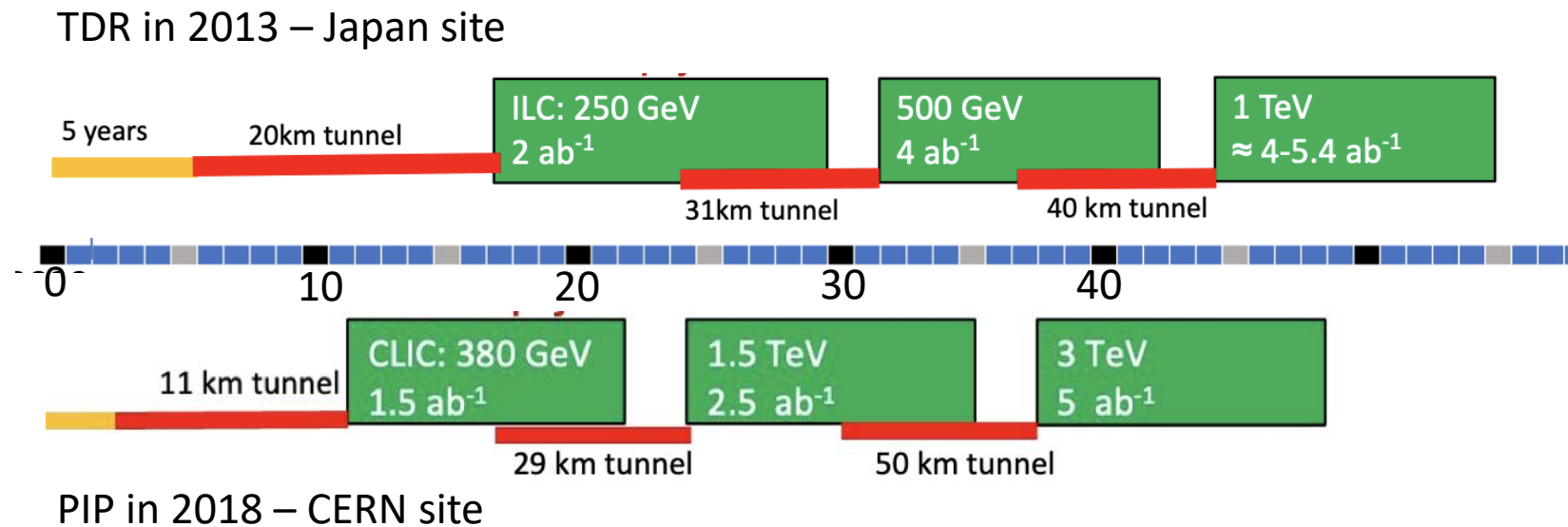
Future collider: A Global Strategy (?)

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, beyond the precision achievable at the end of HL-LHC

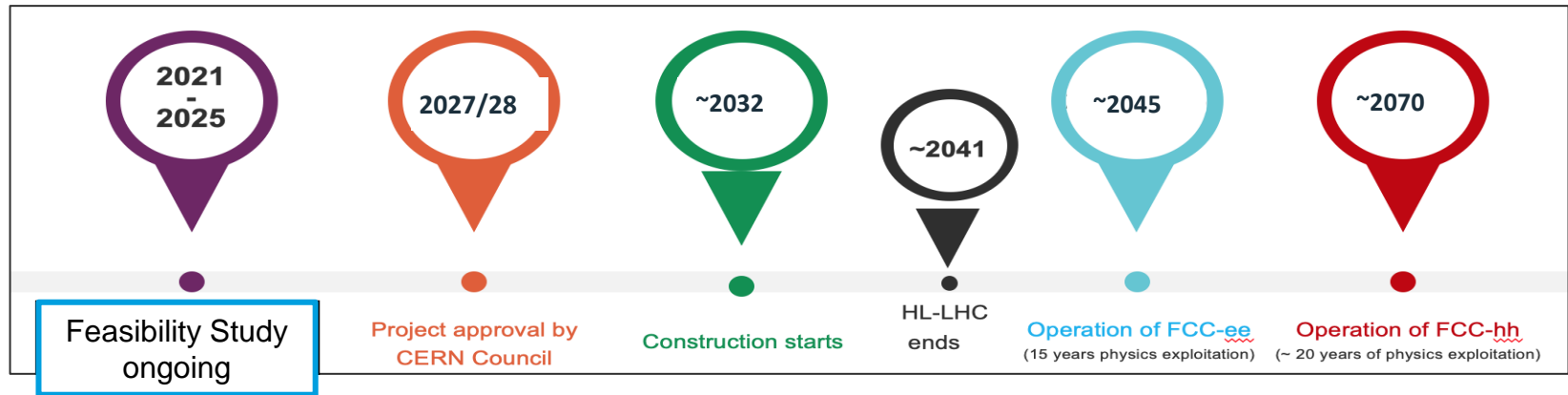
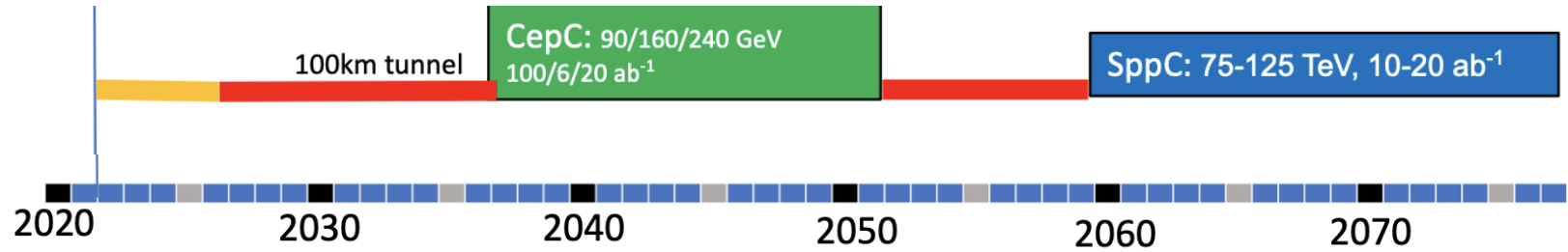
To achieve this goal, some projects have reached a high level of maturity, others are approaching it



Dates of possible approval still to be defined



TDR in 2023



+ other future projects:



HALHF

Tentatively, we could have 1-2 machines operating in the time window **around 2035-2045**

Areas of global discussion

- Governance
- Impact of project size
 - science motivation (when facing other emerging research areas)
 - organisation, cost, availability of funding, operation and maintenance
 - extra cost/difficulties when collider is built in a green site
 - life cycle assessment (global CO₂ footprint)
- Accelerator technologies innovation (also through large demonstrators)
- Time span (often 10-15 y after construction approval)
 - evaluation of cost increase during construction
 - HEP sociology (fewer experiments, many scientists: e.g. CERN has 12k users)
 - lack of youngs' interest in far-off in time projects
- HEP "environment" must also guarantee
 - 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

Governance: A variety of approaches

Independent Regional Roadmaps: CERN ESPP, DOE-NSF P5, CAS 5 Year Plan, MEXT , ...

Different international involvements:

- GLOBAL: machine and detectors funding are fully shared among participants (→ ITER, an in-kind model with some limitations), IGO-like governance
- INTERNATIONAL: machine (only partially) and detectors funding are shared among participants, i. e. host lab maintains governance of the project
- REGIONAL: machine is funded by host country, and detectors funding are shared among participants

Past colliders were largely regional infrastructures being still at affordable costs, with few international exceptions (e. g. HERA, LHC)
and quite substantial international commitments in experimental apparatus

Next large machines will need new requirements in term of governance !

ICFA Meetings

Situation during / after Covid-19 times changed wrt to tradition:

- Traditionally one longish in-person meeting in spring (two days) and one 1-day in-person meeting attached to either Lepton-Photon or ICHEP
- Sometimes a third in-person meeting (e.g. 2017)

After Covid-19, reduced travel appetite, plus sustainability concerns

- need to reconsider the scheme: reduce intercontinental travel while at the same time upholding the possibility of direct exchange between ICFA members

Adopted

- 2 hybrid meetings in spring and autumn / winter
- 1 “long” (two half days) in-person meeting attached to the summer conferences: pragmatic, although not optimal solution. Too much compressed timing
- Anyhow consider that members (especially Lab directors) are extremely busy: quite challenging to make doodles ...

Recent ICFA Activities

November 2023, 13th ICFA Seminar in DESY

In person meeting since 2017 (!)

~ 300 attendants

A broad (3 full days) and up-to-date status of HEP
Participation of Funding Agencies and Labs

April 2024, ICFA meeting, CERN, hybrid

- ICFA statements on P5, and on Test Beams relevance
- Presentations of FCC Mid Report & CEPC TDR

July 2024, ICFA meeting, ICHEP 2024, hybrid

- Reports from Panels
- Special session on Sustainability

November 2024, ICFA meeting, virtual



CERN COURIER PAGE

13TH ICFA SEMINAR

A global forum for high-energy physics

The International Committee for Future Accelerators (ICFA) was formally founded in 1977 as a working group in IUPAP's commission 11 (C11, Particles and Fields). Today it remains the place for discussions on all aspects of particle physics, in particular on the large accelerators that are at the heart of the field, and on the strategic deliberations in the various regions of the world. Although ICFA has no means of ensuring that any of its resolutions are carried out, it can act as the "conscience" of the field, and its recommendations can also influence national or regional activities. Among the currently 16 members, which include directors of CERN, Fermilab, IHEP, KEK and DESY, three are from Europe, three from the US, two from Russia, two from Japan, and one each from China and Canada. Three further members collectively represent



High level Shoji Asai (KEK), Ursula Bassler (IJCLab), Fabiola Gianotti (CERN), Lia Merminga (Fermilab), Nigel Smith (TRIUMF) and Yifang Wang (IHEP) during the panel discussion at the ICFA seminar.

smaller countries and regions, and the functions of chair and secretary rotate through the Americas, Europe and Asia, usually every three years.

A significant fraction of ICFA's work is carried out within a set of seven panels, which meet regularly and assemble expertise on more technical or detailed

ICFA Statement: P5

ICFA Applauds the 2023 Particle Physics Prioritization Panel (P5) Output

April 2024

At its recent meeting on 10-11 April 2024, ICFA – the International Committee for Future Accelerators – congratulated the 2023 Particle Physics Project Prioritization Panel (P5)¹ on their report “Exploring the Quantum Universe” released on 7 December 2023². The report is the P5 answer to the charge of developing a 10-year strategic plan for US particle physics, in the context of a 20-year global strategy and two budget scenarios.

The 2021 Snowmass Community Planning Exercise³, organized by the Division of Particles and Fields of the American Physical Society, represented a relevant source of inputs. Additional contributions came from town hall meetings, laboratory visits, and individual communications.

The P5 report describes three science themes that represent the core of investigations into nature driving the US community in the next two decades: Decipher the quantum realm, revealing the neutrino nature and the unknowns of the Higgs boson; Explore new paradigms in physics, searching for new matter states and/or new phenomena; Illuminate the hidden universe, questioning the nature of dark matter and cosmic evolution mechanisms.

Highest priority was given by P5 to ongoing projects and their maximal science exploitation, such as HL-LHC, DUNE and PIP-II first phase, and the Rubin Observatory. In parallel, the community is encouraged to prepare a list of major projects to study fundamental matter and the universe, comprising CMB-S4, which looks back at the history of the universe, a second phase of DUNE, an offshore Higgs factory in collaboration with international partners, an ultimate experiment for dark matter direct detection, and the IceCube-Gen2 detector. The proposed portfolio includes an intense effort to implement theoretical, computational and technological resources vital to the achievement of the vision.

P5 strongly supports accelerator R&D to chart a path towards a 10 TeV parton centre-of-mass collider based on pp, muon, or potentially wakefield technologies. It also recommends to develop a plan that could lead to the construction of a major HEP facility in the US, potentially in the form of a 10 TeV muon collider, to be hosted on the Fermilab premises.

ICFA is highly supportive of several important international activities recommended by P5, and it acknowledges the far-reaching impact of the report, not only for the US community, but particle physics worldwide. ICFA supports the collaborative platforms on the advanced technologies mentioned in the P5 document.

ICFA congratulates the US community for the P5 report, and reiterates its supports for strong international collaboration that continues to be an effective tool to achieve progress for the entire field of collider-based particle physics.

ICFA Statement: Test beams

ICFA Statement on the Importance of Test Beam Facilities

May 2024

Test beams are vital tools for developing the next generation of detectors for high-energy physics, nuclear physics, and adjacent fields. Every year, close to a thousand users make use of the test beam facilities provided by the major laboratories CERN, DESY, KEK and FNAL as well as smaller facilities around the world. These facilities are provided free of charge to the scientific users. ICFA notes favourably that this policy allows access for a broad and unbiased user community, irrespective of the financial strength of specific user groups.

ICFA acknowledges that test beam facilities are key infrastructures for progress in detector R&D. ICFA also stresses their importance as an ideal training ground not only the next generation of instrumentation experts, but also for young machine scientists.

ICFA, therefore, supports the efforts of all the laboratories to coordinate the shutdowns of their accelerator complexes as much as possible to prevent a global “dark time” for test beam users.

Concluding remarks

Bottom-up community approach represents a key element in deciding which will be the next (very large) machines: policy makers must count on a strong support from a large consensus

However, scientific goals must be “filtered” with feasibility (technical, economical), political support, world-wide situation, pressure from other sciences, and social endorsement

ICFA (together with 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 aspirations can be confronted and discussed. Panels are key tools to support these initiatives

Despite difficult times in which we live, we all still believe scientific collaboration remains a GLOBAL tool for Universe laws deciphering