



ICFA Report to ICHEP2020

Geoffrey Taylor (Chair, ICFA)

Outline

- Brief *Outline* of ICFA
- Some *snapshots* of ICFA Panel activities
- “ICFA Seminar” postponed - *Berlin, October 4-10, 2021*
- ICFA Chair-Designate (*2021-2023*)
- *2020 ESPPU and ICFA*
- The ILC beyond the Linear Collider Board (LCB)
 - ➔ Commencement of the new *ILC International Development Team*
 - ➔ Focus on developing the *ILC as the chosen e+e- linear collider Higgs Factory*
 - ➔ Aim towards the *ILC “Pre-Lab”* on 1.5 year timescale
- Summary

ICFA Mandate

ICFA was created in 1976 by the International Union of Pure and Applied Physics (IUPAP) Commission C11 (Particle and Fields) to:

- *Promote international collaboration in the construction and exploitation of accelerators for high energy physics*
- 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*
- Organize workshops for the *study of problems related to super high energy accelerator complexes* and their *international exploitations* and to *foster research and development of necessary technology*

ICFA is the recognised body to represent high energy physics community on the global stage

ICFA Panels

- Beam Dynamics (Chair: Ingo Hoffmann, GSI)
- Instrumentation Innovation & Development (Chair: Ian Shipsey, Oxford)
- Advanced and Novel Accelerators (Chair: Bruce Carlsten, Los Alamos)
- Interregional Connectivity (Chair: Harvey Newman, Caltech)
- Data Preservation in HEP (Chair: Cristinel Diaconu, CPPM, Marseille)
- Sustainable Accelerators and Colliders (Chair: Mike Seidel, PSI)

A couple of snapshots follow

ICFA Instrumentation Innovation & Development Panel

EDIT School: IHEP, Beijing provisional date 11-22 October, 2021

goal: restore to annual, rotating across three regions.

ICFA School: host and provisional date TIFR, Mumbai Feb-March, 2022

goal: increase frequency

1st multidisciplinary workshop sponsored **MultiHEP2020 @LBNL**

INFIERI 2021 multidisciplinary school sponsored

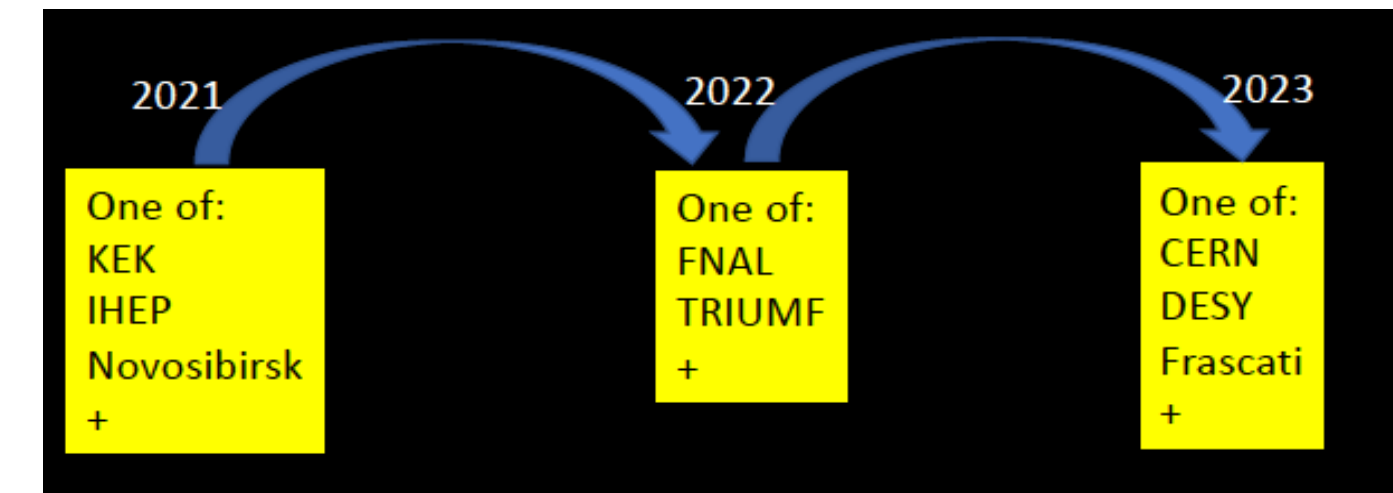
IID panel taskforces:

- EDIT School
- ICFA School
- Interdisciplinary workshops
- Instrumentation Studentships & Instrumentation Prizes

Instrumentation roadmaps globally with IID Panel Member participation:

Europe: ESU/EPS/ECFA Global Detector R&D Roadmap; ECFA Detector R&D panel

North America: DOE BRN (BF&IS co-chairs, MD, PK, FS, PM conveners), DPF CPAD (PM new Chair), Snowmass Instrumentation (PM convener, IS sub-convener)



<https://indico.physics.lbl.gov/event/1217/>

30 September 2020 to 2 October 2020



<https://indico.cern.ch/event/850479/>

Beam Dynamics Panel

Beam Dynamics Newsletter now Online

- The [Beam Dynamics Panel of ICFA](#) encourages and promotes collaboration on beam dynamics studies for present and future accelerators via Workshops and regularly appearing Newsletters dedicated to selected themes –coordinated by an Issue editor.
- Themes include **Publication of the Beam Dynamics Newsletter as Special Issue of the Journal of Instrumentation started in 2020 with Newsletter #79:**
 - General report from the Panel Chair (editor in chief) and the Issue editor.
 - Reports from past workshops/conferences, PhD thesis abstracts and other reports;
 - Papers submitted from individual authors on the special theme of the Issue.
- Beam Dynamics Panel website (<http://www.icfa-bd.org/>):
 - Current and previous Newsletters;
 - Relevant workshops (ICFA Advanced Beam Dynamics Workshops, ICFA Mini-Workshops);
 - Guidelines for Workshops and Newsletters; and
 - List of Panel members.
- Ingo Hofmann (GSI Darmstadt and Technical University Darmstadt, Germany) is Panel Chair

ICFA Panel on Advanced and Novel Accelerators (ANA)

2020 Activities

- The Covid-19 Pandemic:
 - *Advanced Linear Collider Study Group ALEGRO Workshop 2020*, March 24-27, Hamburg, Germany
 - The ALEGRO series of workshops - flagship activity of the ANA Panel
 - *Advanced Accelerator Concepts (AAC) Workshop 2020*, June 21-26, Pacific Grove, CA, USA
- The ANA Panel supporting information plasma wakefield acceleration schemes at the AWLC2020 Workshop
 - **Postponed until the fall.**
- ANA Panel - ALEGRO Working Group Coordinators —>
 - Letter of Interest to the Accelerator Frontier of Snowmass 2021.

13th ICFA Seminar

Berlin, October 4-10, 2021



- “ICFA Seminar” 3-Yearly review of the field
- Moves around the Three Regions:
 - Europe 2020 - Berlin
 - Postponed due to COVID-19 Travel Restrictions

2017: Ottawa (Canada)
2014: Beijing (China)
2011: CERN, Geneva (Switzerland)
2008: SLAC, USA
2005: Daegu (Korea)
2002: CERN, Geneva (Switzerland)
1999: Fermilab (USA)
1996: KEK, Tsukuba (Japan)
1993: DESY, Hamburg (Germany)
1990: IHEP (Russia)
1987: BNL, Brookhaven (USA)
1984: KEK, Tsukuba (Japan)

ICFA Chair-Designate

Three-year Regional Rotation

- *2021-2023 Professor Jonathon Bagger, Director Triumf Laboratory, Vancouver*



European Strategy for Particle Physics Strategy Update and ICFA

- CERN medium term plans

- ❑ Full exploitation of LHC physics potential → successful completion of the high-luminosity upgrade of accelerators and experiments → going well, according to (revised) schedule
- ❑ e^+e^- Higgs factory as the highest-priority next collider
- ❑ Investigation of the technical and financial feasibility of a future ≥ 100 TeV hadron collider at CERN, with e^+e^- Higgs and electroweak factory as a possible first stage.
→ to be completed by next Strategy update (~ 2026).
- ❑ Increased R&D on accelerator technologies: high-field superconducting magnets, high-gradient accelerating structures, plasma wakefield, muon colliders, ERL, etc.
Develop accelerator R&D roadmap under LDG's supervision → starting

Courtesy of Fabiola Gianotti



2020 European Strategy for Particle Physics Update

As part of CERN's High-priority future initiatives –

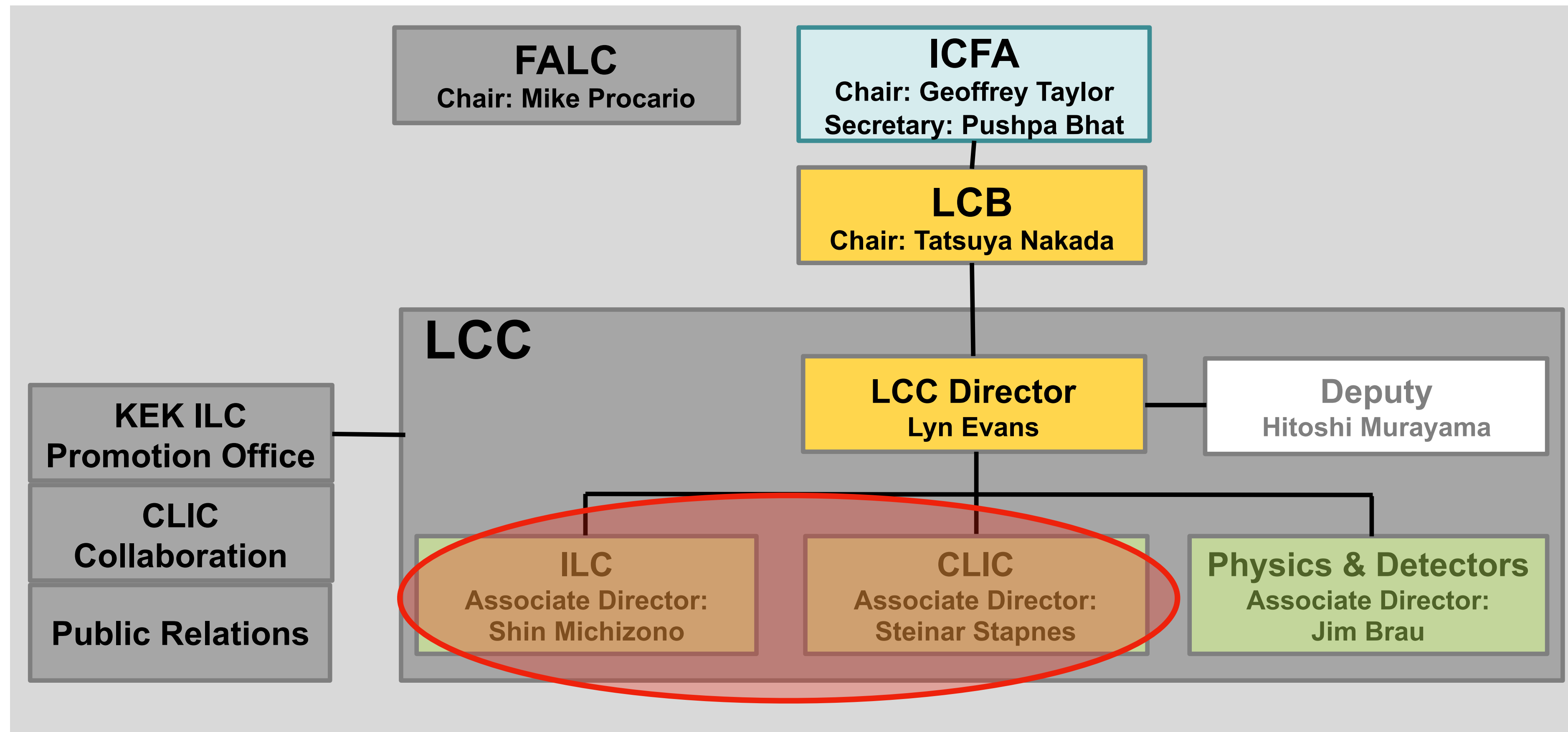
... An electron-positron Higgs factory is the highest-priority next collider. For the longer term, the European particle physics community has the ambition to operate a proton-proton collider at the highest achievable energy.

Accomplishing these compelling goals will require innovation and cutting-edge technology:

The **timely realisation** of the electron-positron **International Linear Collider (ILC)** in Japan would be compatible with this strategy and, in that case, the European particle physics community would wish to collaborate.

HL-LHC and ILC operating together for a decade or more would make a potent partnership for Higgs research

Linear Collider Board (LCB) and the Linear Collider Collaboration



<https://icfa.fnal.gov/>



August 2, 2020

ICFA announces a new phase towards preparation for the International Linear Collider

At its 86th meeting held today, ICFA approved the formation of the International Linear Collider International Development Team as the first step towards the preparatory phase of the ILC project, with a mandate to make preparations for the ILC Pre-Lab in Japan.

A description of the mandate and structure of the ILC International Development Team was also approved by ICFA today.

The Team will commence its work immediately and is expected to complete it by the end of 2021.

The ILC International Development Team will work towards making a timely realization of the ILC possible.

ICFA thanks the Linear Collider Collaboration led by Dr. Lyn Evans for its excellent work over the past several years.

<https://www.interactions.org/press-release/icfa-announces-new-phase-towards-preparation-international>

ILC International Development Team

To prepare the ILC Pre-Lab (without pre-empting the work of the Pre-Lab).

- Timeline ~1.5 years commencing now.
- Clarify the **function and organization** of the ILC Pre-Lab
- Develop common understanding for the **condition to start the ILC Pre-Lab**,
- Provide international framework for the **ILC accelerator effort**
 - Coordinating further R&D and engineering design work ... for a smooth transition to the ILC Pre-Lab phase,
- Provide international framework for the **ILC physics and detector** activities
 - Coordinate physics and detector R&D effort ... for smooth transition to the ILC Pre-Lab phase,
- **Negotiate with international partners** ... for **resources needed** for the ILC Pre-Lab, and
- ...work with **national authorities** to help in ... **establishing** the ILC Pre-Lab.

2020 European Strategy for Particle Physics Update

High-priority future initiatives - of specific importance to ICFA:

Europe, together with its international partners, should investigate the technical and financial feasibility of a future hadron collider at CERN with a centre-of-mass energy of at least 100 TeV

... the particle physics community should ramp up its R&D effort focused on advanced accelerator technologies, in particular that for high-field superconducting magnets, including high-temperature superconductors;

An ambitious next-generation collider project will require global collaboration and a long-term commitment to construction and operations by all parties. ***CERN should initiate discussions with potential major partners as part of the feasibility study for such a project being hosted at CERN***

The technologies under consideration include ***high-field magnets, high-temperature superconductors, plasma wakefield acceleration and other high-gradient accelerating structures, bright muon beams, energy recovery linacs.***

US Snowmass Process

Input to the next P5 Particle Physics Strategy Update

The U.S. particle physics community recently commenced long-range planning “Snowmass” process.

- Division of Particles & Fields of the American Physical Society.
- This study, ~1.5years, scientific studies as input to:
 - Particle Physics Project Prioritization Panel (P5) in 2021-22 deliberations.
 - The P5 report, expected in 2022.
 - Recommend the long-term strategy and priorities for U.S. investments in particle physics for the coming decade.

Future Facilities

.. an important role for ICFA

- 100km - class circular collider for the future
- CERN to maintain central international role for the Foreseeable Future:
 - FCC-ee as stepping stone to FCC-pp (and FCC-eh, FCC-heavy ion)
 - High field dipole magnets critical - performance and cost.
- CEPC is being pursued in parallel
- Further development of high field RF cavities - ILC energy development
- Muon collider alternatives
- Plasma-wave acceleration for future ultra-high acceleration gradient designs



Summary

- ILC International Development Team to work towards the ILC Pre-Lab on a scale of ~1.5 years.
- New ICFA Chair for three years 2021-23
- ICFA Panels very active (Chair and membership renewal)
- ICFA Seminar delayed ~1 year due to COVID-19 - Berlin, October 2021
- 2020 European Strategy for Particle Physics Update
 - applauded by ICFA
 - consistent with ICFA aims
- Looking forward to Snowmass (and P5) deliberations