Minutes

ICFA Autumn Spring 2023[1]

28 March 2023

Participation

ICFA members: Florancia Canelli, Beate Heinemann, Stuart Henderson, Fabiola Gianotti, Geoffrey Taylor, Karl Jakobs, Lia Merminga, Masanori Yamauchi, Sridhara Dasu, Toshinori Mori, Yifang Wang, Richard Teuscher, Gustavo Gil da Silveria, Thomas Schörner (secretary)

ICFA panel chairs: Tatsuya Nakada, Chuanxiang Tang, Harvey Newman, Ian Shipsey, Thomas Roser, Cristi Diaconu

Lab directors and funding agencies: Doon Gibbs, Pierluigi Campana, Richie Patterson, Oliver Kester (for Nigel Smith), Joachim Mnich
Excused: Nigel Smith

Guests: Shoji Asai, Francesca de Lodovico, Sergio Bertolucci

2. News from ICFA

Stuart Henderson reports on recent news relevant for ICFA since the October 2022 ICFA meeting.

- There are two new members – R. Teuscher (Canada) and G. Gil da Silveira (Latin America / other countries) following M. Roney and Ignacio Bediaga.
- ICFA decided to meet in person associated with the Lepton-Photon Conference, Melbourne, on Sunday 16 July 2023.
- The plans for the ICFA seminar converged; the planning is now launched: The seminar will take palce at DESY, Hamburg, from 28 November to 1 December 2023.
- A discussion was held with leaders in the software community (16 December 2022) regarding the notion of a Software Panel – discussed the need, potential role, differentiation from other entities (see later in these minutes).
- There is considerable progress on the ILC Technology Network (see Tatsuya's and Masahiro's reports later).
- Stuart points out that his role as chair ends at the end of 2023 – ICFA needs to identify and nominate a successor from Europe.
- The ICFA panels continue to be very active.

3. IDT and ITN report and discussion

[1] All slides can be found on the INDICO page of the meeting: https://indico.fnal.gov/event/57401/

See Tatsuya Nakada's and Masa Yamauchi's slides in INDICO.

Tatsuya reports on the development of the IDT, and its relation to the ITN. Also, the question of the International Expert Panel was discussed, and the definition of the ILC as an international or a global project. In particular, the community considers ILC to be an international project – i.e. one where Japanese leadership and next steps are expected – while Japan considers the project to be global. For this, however, intergovernmental communication needs to be improved. IDT is working on this communication. It is mentioned that IDT WG2 covers a wider scope of technical issues than does the ITN.

Concerning the timeline, Tatsuya mentions a possibly shorter preparatory phase than was considered for the pre-lab proposal (4 years). MEXT foresees a funding programme for ITN for 5 years (the budget nevertheless needs to be agreed year by year). In order to enter the preparatory phase, concerned governmental authorities from US and Europe must become ready to discuss ILC-specific matters. The P5 discussion in the USA and the FCC feasibility study outcome certainly will have an impact on the ILC timescale. Tatsuya presents a "success-oriented" timeline that assumes construction begin around 2029 (not approved by MEXT, optimistic view).

Tatsuya presents a proposal to ICFA for the future of the IDT, in particular emphasizing the continuation of the ITN, the International Expert Panel, and the WG2 and WG3 activities. Note that WG1 activities are on hold currently, since this WG was designed for the setup of the pre-lab. The next step should be the start of some ITN activities and the sharing of the findings with the International Expert Panel and the government authorities.

Masanori continues by reporting on the ITN that is a network to carry out remaining critical R&D work before entering the preparatory phase. It is emphasized that the ITN is NOT equal to starting the pre-lab phase in a reduced way. ICFA supported the establishing the ITN, and the Federation of Diet Members of Japan have expressed support. ITN is jointly initiated by KEK and IDT and discussions have been helped with laboratories world-wide on their participation.

It is reported that MEXT is well aware of the significance of promoting particle physics research, and it has allocated about $7.2M to KEK for JFY 2023 for the ITN advanced accelerator research – this doubles the amount granted so far. The budget is supposed to last for 5 years. There is also support from the ILC Federation of Diet Members who claim that the Japanese government should promote activities promoting the ILC project.

In Europe, agreement with CERN has been achieved to use CERN as a hub for European activities, and work will start soon.

In USA three laboratories and DOE have been visited in January. The US-Japan cooperation program could be expanded in order to accommodate ITN activities. Currently a response from DOE on this topic is awaited.

In Asia, the AsiaHEP meeting will take place in April, where more Asian researchers will be asked to join the ITN.

A few concrete steps will start the ITN: i) further discussions with potential laboratory partners; ii) IDT will facilitate the startup of the Network Steering Group and Network Institution Board; iii) KEK will invite representatives from funding agencies to form the Funding Agency Oversight Board.

IDT-WG2 has defined time-critical work packages to be implemented in the ITN (15 of the 18 work packages proposed in the pre-lab, reduced in size). Once the ITN agreement is signed, the work packages can start.

The following points are raised during the discussion:

- Fabiola asks about the timeline shown in both presentations: This indicates a construction start in the early 2030s. The European strategy states that the timely start of the ILC is compatible with the European strategy – here "timely" meant that the construction of ILC does not overlap with the construction of a facility at CERN (for resource reasons). The timeline presented here does present such an overlap – is the opportunity for a timely realization missed?
  - Tatsuya takes note of the statement. It might be discussed to be faster, e.g. to reach certain steps earlier.
- Fabiola asks about the IDT activities for the future: The IDT was meant to fill a gap and keep the community together – shouldn't therefore the relevant WG2 scope be transferred and managed by the ITN? There should not be overlap, and ITN should not be part of IDT, but rather separately managed.
  - Tatsuya responds that ITN will have its own organization, and KEK will deal with the MoU issues, while IDT will bootstrap the process (initiate the first instance) – then the process shall run by itself. So there need not be a contradiction.
  - Tatsuya adds that there is clear responsibility for deliverables so that there is no immediate problem. This will be reflected in an update of the relevant figure that triggered Fabiola's question.
  - Fabiola refers to the global projects a la ITER: The comparison to ITER is not well chosen – for ITER there was a global consensus and will (also for political/national interests related to energy production reasons etc.). In our field of HEP, there will not be a global consensus if there is no laboratory ready to host, e.g. to build FCC if CERN is not willing to host it.
- Sridahara asks about the time scale of the governmental process and parallel technical developments, e.g. cool copper technology – can this in any way be considered for the ILC.
  - Tatsuya hopes for constructive relation to new technologies – even CLIC is still there. There should be a more coherent view of the development of a linear collider. The various technologies have their merits – in energy consumption, in energy reach, etc.
- Sridhara also asks about the January visit of Japan to the US, and the DOE reply – what is the timescale for the DOE reply, while P5 is ongoing? The US budget cycle is long – ITN can't really wait for that?

- Masanori states that DOE needs to wait for the P5 outcome – but the timescale of this is unclear.

- Stuart asks about the ITN Funding Agency Oversight Board – are the ITN people confident to bring such a group together, given e.g. the FALC performance recently?
  - Masahiro answers that MEXT is hesitant to start such a meeting on their own, but rather KEK will convene the meeting in the near future.
  - Tatsuya adds that FALC had kind of lost its purpose; this might change with the idea of the ITN in place.

4. Report from P5 process

Hitoshi Murayama did not make it to the meeting; instead, Beate Heinemann who is also on P5 showed a couple of recent slides (not in the ICFA INDICO, see here: https://indico.fnal.gov/event/58272/contributions/262184/attachments/165097/219246/FNAL-ANL-intro.pdf).

- P5 is currently holding a number of townhall meetings – e.g. on cosmology / astrophysics, intensity frontier, energy frontier, accelerator physics and detector technologies.
- There will also be virtual townhall meetings, e.g. with early-stage researchers.
- People can volunteer for short presentations on topics they are particularly fond of – “lightning presentations”.
- There will be closed meetings between end of May and end of July for the committee to write a report. A preliminary report shall be finished by August (this will be internal). The final report is due in October 2023.
- In terms of science, P5 is using all the Snowmass work as input.

Stuart asks about the communication and role-out strategy, which was very involved for the last P5.

- Beate states that it is agreed that this is important, but not yet in the focus. First one needs to understand the science. The success of the last P5 report was due to the fact that it was able to unite the community and came up with a plan supported by the entire community. This is again the plan.

5. Brief reports from EIC, LBNF/DUNE, HyperK

See the slides by D. Gibbs, S. Bertolucci and F. de Lodovico in INDICO.

D. Gibbs reports briefly on EIC – on which JLAB and BNL collaborate on the highest level. Construction on the electron ring – that also affects RHIC operations – will start in 2025. The cooperation is large and growing, and there is agreement on a first detector around which a collaboration has formed. Start of operations can be foreseen for the early 2030s, and the next milestones are CD3a and CD2 in 2024 and 2025 respectively. There is significant international involvement within the detector collaboration and user group.

S. Bertolucci reports on LBNF/Dune – a project done in the CERN style (facility owned by lab / host nation, experiments performed by international collaboration). There is a lot of progress on the accelerators – a very powerful beam is required, as is a high-performance beamline. Lately FNAL came up with the accelerator complex evolution scheme which will greatly increase competitiveness of DUNE and make physics results earlier possible.
The transition to the construction phase is ongoing.

F. da Lodovici reports on HyperK progress. A first collaboration meeting after the pandemic was held in March 2023 in Toyama / Japan. The collaboration comprises more than 500 collaborators from around 20 countries and is still growing; 25% of the members are from Japan. KEK takes responsibility for the near detector, while U Tokyo takes up the far detector.
The major work in the project is the excavation – this is happening now, and most tunnels are excavated, so that they are now reaching the dome (started there in Nov 2022). All work is going according to schedule – everything is on time.
Detector components are being build – e.g. the frame for the PMTs. Also a lot of work inside the integration working group is ongoing, and safety issues are being addressed. PMT construction was halted after 4000 pieces (of 20000) because of performance issues; there was a 1-year stop, and now restart of production is foreseen for end of April 2023. Similarly, production of covers was halted. Beam power ramp-up at J-PARC is ongoing – from 0.5 to 1.3 MW – and the beamline is already upgraded to accommodate 900 kW. The ND280 experiment is being upgraded. The overall timeline foresees start of data taking in 2027.

6. “Round the table” – brief laboratory and regional reports

ICFA heard very brief (no slides) regional and lab updates.

CERN (F. Gianotti)

- 2022 was a challenging year because of several crises (tails of COVID, war in Ukraine, inflation, energy costs, …).
- 2022 was also a very successful year for the LHC, with the start of Run 3, which so far went very well – 40 fb-1 were delivered to the ATLAS and CMS (whilst the target was 25). Important science was achieved – e.g. observation of four-top production (CMS, ATLAS), the measurement of the Run 2 luminosity with a precision better than 1% by ATLAS, …
- The HL-LHC civil engineering work was completed on budget and time. Great progress was achieved at CERN and FNAL with the Nb3Sn technology for the final-focus quadrupoles.
- CERN is considering the possibility to upgrade the beam intensity at the north area for precision K experiments and beam-dump experiments.
- Europe developed an accelerator R&D roadmap, and CERN is aligning to this roadmap.

- The FCC feasibility study is progressing very well. Baseline size and location for the ring are now fixed, and every single municipality along the ring is now being visited for by the FCC team for communication purposes.
- In November 2022, a partnership agreement with the Lausanne University Hospital was signed to build a medical accelerator using FLASH radiotherapy[2] and based on CLIC technology. First clinical trials will take place in 2025 – large societal impact is expected.
- Outreach: CERN welcomed 100000 visitors in 2022 (pre-Covid it was 150000).
- Sustainability: On 2 Feb 2023, CERN received ISO-50001 certification for energy management, granted for institutions that show the best energy management standard and commitment to further improve in the future.

Europe outside CERN (K. Jakobs)

Karl reports on ECFA activities in the past half year. There were two focus topics:

- The implementation of the roadmap for detector R&D: ECFA was charged by CERN council to work out an implementation plan, which was endorsed in September 2022. At the core of this is the formation of DRD (Detector Research and Development) collaborations. A bottom-up approach was started involving all of the community. The goal is to have proposals ready by the end of July 2023, to be reviewed by a board to be set up by CERN management. Approval could happen towards the end of the year, so that DRDs can start work in January 2024. Existing RD collaborations (geared towards LHC and HL-LHC) will come to an end of their lifetimes. The new DRD collaborations are open beyond CERN, also the leadership in them. Further discussions are starting tomorrow on ECFA and the European lab directors to look into infrastructure facilities – e.g. testbeam, radiation facilities to see what is needed for detector R&D.
- The ECFA study on ee Higgs/EW/top factories kicked of 2 years ago and supposed to give a forum for synergies for the various proposals. There is nice progress on technical areas (software, simulation, etc.) – but we do not yet have the full workforce. Better engagement from colleagues from America and Asia, is aimed for also with a second workshop in autumn this year (Pestum, close to Naples, Italy).
- Beate adds that at DESY, in terms of accelerators, the largest project is the upgrade of PETRA III to PETRA IV. Also the advanced accelerator R&D (PWA) is progressing – the lab pushing hard on the KALDERA 1 TW laser wakefield facility and the electron-beam based FLASHForward facility. Otherwise the situation is difficult (inflation, Russian war on Ukraine, …) However, the projects are going well – two end-caps for ATLAS and CMS are being built, and the Belle II PXD2 was shipped to Tsukuba two weeks ago. The suite of on-site experiments are progressing: ALPS II is ready to start data taking; LUXE is pioneering strong-field QED – CD1 in late 2022 placed the experiment on the DESY roadmap. There is a new large research centre for astrophysics in Germany founded – the DZA in eastern Germany. DZA will become home to German ET and SKA activities, and others.

[2] https://home.cern/news/news/knowledge-sharing/cern-and-lausanne-university-hospital-collaborate-pioneering-new-cancer

USA / FNAL (L. Merminga)

- For LBNF / DUNE – 60% of the excavation in South Dakota is complete; installation of detectors starts in one year (a mile underground).
  - Project enjoys strong DOE support – "CD1 reaffirmation" recently achieved (which says first science in 2028, and neutrinos in 2031). 2 of the 5 subprojects were re-baselined.
  - PIP-II construction is under way, the LINAC complex construction has begun in February 2023, and a first cryomodule was completed and is undergoing testing at full power. On 14 April, there will be the ribbon cutting for a new PIP II building, and groundbreaking for the LINAC complex.
- For HL-LHC, FNAL pursues two projects:
  - Accelerator upgrade – the baseline was recently approved; a cryo assembly of two quadrupole magnets around final focused is being cooled down – this is the first cryo assembly that is put together, Nb3Sn technology looking forward to testing!
  - The HL-LHC CMS upgrade project has CD-3 approval today. There is excellent progress.
  - In addition, FNAL hosted, in January 2023, the first CMSDAS in years (Covid), with more than 100 participants on site.
- By the Inflation Reduction Act, FNAL received $260M towards construction projects. The overall funding is good and strong, and the working is unimpeded.
- The new g-2 experiment is in operation and recently reached its statistics goal. New results are expected for late spring or early summer. The final theory result will come in 2025.
- The construction project mu-to-e was re-baselined recently. It has now renewed emphasis from the lab, with completion expected for 2025, and first science for 2026.
- Last week entire US HEP community came together at FNAL for the P5 townhall meeting. It was presented with a bold vision for the DUNE project, and for the upgrade of the accelerator complex, and for the DM and cosmic frontiers as well.
- FNAL is working hard to make the site more accessible again.
- Doon adds for BNL that work on ATLAS continues and on the DUNE magnets.
- Stuart adds for JLAB and nuclear physics – constructing the MOLLER project, high-precision parity-violating electron-electron experiment to deliver a precision measurement of sin2thetaW. Operation in 2 years, and then run for 2 years. JLAB cryomodule (CM) production facility as busy as it has ever been with LCLS-II-HE, SNS and CEBAF CMs simultaneously in production. First LCLS-II-HE CM was the best performing in the lab's history reaching nearly 200 MeV energy gain.

China and IHEP (Y. Wang)

- At the end of 2022 / beginning of this year – there was a big sweep of Covid across China – about 90% of all people were infected. But this was essentially over after one month. BEPC and spallation neutron source operation was not stopped – there was no beamtime lost.
- For the High Energy Photon Source – the linac was finished a few weeks ago (saw first beam from it); also the commissioning of the booster was finished, and by the end of the year the construction of the storage ring will also be finished.

- The upgrade of spallation neutron source has been approved by the central government for the first stage, and next two stages hopefully by the end of the year. We expect an increase of beam power to 500 kW.
- For the Juno experiment, structural construction was finished, and they are now working on the big sphere construction; 10% of the phototubes are already installed. End of this year or early next year the detector will be ready – then we fill it with liquid.
- For CEPC, work on design and technology R&D is ongoing. CAS started to organize a study of future large science facilities, and HEP is one of 8 fields considered. A call for proposals for HEP and nuclear physics is out, and 9 project proposals were received, and CEPC ranked number one among these (also by nuclear physics community). By end of 2023, CAS will finish this study, and then start negotiations with central government. Maybe starting next year things will be taken to the political level.
- Work on SC magnets for HL-LHC is ongoing. The first two sets have been working well (shipped to CERN and tested). No major problems or showstoppers towards final production seen.

Japan and KEK (M. Yamauchi)

- SuperKEKB achieved a new luminosity world record last year, but is still more than an order of magnitude below the design value. In order to improve, machine operation has been suspended in July 2022. Restart of operation will take place in October 2023 – then a large increase in luminosity is expected. Many European and US scientists have contributed to the improvement programme.
- At J-PARC, the first phase of COMET has been completed, and beam commissioning has begun.
- Preparations are being made for an experiment at HyperK. The accelerator is being upgraded to 1.3 MW for this. All construction is expected to be completed in 2026, and experiments will begin in 2027. No major delays have been observed so far.
- The most serious problem at KEK currently is the high cost of electricity. MEXT offered special budget for this purpose, but the future is unclear. Note that most nuclear power plants in Japan are not in operation – maybe they will have 17 back in operation in summer 2023, which would alleviate the problem significantly.

Canada (R. Teuscher, O. Kester)

- Canadian community published its long-range plan reaching until 2025/26, with an outlook into 10 years. It reinforces strong support for labs (TRIUMF, Perimeter Institute, SNOLAB). The plan recommends the full exploitation of TRIUMF, support for long-baseline experiments, and support for future Higgs factories. It also recommends R&D activities for future accelerator studies and supporting detector technologies.
- Canada celebrated the 50th birthday of its Institute of Particle Physics (IPP).
- TRIUMF released its 20-year vision in 2022.
- Since a few years, there is support for the development of LHC crab cavities.

- Canada achieved a large share in the ATLAS silicon upgrade projects, supported by Canadian funding agencies and with support from many colleagues from other institutes.
- There is also good cooperation with industry, e.g. for ASIC work, silicon development.
- Oliver adds that 10-year perspective also foresees joining FCC and EIC, with specific contributions to the projects, and handed in funding proposals to the ministry for that.

Asia (G. Taylor)

- The Lepton-Photon Conference 2023 will be held in July in Melbourne, and will also host the ICFA meeting before.
- After easter, the AFAD forum will meet.
- ACFA will have a meeting on the 14 April. ACFA represents a very broad range of facilities (nuclear physics, large machines, etc.). There are proposals to better focus the HEP programme inside ACFA.
- At Melbourne specifically,
  - an Xband system received from CLIC / CERN was installed in a refurbished basement, to be used for studies on high-gradient RF cavitities.
  - The group is continuing with ATLAS and Belle, and a small group joined HyperK; the group is building modules for ATLAS silicon upgrade.
  - An underground lab in a goldmine in Victoria is being made operational, and first DM experiments are being taken into operation (e.g. looking for annual variations).

India

- No report

Russia / JINR

- No report

Latin America (G. Gil da Silveria)

- A Latin-America symposium was held at the end of 2022 – presenting LA contributions to major experiments. Also, a LA association meeting was held – the first general assembly with focus on an update of the strategic plan for RIs in LA. In 2024 a white paper will be published, and the final document will come in 2025. The idea is to better guide funding and to exploit synergies between LA countries.
- The CERN-LA HEP school is ending today – 66 students from all around the world participated. The school exists for more than 10 years by now.
- In May the Physics Opportunities at an Electron Ion Collider (POETIC) conference will be held in Sao Paulo
- From Sao Paulo, there are contributions to DUNE, and modules were tested in Columbia.
- Last month Colombia signed a declaration of interest for CERN (LHCb, etc.), they want to increase this activity. Part of the plan is to improve the mobility of young researchers from Colombia and to have more consolidated participation at LHC.

- Mexico is member of Alice and hosts a virtual control centre where online shifts can be performed.
- Brazil: Two weeks ago, the LISHEP conference was held, with discussions to formalize an FCC participation, to establish national contacts and institute representatives – in the hope to have some people contributing to FCC in the next few years.
- Brazil: Members of the LHC experiments submitted proposals and received a large amount of funding. This is expected to lead to stable participation at CERN over the next few years (mobility etc.).

7. Executive Meeting

The executive meeting is not reflected in the minutes.

The meeting was adjourned.