

IDT-WG2 report

Shin MICHIZONO (KEK/IDT-WG2)

(July 12, 2022)

(1) IDT report

(2) Snowmass ITF(Implementation Task Force report)

(3) Conference information:

July 6-13: ICHEP 2022 (Bologna, Italy)

<https://agenda.infn.it/event/28874/program>

Two ILC accelerator related talks

Angeles Faus-Golfe “The CLIC and ILC accelerator status and plans”

<https://agenda.infn.it/event/28874/contributions/170185/>

Philip Burrows “Current Status of the ILC and CLIC projects”

<https://agenda.infn.it/event/28874/contributions/169166/>

July 17-26: Snowmass Community Summer Study Workshop

<http://seattlesnowmass2021.net/>

IDT report

E-mail from IDT-EB chair

Nomination of the IDT International Expert Panel members for ICFA endorsement

Submitted to ICFA by the ILC IDT Executive Board
11 July 2022

International discussion for realisation of a large-scale accelerator facility as a global project

Report submitted to ICFA by the ILC IDT Executive Board
9 June 2022

Timeline

- June 2022: Appointment of the International Panel Members
- June 2022: The first meeting of the International Expert Panel in remote mode
- July to October 2022: Drafting of the Discussion Document by the Core Group for the first part, i.e. general discussion of a global project that could be applicable to the ILC. The drafting will be done in close consultation with the International Expert Panel, whose members will keep close communication with the government authorities, CERN and the community.
- November 2022: The first face-to-face meeting of the International Expert Panel to review the first part of the draft.
- December 2022: Intermediate review by a face-to-face meeting with the officials of the governments and CERN on the first part. Based on the outcome of this meeting, a plan for the rest of the work will be defined.

Introduction

In a document submitted to ICFA on 9th of June 2022 with a title “International discussion for realisation of a large-scale accelerator facility as a global project”, creation of the International Expert Panel together with its Core Group was proposed and their charges described. This is a list of panel members nominated by the IDT Executive Board and we would like to ask ICFA endorsement of the list.

Nomination

International Expert Panel members

- Ursula Bassler (FR)
- Philip Burrows (GB)
- Beate Heinemann (DE)
- Stuart Henderson (US, ICFA Chair)
- Karl Jacobs (DE, EFCA Chair)
- Andrew Lankford (US, IDT-EB Americas)
- Nadia Pastrone (IT)
- Antonio Pich (ES)
- Steinar Stapnes (CERN, IDT-EB Europe)
- Nigel Smith (CA)
- Geoffrey Taylor (AU, IDT-EB Asia-Pacific)
- Katsuo Tokushuku (JP)

Chaired by Tatsuya Nakada (IDT EB Chair)

Scientific Secretary by Wataru Ootani (IDT EB Scientific Secretary)

Note that the Core Members are underlined.

Implementation Task Force report

Draft was released last week and I circulated it to the IDT-WG2 steering members .

<https://indico.fnal.gov/event/54953/sessions/20614/attachments/156153/203696/ITFreportDRAFT.pdf>

As Kaoru mentioned in an email he sent to the IDT-WG2-Sources Group, there was a snowmass accelerator meeting.

<https://indico.fnal.gov/event/55116/>

Concerning ITF draft, we pointed out about the positron source;

1) Table.13 "**Performance achievability**" score 3 (high risk)

We insist the R&D of the undulator scheme is not that low level.

At least >100 GeV electron beam is not necessary to validate the scheme.

and also the risk of the e-driven source is more or less the same as in other linear collider projects such as CLIC and CCC. (It seems they are evaluated to be 1.)

2) **Technical risk of the ILC positron source** is ranked 3 in Table.7, judging from the color. But Table.13 says score 2. Isn't this **inconsistent**?

3) If the above claims are acceptable, ILC entry in the summary table (Table.14) should be changed accordingly.

After serious discussion in the meeting it was agreed that

a) the "Performance achievability" in Tab.13 should be **lowered to 2**

b) **Rank 2 is adopted as the technical risk** in Tab.7 consistently as Table.13.

c) Table.14 will be changed accordingly.

We insisted we have the e-driven source as the backup. On the other hand **the policy of ITF is to adopt a single design for each project.**

Hence, we understand that the above evaluation is intended to the undulator scheme. For us the rank 2 is acceptable because it agrees with the number in our own evaluation sheet submitted around February.

International discussion for realisation of a large-scale accelerator facility as a global project

Together with the time critical R&D work on the accelerator, **this is one of the two tasks** we need to perform.

June 14
IDT-WG2 meeting

Introduction

The International Linear Collider (ILC) was conceived and has evolved as a global project under the umbrella of ICFA. Since 2012, ICFA has been supporting the proposal by the Japanese high energy physics community to host the ILC in Japan as a global project and created the International Development Team (IDT) in August 2020.

In June 2021, the IDT proposed to create the ILC Preparatory Laboratory (Pre-lab) as an international network of laboratories with headquarters in Japan, with a view that this would be a necessary step for having an intergovernmental negotiation for the sharing of the cost and responsibilities for the ILC among the international partners. MEXT expressed its view that it could not proceed toward the Pre-lab before having a prospect for the international cost sharing. Those two views are not compatible. The Advisory Panel of MEXT for the ILC concluded that it was premature to proceed toward the Pre-lab and recommended re-evaluation of the roadmap of the ILC project in a global context taking into account the progress in other Higgs factory studies.

In order to move forward with a fresh start, the IDT will organise international discussions, supported by KEK and with MEXT cognisance, to address those topics. The discussion will start by developing a general description of the evolution of a global project from conception to operation, which could be applicable to the ILC. Discussion for the specific case of the ILC will then follow, describing the full lifecycle of the project, suggesting processes for necessary decisions and potential consequences of those decisions. Possible implementation models could also be included in the discussion. Note however that the final implementation will be settled by the future intergovernmental negotiations.

The discussion will be carried out by an International Expert Panel consisting of scientists who are experienced in working with large international collaborations and well connected with both the particle physics community and government authorities. Through regular contact, the Panel members will make certain that government authorities and CERN are well informed about the status of the discussion and its progress. In this way, the authorities can provide frequent feedback through the Panel members. Occasional meetings of the Panel together with officials from the governments interested in the ILC and from CERN will be needed to ensure that all opinions are shared and discussed, in order that a common view among the participants

Timeline

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- Welcome page
- Announcements
- Snowmass Calendar
- Ethics Guidelines
- Snowmass Report

Organization

- Snowmass Steering Group
- Snowmass Advisory Group
- Frontier Conveners
- APS DPF Snowmass page
- Snowmass Early Career

Snowmass Frontiers

- Energy Frontier
- Neutrino Physics Frontier
- Rare Processes and Precision
- Cosmic Frontier
- Theory Frontier
- Accelerator Frontier
- Instrumentation Frontier
- Computational Frontier
- Underground Facilities
- Community Engagement
- Snowmass Liaisons

Community Contributions

- Letters of Interest
- Contributed (White)

Trace: • [accelerator](#)

<https://snowmass21.org/accelerator/start>

ACCELERATOR FRONTIER

* **Snowmass 21/22 Community Summer Study (Seattle, July 17-26) - please, REGISTER ASAP**

<http://seattlesnowmass2021.net/>

AF Reports (Drafts)

Here is the list of the preliminary drafts of reports in the Accelerator Frontier and their associated documents to collect feedback by the community before the reports are finalized. **LINKS ARE TO BE**

ADDED

1. [AF1: Beam Physics, Education and Outreach](#)
 - Please enter your comments and feedback on the report draft in this [shared document](#)
2. [AF2: Accelerators for Neutrinos](#)
 - Please enter your comments and feedback on the report draft in this [shared document](#)
3. [AF3: Higgs/Electroweak Factories](#)
 - Please enter your comments and feedback on the report draft in this [shared document](#)
4. [AF4: Energy Frontier Colliders](#)
 - Please enter your comments and feedback on the report draft in this [shared document](#)
5. [AF5: Beams for BSM Physics](#)
 - Please enter your comments and feedback on the report draft in this [shared document](#)
6. [AF6: Advanced Colliders](#)
 - Please enter your comments and feedback on the report draft in this [shared document](#)
7. [AF7-T: Accelerator Technologies - Targets and Sources](#)
 - Please enter your comments and feedback on the report draft in this [shared document](#)
8. [AF7-M: Accelerator Technologies - Magnets](#)
 - Please enter your comments and feedback on the report draft in this [shared document](#)
9. [AF7-R: Accelerator Technologies - RF](#)
 - Please enter your comments and feedback on the report draft in this [shared document](#)
10. [Implementation Task Force Report](#)
 - Please enter your comments and feedback on the report draft in this [shared document](#)
11. [Muon Colliders Forum Report \(available\)](#)
 - Please enter your comments and feedback on the report draft in this [shared document](#)
12. [e+e- Colliders Forum Report](#)
 - Please enter your comments and feedback on the report draft in this [shared document](#)
13. [Accelerator Fronties Summary Report](#)
 - Please enter your comments and feedback on the report draft in this [shared document](#)

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To join the Snowmass mailing list, follow the instructions at the bottom of the Welcome page.

Frontier Conveners

Implementation Task Force report

June 28
IDT-WG2 meeting

Draft was released last week and I circulated it to the IDT-WG2 steering members .

<https://indico.fnal.gov/event/54953/sessions/20614/attachments/156153/203696/ITFreportDRAFT.pdf>

Report of the Snowmass'21 Collider Implementation Task Force

Thomas Roser (chair)¹, Reinhard Brinkmann², Sarah Cousineau³, Dmitri Denisov¹, Spencer Gessner⁴, Steve Gourlay⁵, Philippe Lebrun⁶, Meenakshi Narain¹⁰, Katsunobu Oide⁷, Tor Raubenheimer⁴, John Seeman⁴, Vladimir Shiltsev⁸, Jim Strait⁸, Marlene Turner⁵, and Lian-Tao Wang⁹

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June 15, 2022

Abstract

The Snowmass'21 Implementation Task Force has been established to evaluate the proposed future accelerator projects for performance, technology readiness, schedule, cost, and environmental impact. Corresponding metrics has been developed for uniform comparison of the proposals ranging from Higgs/EW factories to multi-TeV lepton, hadron and ep collider facilities, based on traditional and advanced acceleration technologies. This report documents the metrics and processes, and presents evaluations of future colliders performed by Implementation Task Force.

Proposal Name	CM energy nom. (range) [TeV]	Lum./IP @ nom. CME [$10^{34} \text{ cm}^{-2} \text{ s}^{-1}$]	Years of pre-project R&D	Years to first physics	Construction cost range [2021 B\$]	Est. operating electric power [MW]
FCC-ee ^{1,2}	0.24 (0.09-0.37)	8.5 (28.9)	0-2	13-18	12-18	280
CEPC ^{1,2}	0.24 (0.09-0.37)	8.3 (16.6)	0-2	13-18	12-18	340
ILC ³ - Higgs factory	0.25 (0.09-1)	2.7	0-2	<12	7-12	140
CCC ³ (Cool Copper Collider)	0.25 (0.25-1)	1.3	3-5	13-18	7-12	150
CLIC ³ - Higgs factory	0.38 (0.09-1)	1.5	0-2	13-18	7-12	170
CERC ³ (Circular (ERL collider))	0.24 (0.09-0.6)	78	5-10	19-24	18-30	90
ReLiC ^{1,3} (Linear ERL collider)	0.24 (0.25-1)	165 (330)	5-10	>25	7-12	100
ERLC ³ (ERL linear collider)	0.24 (0.25-0.5)	90	5-10	>25	12-18	250
XCC (FEL-based $\gamma\gamma$ collider)	0.125 (0.125-0.14)	0.1	5-10	19-24	4-7	~90
Muon Collider Higgs Factory ³	0.13	0.01	>10	19-24	4-7	200

Table 1: Main parameters of the submitted Higgs factory proposals. The superscripts next to the name of the proposal in the first column indicate (1) Facility is optimized for 2 IPs. Total peak luminosity for multiple IPs is given in parenthesis; (2) Energy calibration possible to 100 keV accuracy for M_Z and 300 keV for M_W ; (3) Collisions with longitudinally polarized lepton beams have substantially higher effective cross sections for certain processes

Implementation Task Force report

Table 7: Technical risk registry of accelerator components and systems for future e^+e^- and ep colliders: lighter colors indicate progressively higher TRLs (less risk), white is for either not significant or not applicable.

	FCCee/CEPC	ILC	HE ILC	CCC	HE CCC	CLIC	HE CLIC	CERC	ReLiC	HE ReLiC	ERLC	XCC	LHeC/FCCeh
RF cav./power sources													
Cryomodules													
HOM detuning/damp													
High energy ERL													
Positron source													
Arc&booster magnets													
Inj./extr. kickers													
Two-beam acceleration													
Damping rings													
Emitt. preservation													
IP spot size/stability													
High power XFEL													
e^- bunch compression													
High brightness e^- gun													
IR SR and asymm.quads													

Technical Risk Factor	Score	Color Code
TRL = 1,2	4	
TRL = 3,4	3	
TRL = 5,6	2	
TRL = 7,8	1	

Table 6: TRL scoring chart and color codes (used below in the summary Table 14).

ILC Higgs Factory	Risk Factor	Technology Validation	Cost Reduction Impact	Performance Achievability	R&D Timescale	Average of Squares
Critical Enabling Technologies						
SRF Cavities	1	1	1	1	0.5	0.85
Cryomodules/Assembly	1	2	2	1.5	0.5	2.3
Positron Source	2	2	1	3	0.5	3.65
nm Spot Size/Stability at IP	1	2	1	1	0.5	1.45
Damping rings inj and extr	1	1	1	1	0.5	0.85

Table 13: ILC Higgs Factory Scoring Example

Performance Achievability	Score	Color Code
Significant - needs explicit demo of beyond state-of-the-art	3	
Moderate - Feasible to achieve 2 - 3X state-of-the-art	2	
Feasible - at state-of-the-art	1	


Table 11: Technical component and subsystems' performance achievability scoring chart and color codes (used below in the summary Table 14).


Our comments are

1. in Table 7 (Technical Risk) ILC and HEILC, the positron column should be the same gray as CCC, CLIC, etc.
2. change "Performance Achievability" from 3 to 1 for the positron source in Table 13

meeting with ITF - Snowmass Accelerator Conveners (AF1-AF7, ee/mmFora) Meeting #18

<https://indico.fnal.gov/event/55116/>

 Wednesday 29 Jun 2022, 16:00 → 19:00 Europe/Berlin

 Steve Gourlay (LBNL) , Tor Raubenheimer (SLAC) , Vladimir Shiltsev (FNAL)

Description Q&A Meeting with ITF - Snowmass Accelerator Frontier Conveners and Proponents (Meeting #18)
Time: Wed., June 29, 2022 09:00 AM Central Time (US and Canada)

Agenda:

1. ITF members address submitted questions and comments

2. Discussion

ITF Report:

<https://indico.fnal.gov/event/54953/sessions/20614/attachments/156153/203696/ITFreportDRAFT.pdf>

Submitted Questions/comments: https://docs.google.com/document/d/1zBnSmDX0iAmnE1_X5agaBHjk4Echjk31Qs7ZrGrs4xM/edit

Zoom Link:

Join Zoom Meeting

<https://fnal.zoom.us/j/98105241806?pwd=RjJ4QlhGcXQ1aE5DV3NVdmZhVG5rZz09>

Meeting ID: 981 0524 1806

Passcode: 527516

16:00 → 18:45 **Summaries:: ITF (chair and members) address submitted Qs/comments and critique**
Convener: Vladimir Shiltsev (FNAL)

18:45 → 19:00 **AOB**

AOB

Speakers: Steve Gourlay (LBNL), Tor Raubenheimer (SLAC), Vladimir Shiltsev (FNAL)

