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ILC Cost-Update 2024: Task-Force Work Progress and Plans

Akira Yamamoto

ILC Cost-Update-2024 Task Force and KEK

Discussed originally at the **3rd** ILC-CU24 TF meeting, 2024-6-14, and

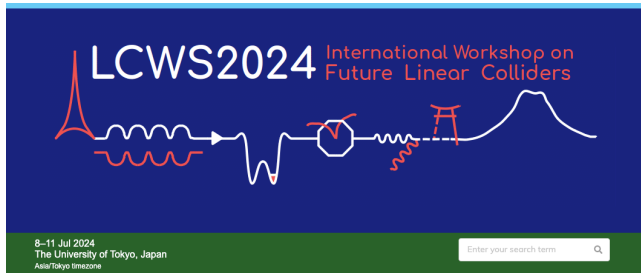
Reported at **ILC-CU24 TF meeting**, 2024-7-17 and

To be reported at **IDT-WG2 meeting**, 2024-7-23

Updated: 2024-7-23

ILC Cost-Update study requested to the Task Force

<https://agenda.linearcollider.org/event/10134/overview>



The IDT established by ICFA in August 2020 has been supporting the Japanese HEP community, who had proposed to host the ILC in Japan as a global project.

- Working Group 1: Giving advices for founding the ILC Preparatory Laboratory, Pre-lab: (MEXT considered that it was premature for establishing a Pre-lab.)
- Working Group 2: Forum of the accelerator community interested in the ILC: Through regular meetings, it established the accelerator work packages for the Pre-lab proposal and ILC Technology Network (ITN). It follow **the ITN activities** as well as the **ILC Cost Update** work.

Status of the ILC

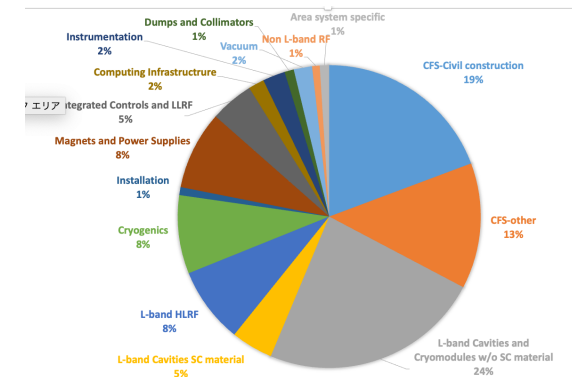
-Activities of the International Development Team (IDT)-
LCWS2024 at University of Tokyo
Tokyo, Japan, 8-11 July 2024

Tatsuya Nakada
EPFL, Switzerland
Chair of the IDT Executive Board

Cost update task force members:

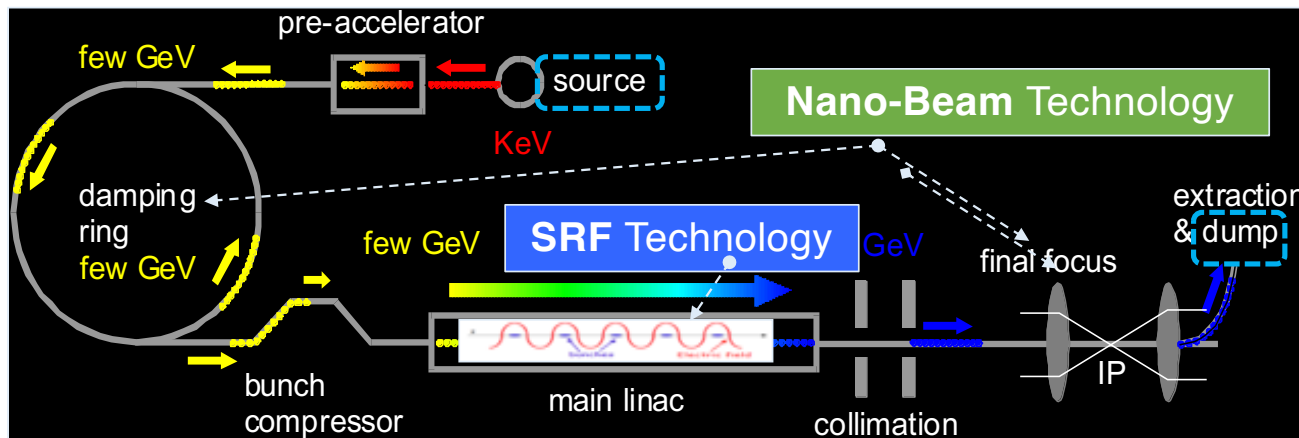
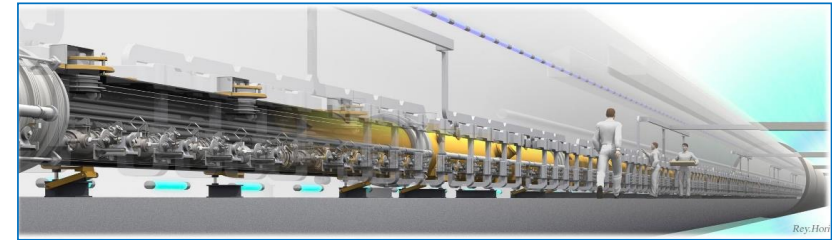
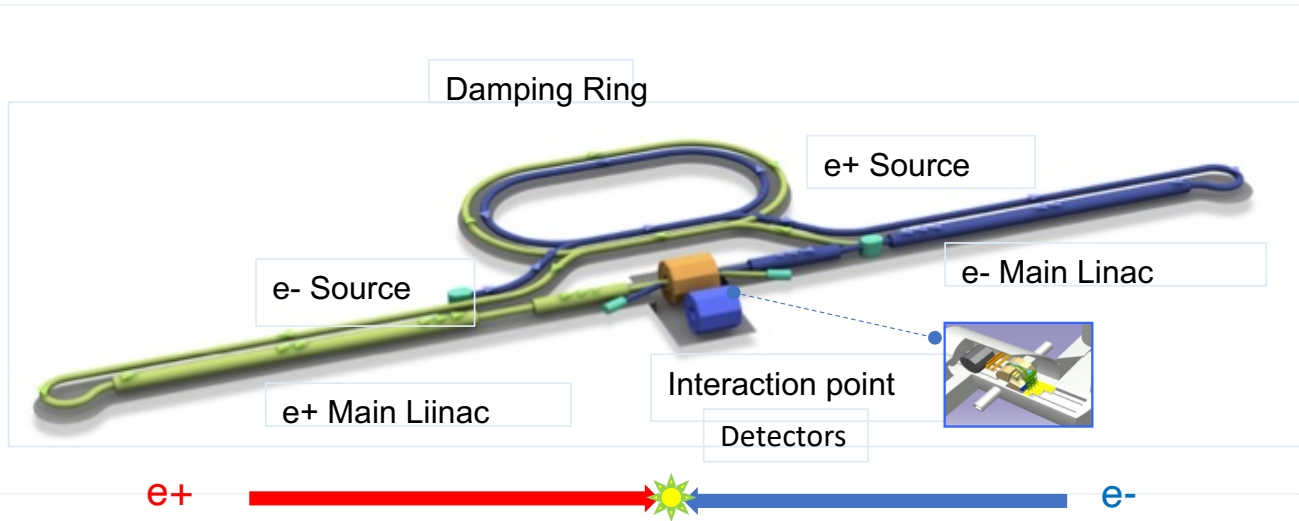
Gerry Dugan	(Cornell)
Benno List	(DESY)
Marc Ross	(SLAC)
Hiroshi Sakai	(KEK)
Nobuhiro Terunuma	(KEK)
Nick Walker	(DESY)
Akira Yamamoto ^{*)}	(KEK)
and from IDT EB	
Andy Lankford	(UCI)
Shinichiro Michizono	(KEK)
Steinar Stapnes	(CERN)

^{*)}Task Force leader



ILC250-A Cost fraction in 2017,
to be updated

ILC-250 and the Accelerator Technology



Parameters	Value
Beam Energy, Length	125 + 125 GeV, 20.5 km
Luminosity	1.35 / 2.7 x 10 ¹⁰ cm ² /s
Beam rep. rate	5 Hz
Pulse duration	0.73 / 0.961 ms
# bunch / pulse	1312 / 2625
Beam Current	5.8 / 8.8 mA
Beam size (y) at FF	7.7 nm
SRF Field gradient	< 31.5 > MV/m (+/-20%) Q ₀ = 1x10 ¹⁰
# SRF 9-cell cavities	~ 9,000 (~ 8,500 x 1.05)
# CM	~ 1,000
# RF units:	~ 240
AC-plug Power	111 / 138 MW

ILC-250 SRF Cavity-, Mag-, CM-, and RF-units

arXiv: 1711.00568 v3.

KEK 2017-3
 DESY 17-180
 CERN-ACC-2017-0097

The International Linear Collider
 Machine Staging Report 2017
 Addendum to the International Linear Collider Technical Design Report published in 2013

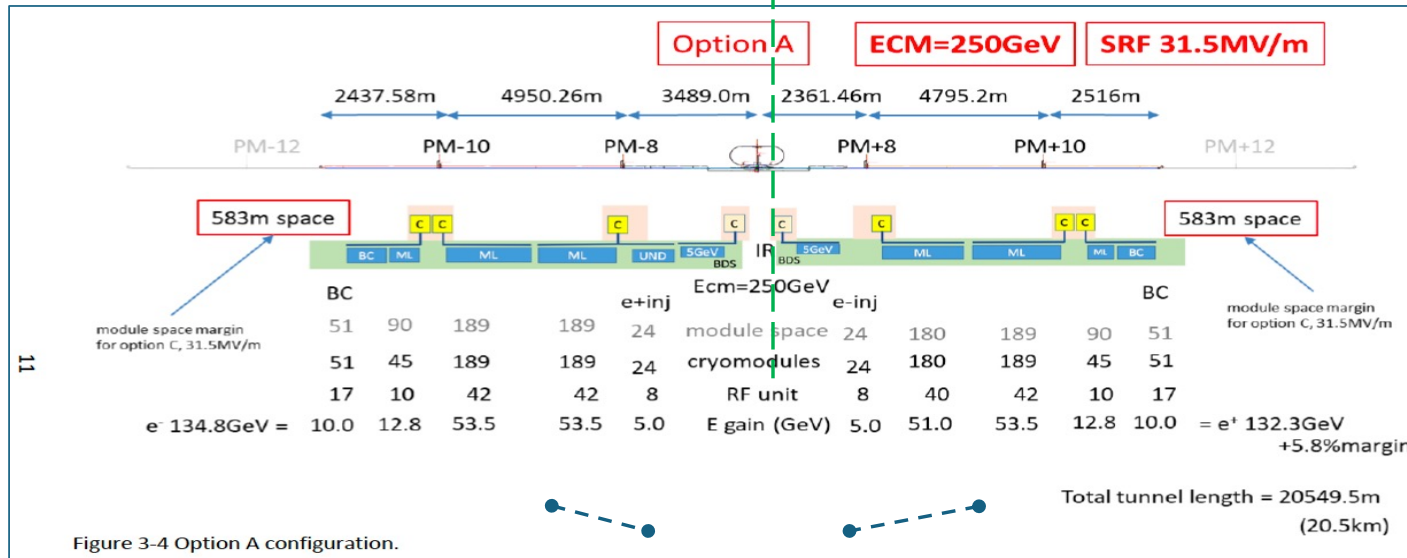
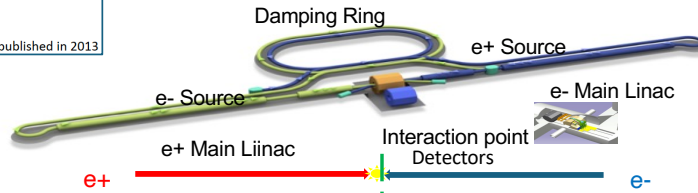
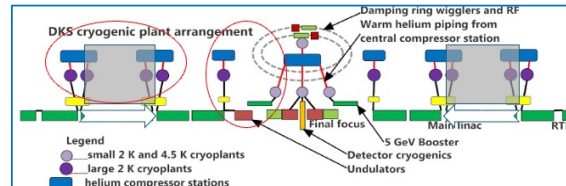
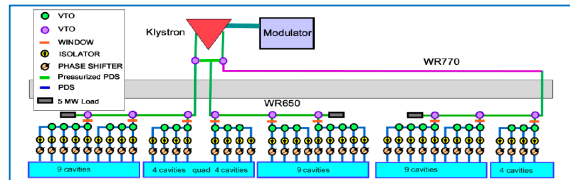


Figure 3-4 Option A configuration.



1.3-GHz SRF-Cavities (total): 8,554
 (Indust. Prod. Study) → ~9,000
 BC: 68x9 + 34x8 = 884
 ML: 558x9 + 279x8 = 7,254
 e+e- S.: 32x9 + 16x8 = 416

SC-mag +BPM (total): 329
 (→ ~330)
 BC: 34
 ML: 279
 e+e- S.: 16

1.3-GHz CMs (total): 987
 (→ ~990)
 BC: 102
 ML: 837
 e+e- S.: 48

1.3-GHz RF-units (total): 236
 (→ ~240)
 BC: 34
 ML: 186
 e+e- S.: 16

Cryogenics 6 (Large) + 2 (Small)
 (→ 6+2)
 BC + ML : 6 (large)
 e+e- S (Lnac): 2 (small)

ILC Cost Estimate Update 2024: Working Approach

- **Strategy Update:**

- Various boundary conditions on currency (ILCU or real exchange rates?), ppp?, inflation, and further social status to be well defined.

- **Accelerator Cost Update:**

- **SRF:**

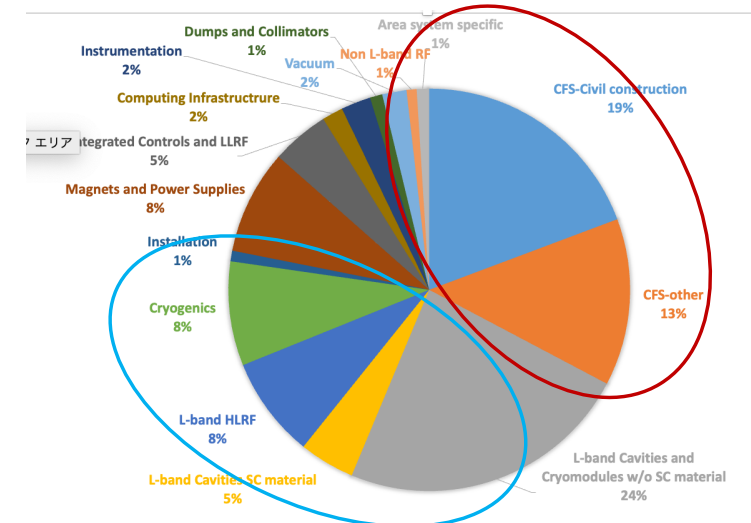
- Understand Eu-XFEL, LCLS-II-HE experiences as facts,
- Update of **Industrial study for Cavity**, Tuner, Coupler, **CM**, HLRF, and Cryogenics.
- Re-validate the cost update.

- **Other Technical Systems.**

- re-validate the cost based on systematic scaling.

- **CFS (CE & CF):**

- No site-specific: re-validate the cost based on recent multiple studies, as to be 'fresh'.
- (Site-specific: to be separately handled with care.)



Proposal for Updated Cost

Courtesy: B. List
"IDT methodology for 2024 Cost Update"
ILC-CU24 Task Force Meeting, 19.7.2024



- **Keep the TDR methodology:**
 - Stay consistent with existing cost estimates
 - IDT mandate is for ILC in Japan as a global, in-kind contribution project
 - This means:
 - **Equipment prices (Value)**
 - Taken from quotes/estimates in a specific region (either 2012 estimate or **new estimate/quote**)
 - escalated using regional escalation factor to 2023 if necessary
 - Converted **to a new ILCU2023 using PPP rates**
 - Define a **new ILCU2023:**
"1 ILCU(2023) corresponds to the purchasing power of **1 US\$ in the U.S. in Jan 2023**, as representative for 2022-2024"
 - Depending on item
 - escalate values from TDR
 - Update value from new quote, convert with PPP
 - **Start from accelerator area / technical system matrix, do not go back to full item list**
- Technical implementation for escalation:
 - Starting from TDR cost estimate:
 - Evaluate which costs were evaluated in which currency / region originally
 - Convert cost back from ILCU2012 to local currency using PPP(2012) rates from TDR
 - **Escalate cost from 2012 to 2023** using local escalation rates
 - Convert cost to ILCU2023 using PPP(2023) rates
 - Can be considered as evaluating an effective escalation factor from ILCU2012 to ILCU2023, based on a "basket" of goods and regions
-> do separately for each accelerator area/technical system
 - The resulting escalation factors can be applied also to scaled cost estimate, i.e. the 2017 cost estimate for a staged machine

} 1 factor

Reminder from last meeting

Cost: ILC250 Option C (→ A)



Option-C-CostRandD-20170914-ay240603

Excel file: Option-C –CostRandD-20170914-ay240603, Matrix OptionC

Cost Matrix Updated for Option-C without Cost R&D

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fraction	total	Area System	CFS-Civil construction	CFS-other	L-band Cavities and Cryomodules w/o SC material	L-band Cavities SC material	L-band HLRF	Cryogenics	Installation	Magnets and Power Supplies	Integrated Controls and LLRF	Computing Infrastructure	Instrumentation	Dumps and Collimators	Vacuum	Non L-band RF	Area system specific	TOTAL
7.5%	391.685	Common																
4.0%	209.145	Electron Source																
5.7%	300.175	Positron Source																
9.1%	477.756	Damping Rings																
11.6%	607.460	RTML																
52.6%	2,762.871	Main Linac																
2.2%	326.847	BDS																
3.4%	181.031	IR																

CFS-other	L-band Cavities and Cryomodules w/o SC material	L-band Cavities SC material	L-band HLRF	Cryogenics	Installation	Magnets and Power Supplies	Integrated Controls and LLRF	Computing Infrastructure	Instrumentation	Dumps and Collimators	Vacuum	Non L-band RF	Area system specific	TOTAL
708,289	1,239,477	234,788	426,951	440,416	44,988	440,505	244,426	88,647	125,878	52,407	102,879	42,506	52,700	5,256,970

Common	Electron Source	Positron Source	Damping Rings	RTML	Main Linac	BDS	IR
391.685	209.145	300.175	477.756	607.460	2,762.871	326.847	181.031

Technical System	Percentage
Main Linac	53%
CFS-Civil construction	19%
CFS-other	13%
L-band HLRF	8%
L-band Cavities SC material	5%
L-band Cavities and Cryomodules w/o SC material	5%
Dumps and Collimators	2%
Installation	2%
Integrated Controls and LLRF	2%
Computing Infrastructure	2%
Instrumentation	2%
Non L-band RF	2%
Area system specific	2%
Vacuum	2%
Common	7%
Electron Source	4%
Positron Source	6%
Damping Rings	9%
RTML	12%
BDS	6%
IR	3%

Component	Percentage
Main Linac	53%
RTML	12%
Damping Rings	9%
Positron Source	6%
Electron Source	4%
Common	7%
BDS	6%
IR	3%

Area System
Common
Electron Source
Positron Source
Damping Rings
RTML
Main Linac
BDS
IR
TOTAL (MILC)

Technical System
CFS-Civil construction
CFS-other

undulator extension is included in magnets
magnet,vacuum were shorten
dumps were reduced.

Matrix-Summary | Matrix; OptionC-R&D | Matrix; OptionC | LCB meeting | TDR Cost Decomposition | Cost R&D + Cryogenics Merging | Cost Reduction R&D | Staging Options | Staging Options 2017-7-14 | TDR Cost Decomposition (R)

Use of Purchasing Power Parity Indices for the Value Estimate

Purchasing Power Parity indices reflect how the value of goods change from place to place. In contrast to currency exchange rates, they are goods dependent as well as dependent on the country (PPP rates for Euro to Dollar conversion differ for the various member states of the Euro zone).

For an international in-kind contribution project such as the ILC, use of **PPP indices is appropriate** because it gives the cost for domestic production or procurement of the respective items. It is assumed that in-kind contributions will mostly be produced and purchased in the contributing regions.

For example, if a cryo module would cost **1.0 M€ to produce in Europe**, then it would be expected to cost **1.185M\$ to produce in the U.S.** (as a PPP index of 0.844 for \$/€), and **1.283 Oku¥ to produce in Japan** (at a PPP index of \$/¥=108.3). In contrast, the currency exchange rate would indicate how much it cost to acquire the item in Europe, e.g. **it would cost 1.35 Oku¥** to pay for a European made cryomodule in Yen, **at an exchange rate of €/¥=135.**

If due to currency fluctuations a region has an overvalued currency (which means that the currency costs more on the money market than would be appropriate from its Purchasing Power, a situation currently faced by the Euro zone and even more by Switzerland, compared to the U.S.), it can make use of that advantage and acquire goods from abroad at lower prices, or decide to support the own economy and buy local. Insofar, the PPP cost estimate can be considered “conservative” for overvalued currencies. On the other hand, if a currency is undervalued (such as the Yen compared to the Euro in the preceding example), the PPP rates reflect the true buying power of the currency for locally produced goods instead of inflating the cost estimate due to (possibly temporarily) unfavourable exchange rates.

ILC Cost-Update2024 Approaches

Category	ILC-TDR-500 (2012) Updated from RDR &.. (by GDE)	ILC250 (2017) Updated from TDR & .. (bu LCC)	New Efforts for ILC250 further update, in progress (by IDT)	ILC250 (2024) Expected: (by IDT)
Year	2012 ~ 2013	2017 ~ 2018	2018 ~ 2024	
SRF	- Eu-XFEL, - Industrial study	- Scaling, - Industrial study update-1	- Design update for ILC250, - Comparison w/ LCLS-II-HE, ← Cavity - Comparison w/ Eu-XFEL (update) ←Cavity and CM - Industrial-study update-2, ← Cavity	- 2024-based cost update
Other Tech. Sys. (Mag., PS, Vac., Control, others. ...)	- Lab study & - Scaling:	- Scaling:	-----> e-driven e+ source studied to be an alternate	- Scaling-update - e-driven e+ source as alternate ?
CFS (CE & CF)	- Global efforts:	- Scaling, - New multiple design- and cost-studies in JP, resulting good consistency.	- Further design- and cost-update	- 2024-based, design- and cost-update

The international Linear Collider -- A Global Project

Appendix: ILC250 Project Costs

	[2013]	[2018]	
	TDR: ILC500 [B ILCU] (Estimated by GDE)	ILC250 [B ILCU] (Estimated by LCC)	Conversion to: [B JPY] (Reported to MEXT/SCJ)
Accelerator Construction: sum	n/a	n/a	635.0 ~ 702.8
Value: sub-sum	7.98	4.78 ~ 5.26	515.2 ~ 583.0
Tunnel & building	1.46	1.01	111.0 ~ 129.0
Accelerator & utility	6.52	3.77 ~ 4.24	404.2 ~ 454.0
Labor: Human Resource	22.9 M person-hours (13.5 K person-years)	17.2 M person-hours (10.1 K person-years)	119.8
Detector Construction: sum	n/a	n/a	100.5
Value: Detectors (SiD+ILD)	0.315+0.392	0.315+0.392	76.6
Labor: Human Resource (SiD + ILD)	748+1,400 person-years	748+1,400 person-years	23.9
Operation/year (Acc.) : sum	n/a	n/a	36.6 ~ 39.2
Value: Utilities/Maintenance	0.390	0.290 ~ 0.316	29.0 ~ 31.6
Labor: Human Resource	850 FTE	638 FTE	7.6
Others (Acc. Preparation)	n/a	n/a	23.3
Uncertainty	25%	25%	25%
Contingency	10%	10%	10%
Decommission	n/a	n/a	Equiv. to 2-year op. cost



to be updated
[2024]

arXiv:1901.09829v1 [hep-ex] 28 Jan 2019

http://www.mext.go.jp/component/b_menu/shingi/toushin/_icsFiles/afieldfile/2018/09/20/1409220_2_1.pdf

FIG. 7. Costs of the ILC250 project in ILCU as evaluated by the Linear Collider Collaboration (LCC), converted to JPY and re-evaluated by KEK, and summarised in the MEXT ILC Advisory Panel report, in July, 2018.

ILC250 SRF Industrial Cost Update Plan

1. Cavity and CM	
(1) Cavity related	
① SC Material	
② Resonator (main body)	
③ Cavity Inspection	
④ Input power coupler	
⑤ Coupler Processing	
⑥ Tuner	
⑦ Helium Vessel	
⑧ Magnetic Shield	
⑨ Transportation	
(2) Quadrupole SCM package	
(3) Cryomodule	
① TDR Engineering study	
② Cryostat and Cold-mass	
③ CM assembly	
④ CM transportation	
⑤ CM Acceptance	
(4) Coupler Process Infra-St.	
(5) Kly RF Power and Distribution	
① Klystron	
Associated equipment	
② Assoc. : Modulator	
(3) RF Power distr.	
Supporting structure	



Cavity related:

- SC Material:
- Cavity (resonator):
- Coupler :
- Tuner:
- Mag. Shield ?

Magnet:

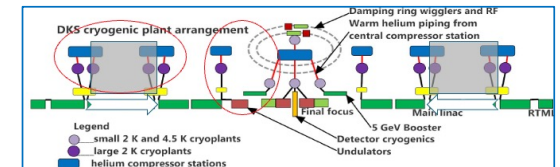
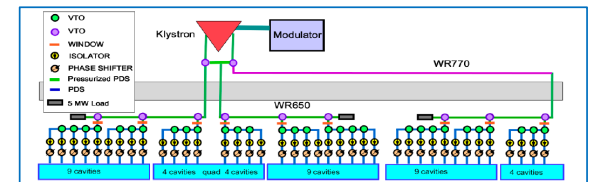
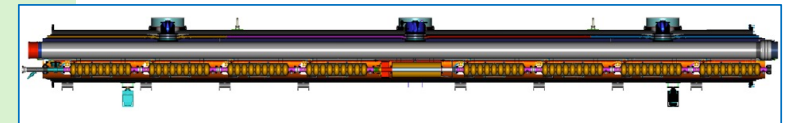
CM:

- Components
- Assembly

HLRF:

- Klystron ?
- Modulator ?
- PDS ?

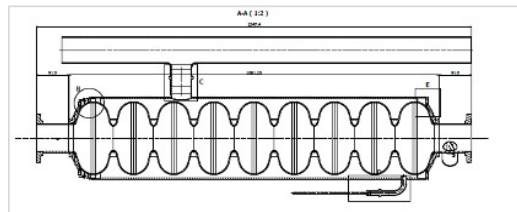
Cryogenics:



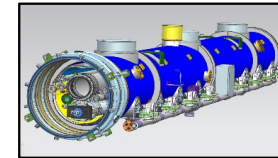
Clarifying ILC250 SRF Industrial Cost Update Plan

SRF Cavity:

- Update of the 1.3 GHz **SRF cavity** industrial production study on ILC250 as of 2024
- Delivery expected to be ready for the cold RF test and for assembly into CM
- **3,000 cavities** as a baseline industrial production model, **to be shared with 3 region/industry,**



To be Ready for



- ~ 6 years production period, including **4 yrs steady production period** (or alternate proposal)
- Additionally, results of the study will be **scaled to the 9,000 full production.**

Study plan expected:

- The study contract to be made by the end of July, 2024, (→ to be discussed)
- The **study result** to be reported to IDT/CERN **by the end of October, 2024.**

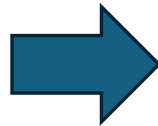
Action Progress in Communication with Industry/Labs for the ILC-CU24 TF Work

A. Yamamoto, 240715

Category	Production Items	Consisting of	Key Parameters	# required for ILC250	Indust. Prod. Model (w/ 3 regions/vendors)	Option for full production	Reference in 2024 price
ML/SRF	SC material	FG sheets, or MG discs	265 ^Λ . x 2.8 [mm] 260 (dia) x 2.8 [mm]	9,000 x (18+2)	3,000	(tbd)	Ind. Cost Quotation
	Cavity/Resonator	9-cell, end-g, 2p-He pipe, HOM	1.3 GHz, pulse, E:35 MV/m, Q: 1e10	9,000	3,000	9,000	Ind. Cost Quotation LCLS-II-HE (2021)
	Input-Coupler	Warm-, cold-sections	1.3 GHz, pulse,	9,000	3,000	(tbd)	Ind. Cost Quotation LCLS-II-HE (2021)
	Tuner	Lever-Mech., Motors, Piezo	ΔF: ?? Hz T-response: < 0.1 ms ?	9,000	3,000	9,000	Ind. Cost Quotation LCLS-II-HE (2021)
	Magnetic Shield	Single-layer (outside)	Residual B field : < ? mT	9,000	3,000	9,000	Ind. Cost Quotation LCLS-II-HE (2021)
ML/SCM package	SC-mag + BPM	SC-mag, BPM	G: 40 T/m, L: 0.9 m Conduction cooling	330	110	330	Ind. Cost Quotation LCLS-II-HE (2021)
ML/CM	Components	Cold-mass, V. Veseel,	Size: 1 m x 12.5 m T-op: 2 K,	900 + α	300 + α'	900 + α	Ind. Cost Quotation LCLS-II-HE (2021)
	Assembly	Cavity-string assembly, Installation into V.V.		900 + α	300 + α'	?	Lab's expert estimate, scaling from Eu-XFEL
ML/HLRF	Modulators			240 + β	80 + β'	240 + B	Ind. Cost Quotation
	Klystron		1.3 GHz	240 + β	80 + β'	240 + β	Ind. Cost Quotation
	Power Distr. System			240 + β	80 + β'	240 + β	Ind. Cost Quotation
ML/Cryogenics	Refrigerator System		~ 20 KW @ 4.5 K	6 large system	3 large large system	6 large+	Lab's expert estimate based on HL-LHC
Others: - Sources				Similar to TDR			Scaling for inflation from 2012 (TDR)
Others: - DR/RTML/BDS				Similar to TDR			Scaling for inflation from 2012 (TDR)
CFS	CE, CF,	Tunnel, Build., Utilities					New estimate in 2024

ILC250 SRF Industr. Cost Update Work in Progress

TDR Cost Estimate (Break Down) for MEXT	
Item	
1. Cavity and CM	
(1) Cavity related	
①	SC Material
②	Resonator (main body)
③	Cavity Inspection
④	Input power coupler
⑤	Coupler Processing
⑥	Tuner
⑦	Helium Vessel
⑧	Magnetic Shield
⑨	Transportation
(2) Quadrupole SCM package	
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⑤	CM Acceptance
(4) Coupler Process Infra-St.	
(5) Kly RF Power and Distribution	
①	Klystron
Associated equipment	
②	Assoc. : Modulator
(3) RF Power distr.	
Supporting structure	



Cavity related:

- SC Material: → **OTIC (cn)**, **ATI (us)**, Tokyo-Denkai (jp)
- Cavity: → **RI (de)**, **Mirapro (jp)**, **MHI (jp)**
- Coupler : → **RI-Thales (de-fr)**, **CPI (us)**
- Tuner: → Suzuki-Kikai (jp)
- Mag. Shield → tbd/scaling

CM:

- Components (VV and cold-mass): → WUXI (cn), Zanon (it)
- Assembly → CEA-Saclay(eu-XFEL), Fnal (us-LCLS-II)

HTRF:

- Klystron: → Canon (jp) and ?
- Modulator: → tbd
- PDS → tbd/scaling?

Cryogenics: CERN (HL-LHC), SLAC (LCLS-II)

Blue: Communication in progress

Action Progress in Communication with Industry/Labs for the ILC-CU24 TF Work

A. Yamamoto, 240715

		Contacted	To be contacted	TF members in charge	Advisors @ KEK (requested)	Advisors / Contacts IDT / ITN labs. (expected) , or comments	
SRF	SC material	OTIC, ATI-jp	Tokyo-Denkai	WG-2 : SRF A. Yamamoto (AY) M. Ross (MR) N. Walker (NW) H. Sakai (HS)	T. Saeki K. Umemori,	J. Gao (IHEP)	
	Cavity/Resonator	RI*, MHI, Mirapro*			KU, TS	S. Steinar / K. Schirm (CERN)	
	Input-Coupler	RI/Thales*	CPI ?		Y. Yamamoto (YY)	SS/KS,	
	Tuner	Suzuki-Kikai	Sanyo?		M. Omet, T. Dohmae	Y, Picharnikov (Fnal)	
	Magnetic Shield		??		R. Ueki		
SC-mag			Mitsubishi,		Y. Arimoto, T. Yamada	T. Fernando (CIEMAT)	
CM	Components (Cold-mass, V.Vessel)		WUXI, Zanon		WG-1 and -3; Strategy and Other Tech. B.List (BL), G.Dugan (GD) NW, AY, HS	YY, TD	J. Gao (IHEP), L. Monaco (INFN)
	Assembly	CERN, FNAL/CEA, (XFEL) Hitachi	Fnal / CEA			YY & others (robotics)	V. Parma (CERN), O. Napoli (Fnal), (C, Madec, S. Berry (CEA), T. Semba (Hitachi) (T. Peterson, T. Arkan, (SLAC/Fnal, JLab)
HLRF	Modulators		?			T. Matsumoto	tbd
	Klystron	Canon				TM	T. Harada (Canon)
	Power Distr. System		?			TM	
Cryogenics	Refrigerator System	CERN (HL-LHC) SLAC (LCLS-II)				K. Nakanishi	D. Delicaris (CERN), E, Fauve, T. Peterson (SLAC)
Others: Sources						Y. Enomoto,	(based on 'scaling')
Others: DR/RTML/BDS						T. Okugi	(based on 'scaling')
CFS		P. Consulting				WG4: N.Terunuma (NT)	


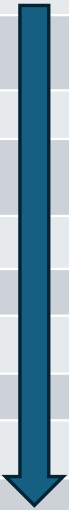
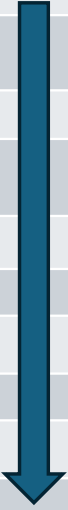

ILC-CU-2024 TF Actions Progress

- **Strategy:**
 - Currency : to keep ILC unit, and to redefine the new reference point at January 2023 (to be in balance with ppp availability).
 - Inflation/escalation: to rely on ppp (latest available in 2023)
- **SRF:**
 - Mass production scaled down to ILC250,
 - learning curve co-efficiency: < 95 % model> → a half production resulting 5 % up/unit
 - Cost renewal actions in progress in global communication,
 - to figure out the price in 2024
- **Other technologies:**
 - Scaling from ILC-500 (TDR) to ILC-250,
 - from 2012 to 2023 (or 2024)
- **CFS (CE and CF):**
 - Cost renewal action in progress in Japan
 - to figure out the price in 2024.

Cost Evaluation: ILC-500 (AS) to -ILC250-A (A') – Confidential --

– update-ay180112, for MEXT-TDR-WG-180120 → ILC-Cost-Update-2024

180103: S. Michizono, B. List, A. Yamamoto
240609: A. Yamamoto, S. Michizono (for ILC250-2024)

Progress Year-base Unit [MILC]	ILC500 2012-base	Energy 500→250 # Reduction R.	ILC250-A 2012-base	ILC250-A' 2012-base	Unit cost-up Due to prod. Scale-down	Design/Production update effect (tbd)	Escalation effect*, 2012-2024 (tbd)	ILC250-A 2024-base (tbd)
<i>Year of work ~ report</i>	<i>2012 ~ 2013</i>	<i>2017 and reported in EXPPU2020, SnowMass2022</i>	→ ILC cost update 2024					
Acc. SRF								
SC material	440	x 0.53	235	108	Tbd	tbd	tbd	tbd
Cavity-CM	2,317	0.53	1,239	1,053				
HLRF	789	0.53	427	407				
Cryogenics	674		440					
Other Tech. System	(2,065 -674) =1,391	0.79	(1,636 -440)					
e-dr. e+Source								
CE & CF								
CE & Build.			1,014	1,014				
Tun. for e-dr. e+ S.								
Electrial	333	0.77	258	258				
Mechanical: C./Vent., Safety & Alignment	576	0.76	448	448				
Sum	7,985	0.66	5,256	4,780				
Note;	(1.0)	ML-RF unit (500/250): 378 /186 = 0.49 All-RF units (500/250): 438/242 = 0.55	(0.66)	(0.66)	Learning curve coefficient Unified to be 95 %		To be justified using ppp and currency ILC Unit	

Work in Progress

Further Plan

- TF meetings:
 - CFS : 24 July, tomorrow,
 - SRF:
 - WuXi (CM); 29 July,
 - Zanon (CM): 30 July
 - RI (Cavity) : 28 Aug. (tbc), 26 Sept. (visit RI) , 11 Nov. (Visit RI)
 - OTIC: in early Aug. and 31 Oct (visit OTIC)
 - ATI: in early Aug. Canon in August, ...
 - Others. ...
 - Acc. Sub-groups: 4 Sept. 14:00 CEST
 - TF General: 4 Sept. 15:00 CEST
- Due date for Industrial production study : end Oct.
- Due date for TF report : (hopefully) end Nov.