… et si l'ILC est décidé

Vincent Boudry

Congrès du LLR

18-20 sept 2017
Guidel-Plage

TA support + WP14

Donald J. Trump @realDonaldTrump · 1 h

Years of efforts with all my great professionalism.
PROUD to announce I convinced Japanese Govt to build

Donald J. Trump @realDonaldTrump · 1 h

the greatest EVER accelerator in UNIVERSE.
American people has the right to know :
has God made America stable or not ?!

A l'origine en anglais

4,5 k 5,1 k 19 k

•

Paramètres d'un collisionneur *
* = faisceau contre faisceau

L'énergie dans le centre de masse ($\sqrt{s}$)

- Tevatron 2 TeV
- LHC = 14 TeV
- **ILC** = 250 GeV… 500 GeV ?
- CLIC = 3 TeV
- HERA = 330 GeV (30 GeV e± × 920 GeV p)

Type de particules

- HERA = electron/positron × protons
- Tevatron = proton × antiprotons
- LHC = proton × proton
- LEP / **ILC** / CEPC / FCC-ee = e^+e^-
- Muon : $\mu^+\mu^-$

Geometrie: Lineaire vs Circulaire

La luminosité intantanée ($\mathcal{L}$)

- nombre de collision attendu par unité de surface (section efficace, σ)
  - × courant ² / surface des faisceaux
  - 1.8×10^{34} $cm^{-2}s^{-1}$ (1 barn = 10^{-28} m²)

La polarisation (= orientation du spin): 0 – 80%

Structure du faisceau:

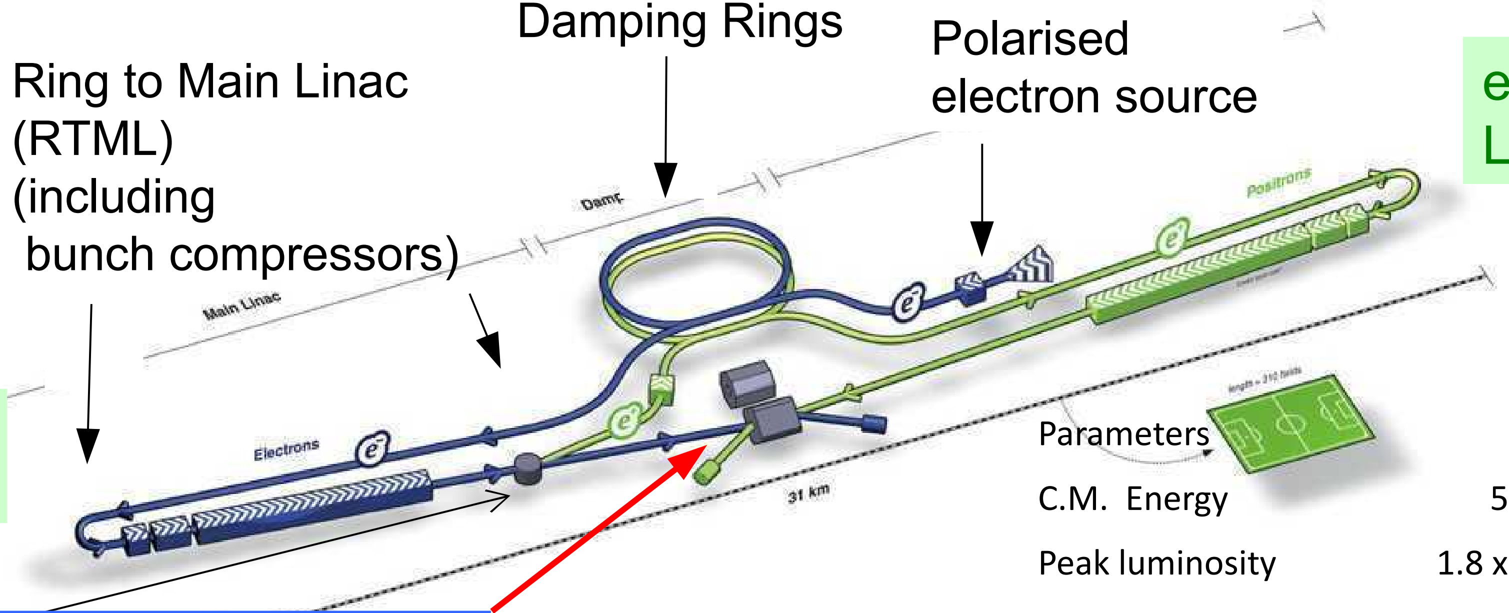
- Distance entre paquets
  - LHC 25 ns; ILC = ~500 ns; FCC-ee/CEPC ~ 200ns – 3.6μs
- Angles de croisement
- Forme des paquets (cylindriques, plats, …)
- Trajectoires ⟶ BdF

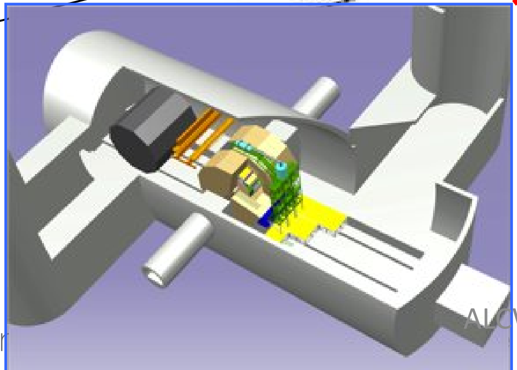
Puissance consommée: 100's MW...

Coût = 5^+ G€ + 10 % / det

ILC Accelerator in TDR

Lin Evans, AWLC'16





Parameters	Value
C.M. Energy	500 GeV
Peak luminosity	1.8 x10^{34} $cm^{-2}s^{-1}$
Beam Rep. rate	5 Hz
Pulse duration	0.73 ms
Average current	5.8 mA (in pulse)
FF beam size (y)	**5.9** nm
E gradient in SCRF acc. cavity	**31.5** MV/m +/-20% Q_0 = 1E10

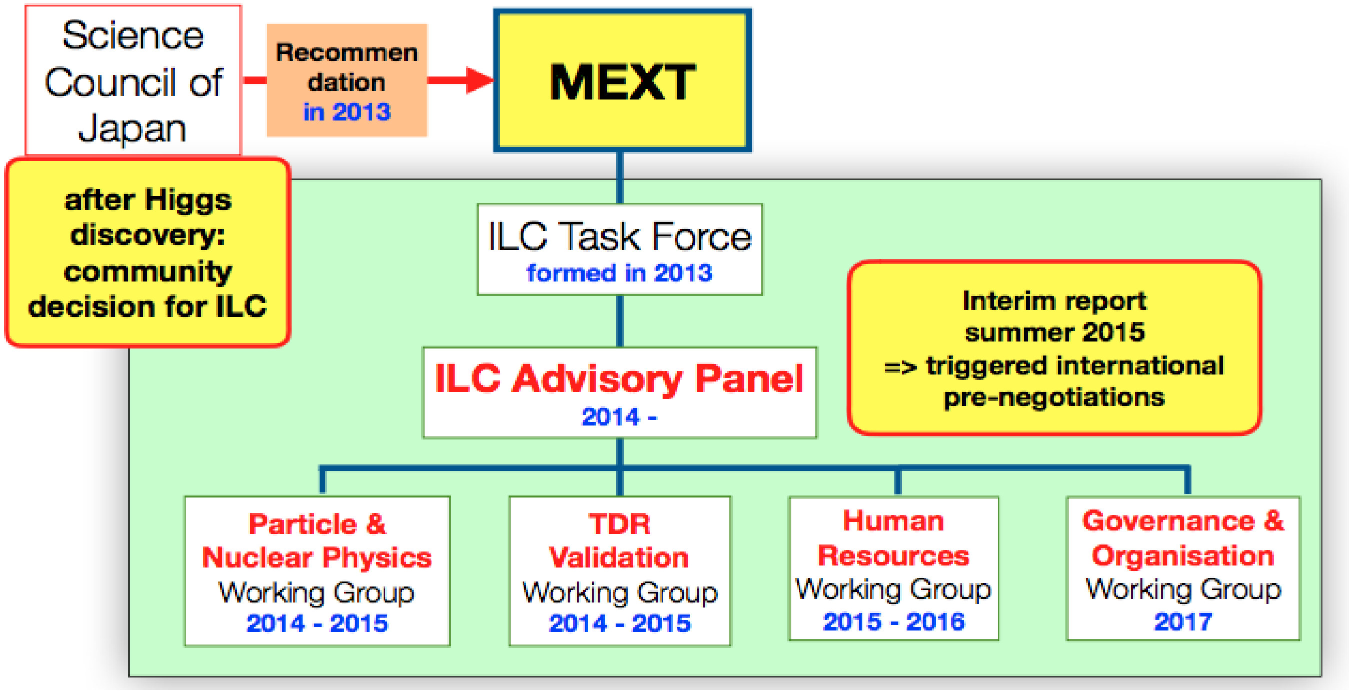
Demonstrated in TDR (Beam Rep. rate, Pulse duration, Average current)

Progress in 2014 (FF beam size (y), E gradient in SCRF acc. cavity)

ILC Organisation

ILC TDR 2012

Review by Japanese Science Ministry (MEXT)



- The Japanese government has expressed interest in hosting the ILC
- The government has been put under pressure by strong and well organized lobby led by Satoru Yamashita and consisting of physicists, Diet members (about 150), politicians from the Tohoku region and Industry

  (+ computing center in Kyushu region)

- It responded by consulting the Science Council of Japan which proposed a 2-3 year study of all aspects, scientific, socio-economic, technical. That study will be finished next year.

- Staging. We were not instructed by MEXT to study staging. That would have effectively validated point 1 above. We were told by the "back door" that the 500 GeV machine has no chance.
- Warm RF.
  - The best way to kill the ILC is to open this Pandora's box.

ILC Cost reduction

adapted from Lin Evans, AWLC'17

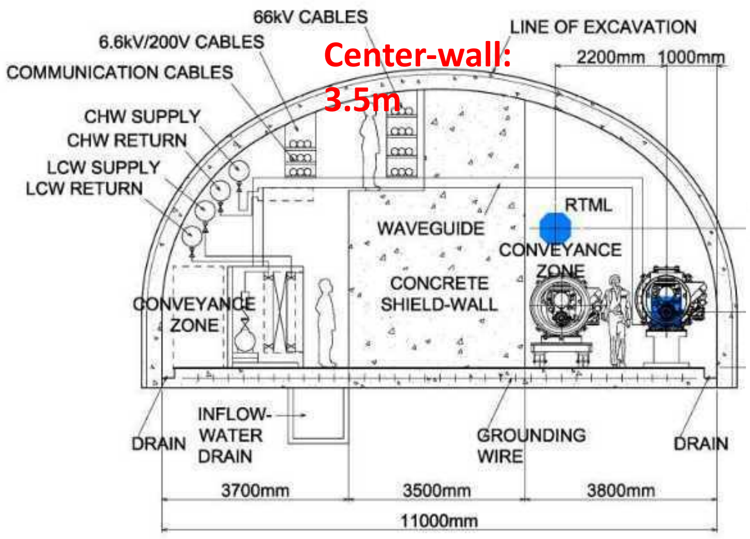
- 2015 discussion US/Japan → cost reduction effort (priority in US)
- Many measures to reduce the cost by 10-20%,
  but that is not enough for a realistic project funding.
- The beauty of a linear collider is that it can be staged.
- Serious discussions must now start on realistic staging scenarios to bring the cost of the first stage down.

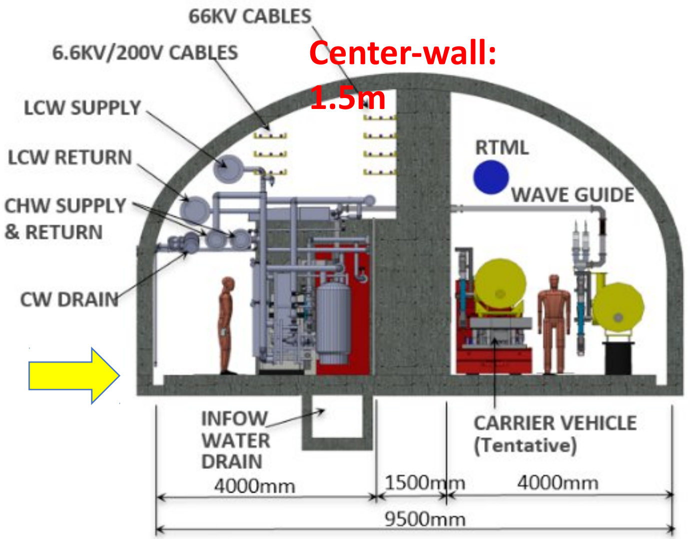
Main : Start @ 250 GeV

Pending questions :
- Positron production at low energy.
- How important is polarisation?
- How interesting is gamma-gamma?

ILC ML Tunnel X-Section Reduced

Lin Evans, AWLC'17





	TDR-baseline	Updated
Center-wall width	3.5 m	1.5 m
Tunnel width	11 m	9.5 m
Access to RF in CM-SRF operation	Yes	Yes
Access to RF in beam operation	Yes	No

staging option name (given b y S. Michizono, 02052017)

<u>350GeV option were added</u>

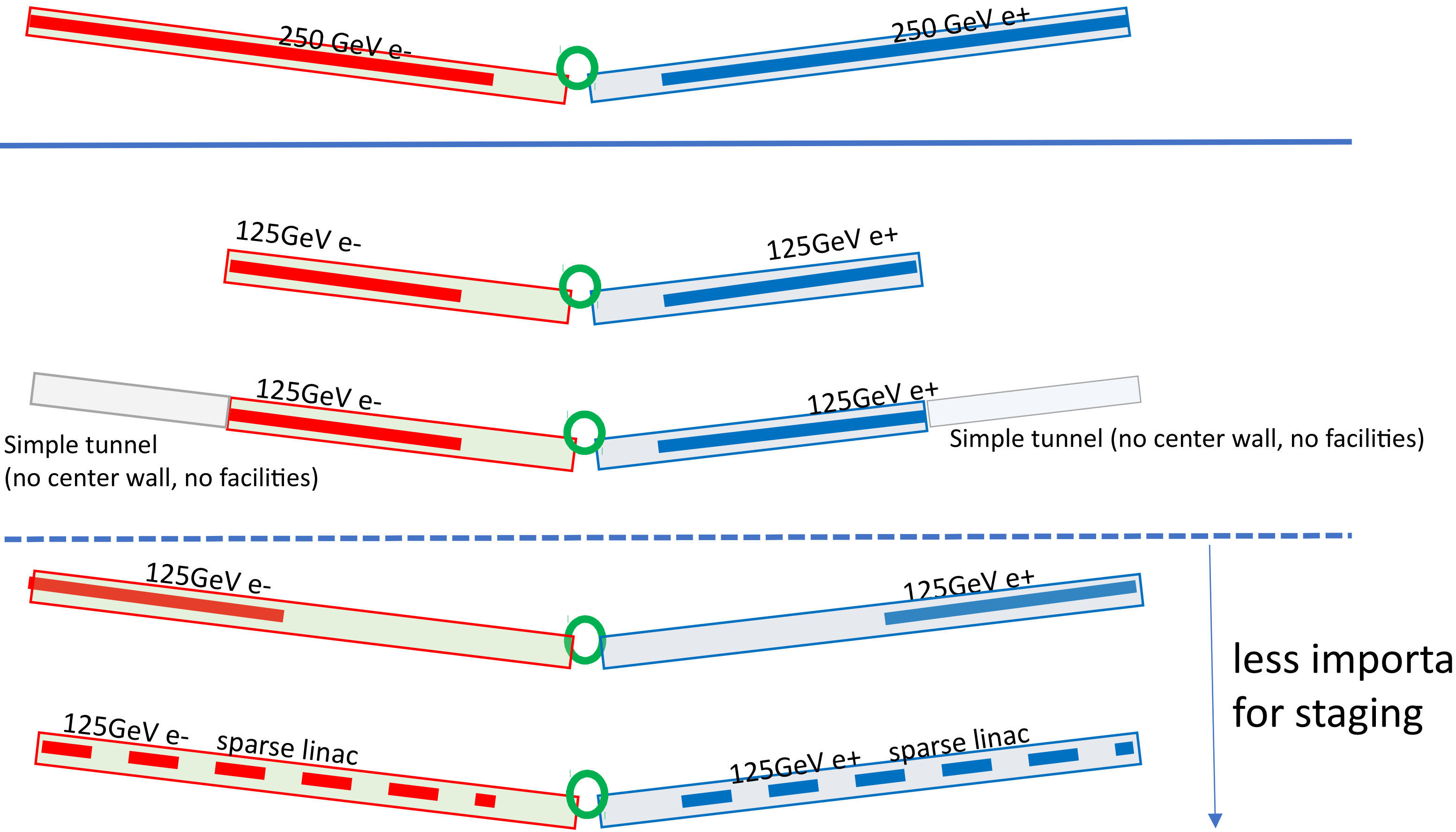
500GeV TDR:

250 GeV Option C:

Option D:
350GeV Option D':

Option E:
350GeV Option E':

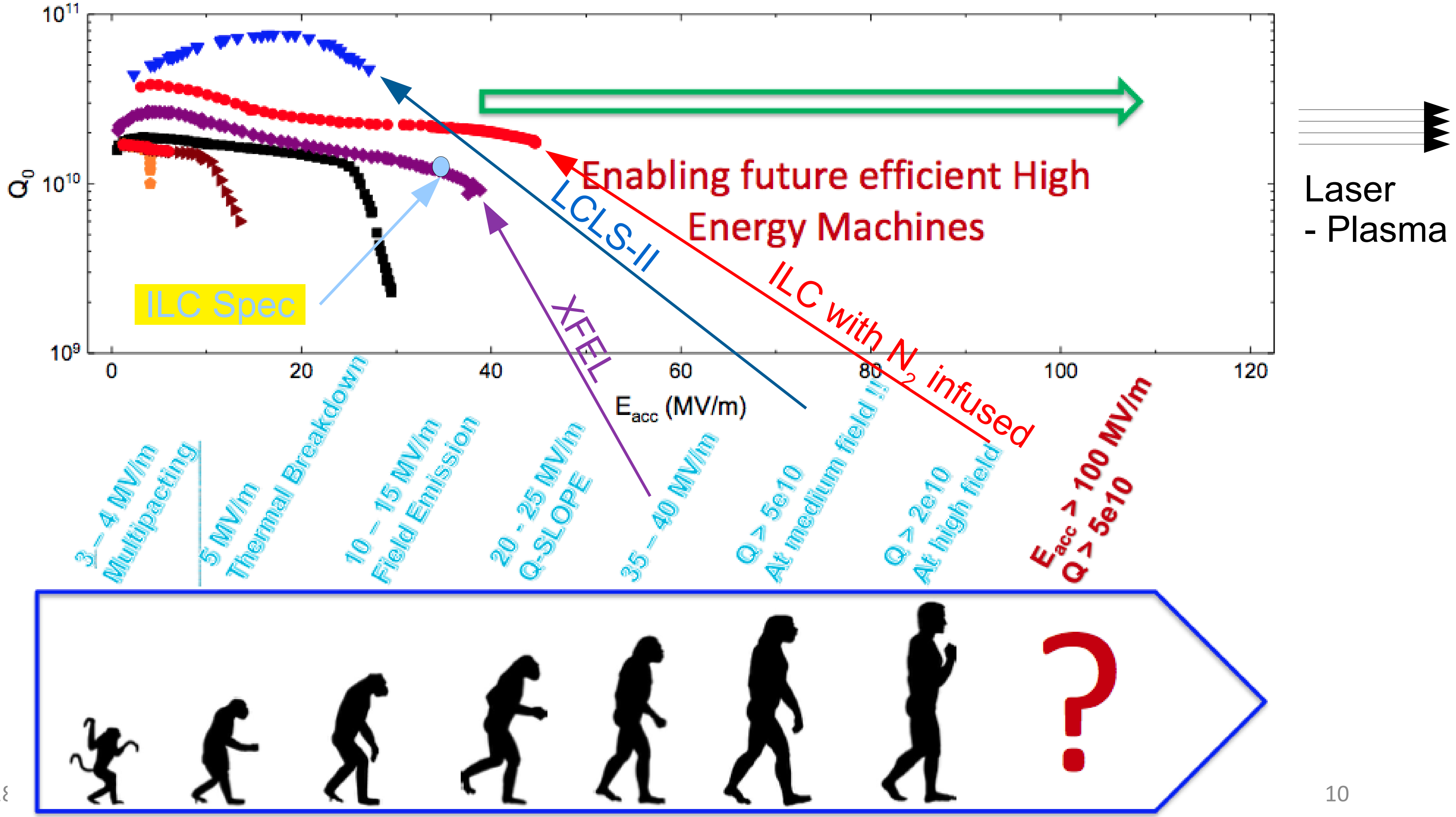
Option F:
350GeV Option F':



less important for staging

SRF Performance Evolution

Courtesy A. Grassellino



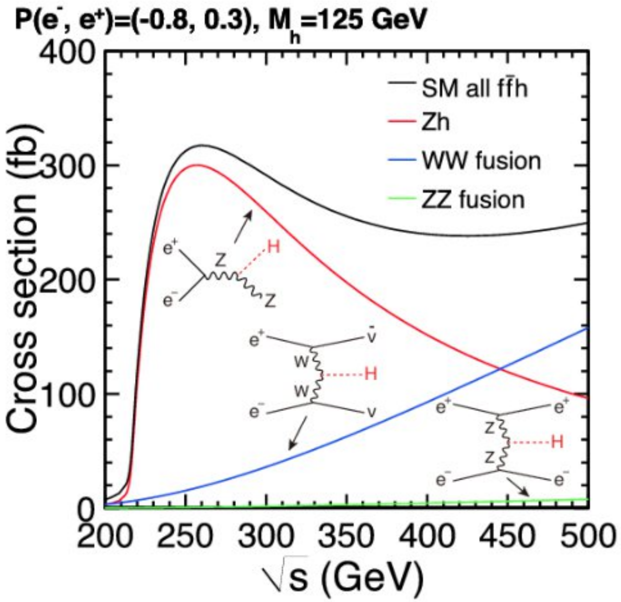
Staging scenario

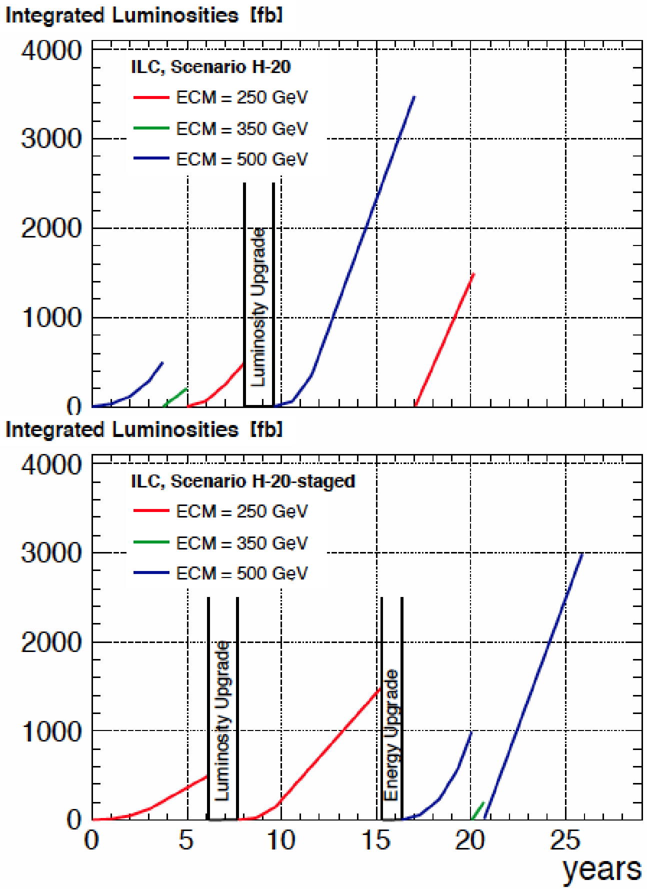
Starts at $\sqrt{s}$ = 250 GeV (instead of 500 GeV)

- no new physics @ LHC run2

opt: Higher luminosity (×1.6) by reduced $\varepsilon_{x,n}$

Polarisation : e-(80%) e+(30%)





Exemple of scenario change

ILC500 H20

ILC250 H20 staged

top physics starts after > 16y
in total ~ 6y longer

Scientific Case of ILC250 Higgs Factory

Assumptions

1) $L=120\text{-}240\ fb^{-1}$ /year (TDR & 2 bunches) and Maximum $360fb^{-1}$ / year → $2ab^{-1}$ in 10 years

2) **Concurrent operation with HL-LHC:** Start in 2028-2030, Physics results around 2040

3) Beam polarizations (TDR): **Positrons 30%, Electrons 80%**

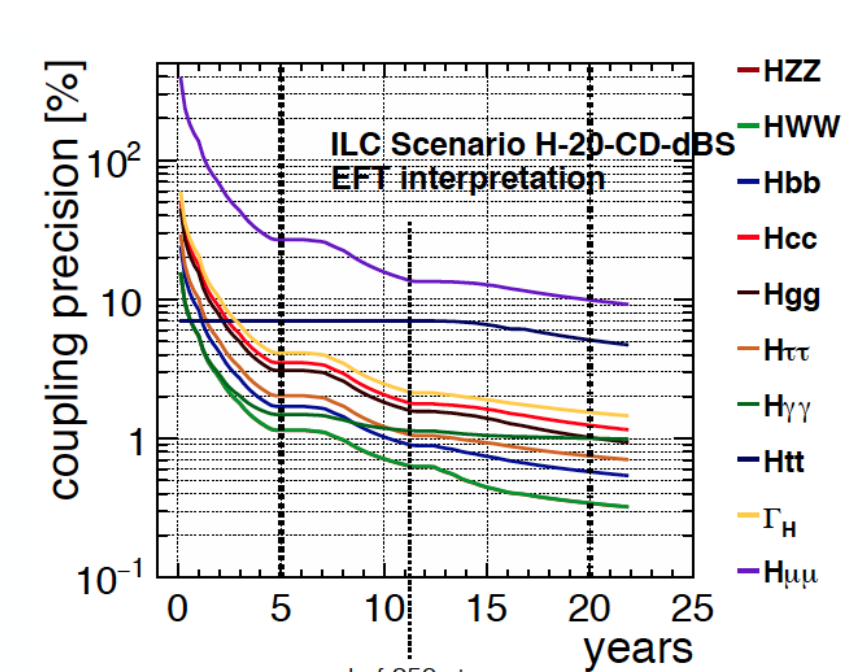
4) Input from other experiments: **Synergy**

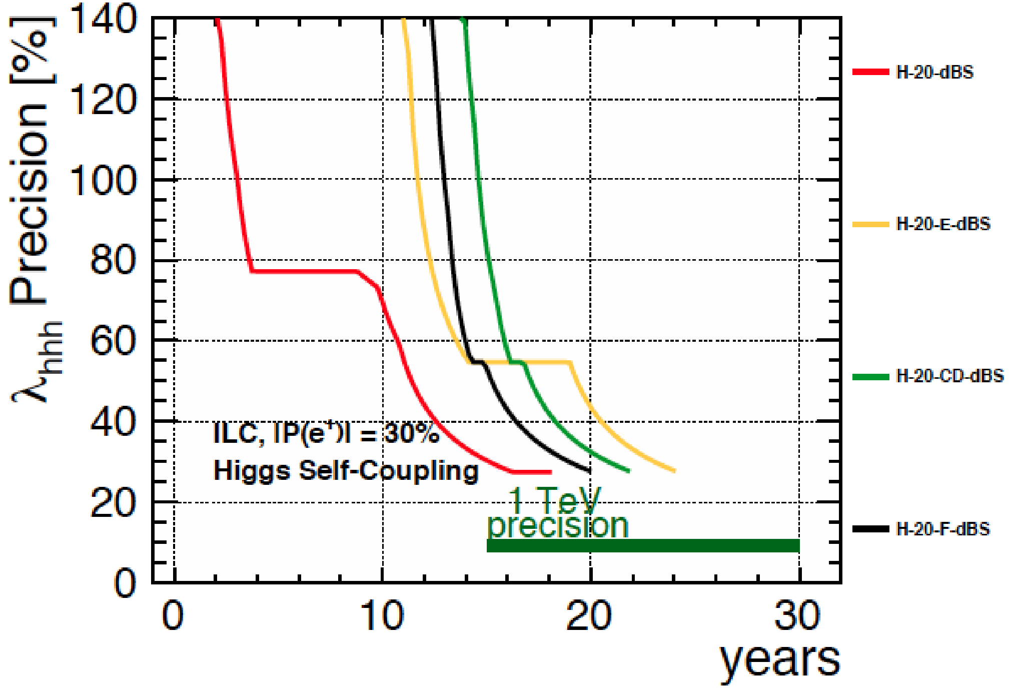
Take full advantage of expected physics results in 2030-2040

HL-LHC (top mass, Higgs coupling, direct search)
SuperKEKB (rare decay, charged Higgs, CP phase)
T2K (If CP phase → leptogenesis)
Double beta decay (→ leptogenesis)
Electric dipole moment (→ electroweak baryogenesis)
Lepton flavor violation (→ leptogenesis)
Gravitational waves (→ electroweak baryogenesis)
Lattice QCD (α_s , m_c , m_b), higher-order corrections

Staging scenario

Evolution of coupling precision

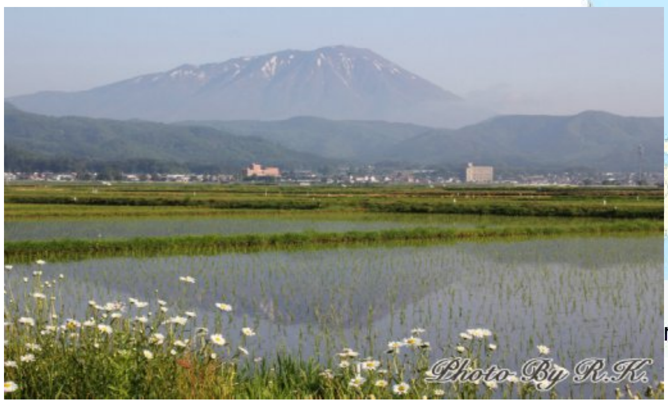


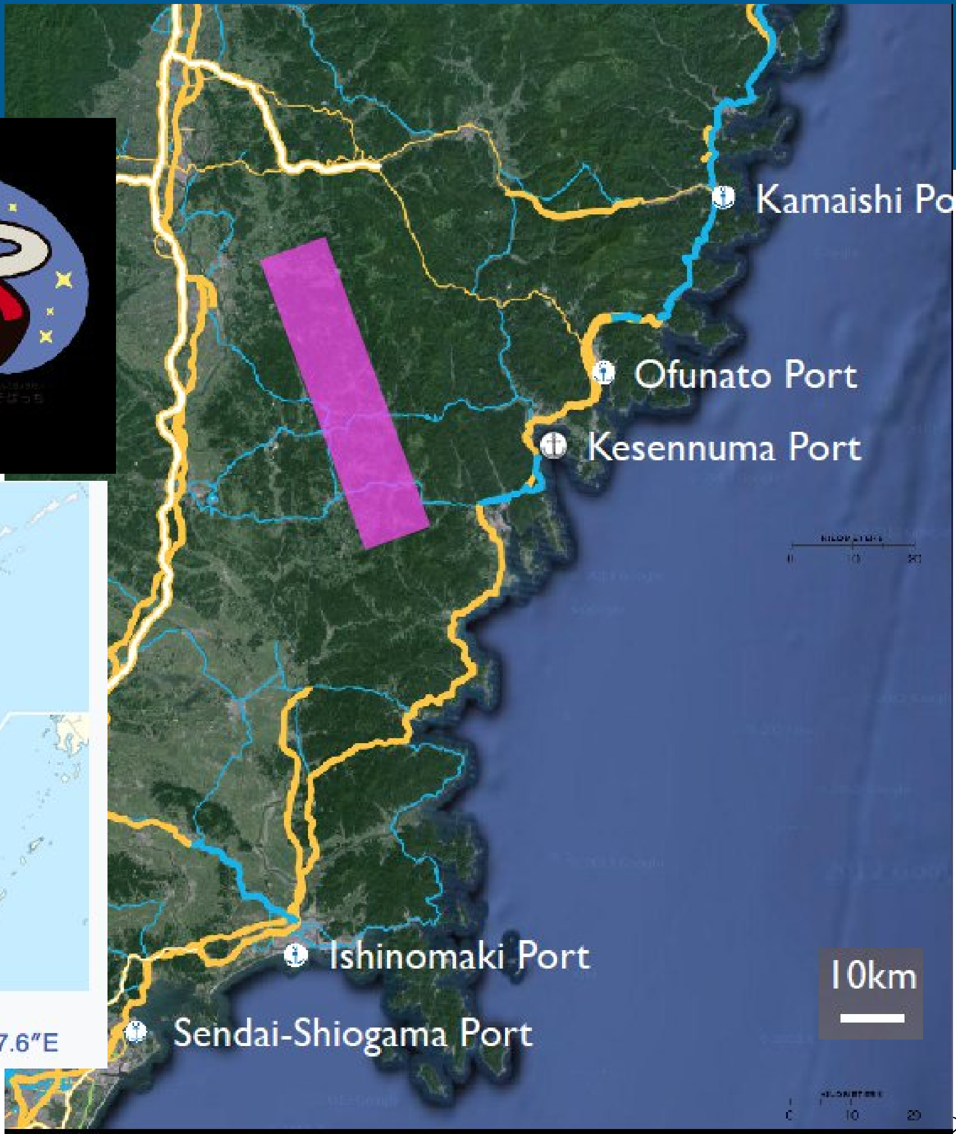


le site : Kitakami

près de Oshu, Près de Morioka (Cap), Pref. Iwate, Région de Tohoku

- Géologie
  - 1 bloc de granit de ≥30 km de long
- Tremblement de terre de 2011
- Demographie
- 2h de Shinkansen de Tokyo × 2-3/h





The Shiki-Shima train

10 Wagons
34 passagers

Tokyo...
.. Sources chaudes ..
... et l'ILC

2j/1n à partir de 320,000¥
(2400€)

la cité

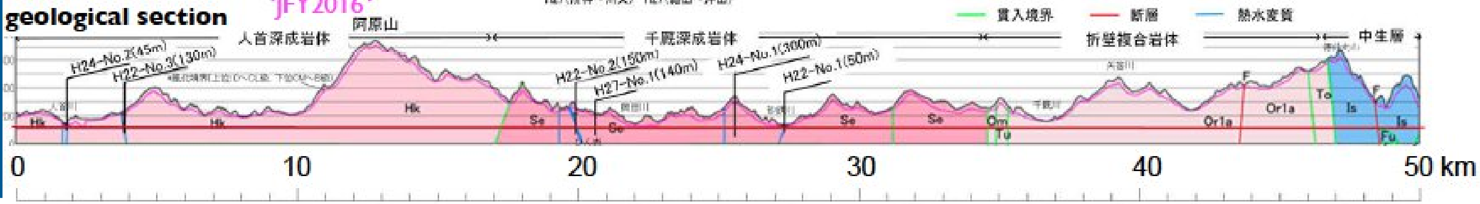
Internationale

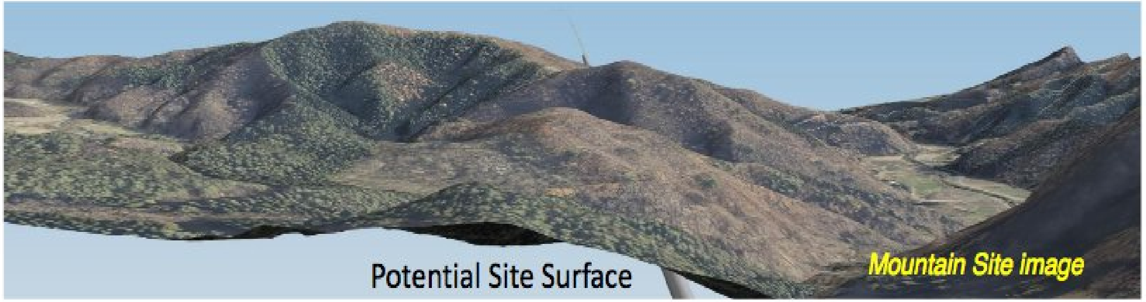
- revues des besoins:
    - Nombre de visiteurs (hotels)
    - Long terme: nombre de chercheurs
    - conjoints, familles: travail, écoles, bars, …

Support “spontané” de la population

- gros travail de PR ⊃ école, lycées
- Concurrence Kyushu/Tohoku

Le Campus





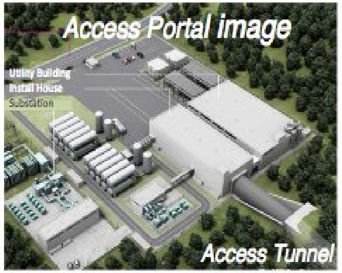
ILC Tunnel Optimization Tool (ILC-TOT)

Collaboration with ARUP for a Joint project supported by CERN & KEK:

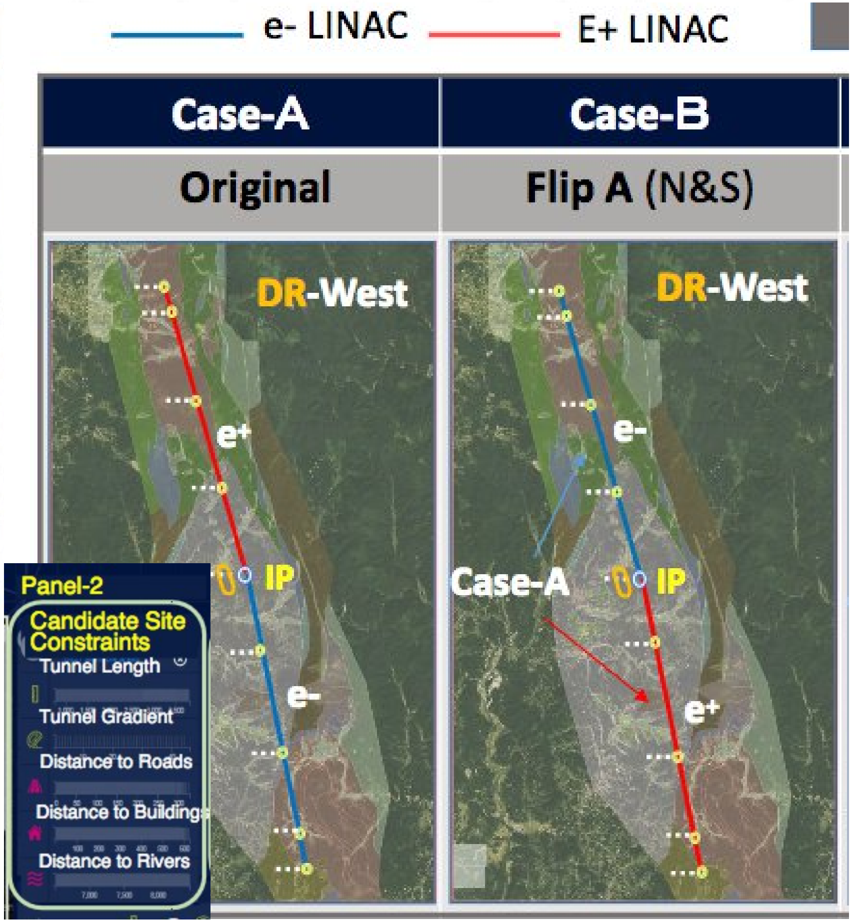
- TOT was originally developed for CERN-FCC study.
- It has been applied for the ILC-TOT development since 2015, and being completed.

Objectives:

- To aid the optimization work of the ILC accelerator facilities localization and layout (IP & LINAC), and
- To profile the optimum Access (AP & AT)



LCWS2016 at Morioka 3



Energy Flow

Front end

Local electric power company (154kV)

ILC main substation (154⇒66kV)
+ LNG-CGS ensuring redundancy
66kV grid interconnection

Ground surface facility

Riken (Wako)6MVA · CGS is in operation since 2003

ILC access hall substation(66⇒6.6kV, in access hall)

ILC local substation (6.6kV⇒400V, in main tunnel)

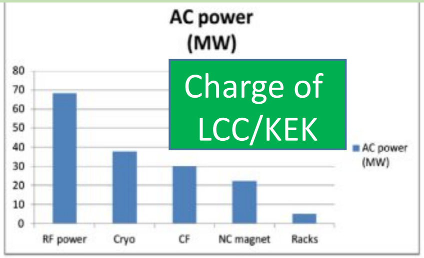
Underground facility

Energy flow in ILC

- Cooling water
- Air conditio-ning
- Air venti-lation

- ILC electric power demand
  - Peak 164MW
  - Annual power consumption 10^9 kWh (3.6 PJ)

Underground facility



Charge of LCC/KEK

Back end

Cooling water⇒recovery of waist heat⇒cooling tower

Ground surface facility

Green ILC

Local industries

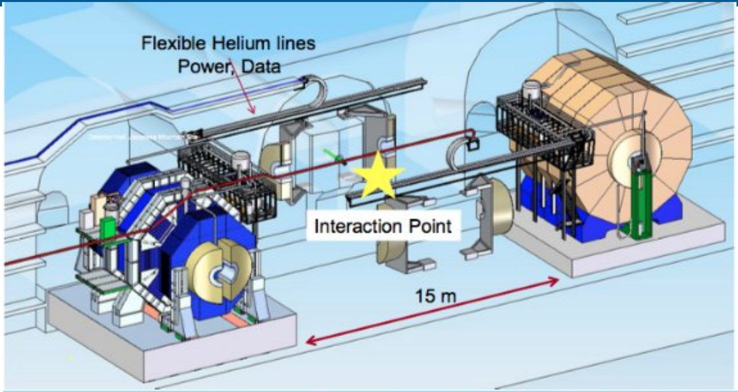
Industrial water (10^4 ton/day)

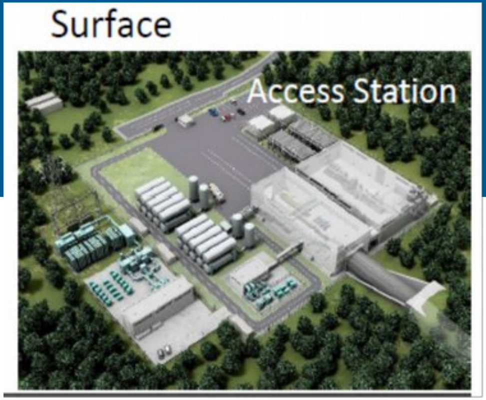
Industries recupération chaleur

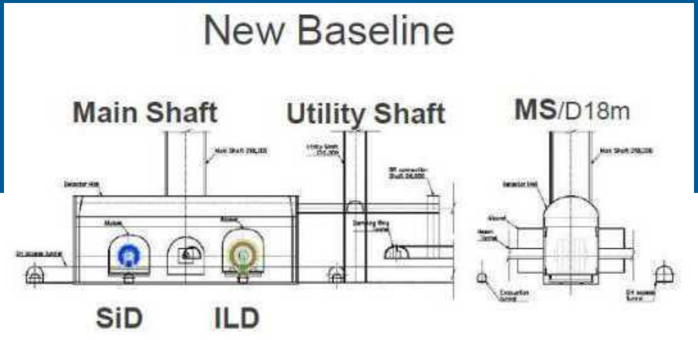
– serres; sechage bois; aquaculture, …

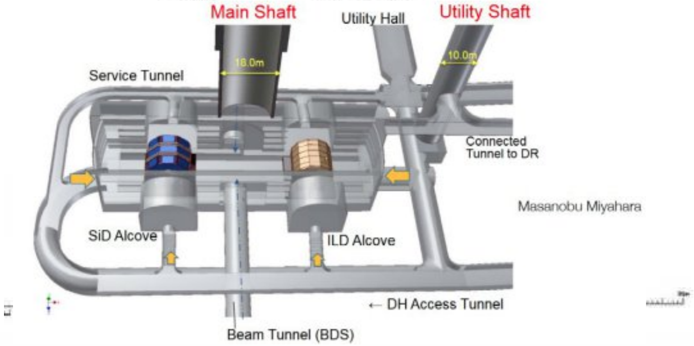
Chauffage urbain

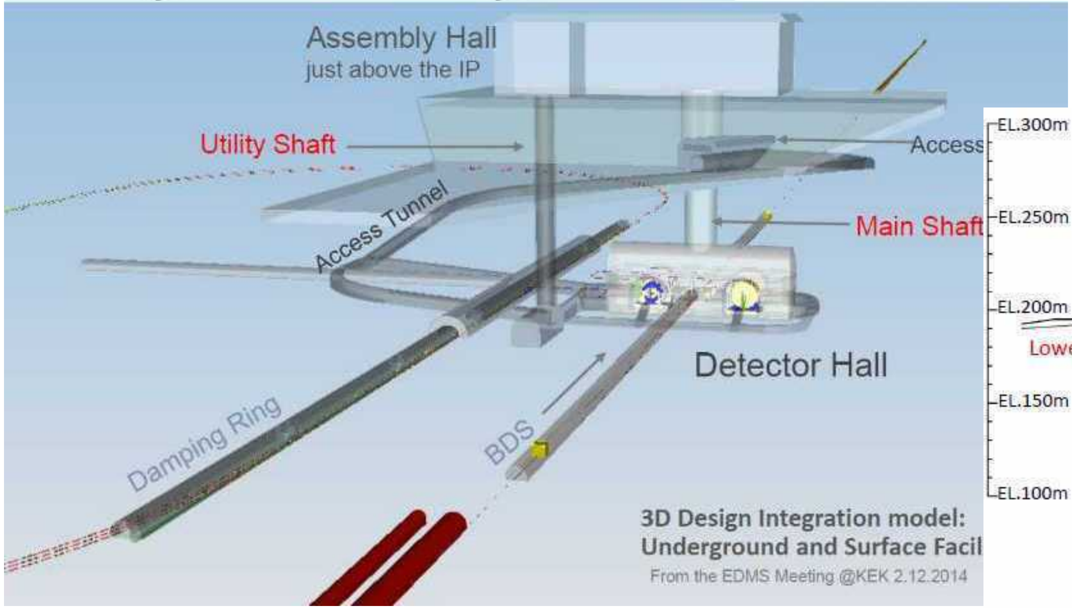
Halls, Puits, Tunnels

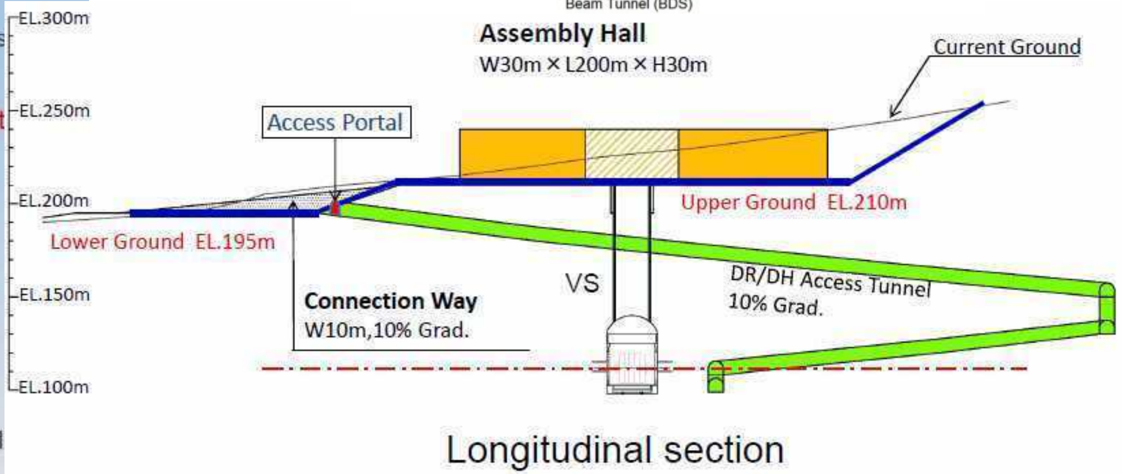












Estimation des espaces nécessaires:

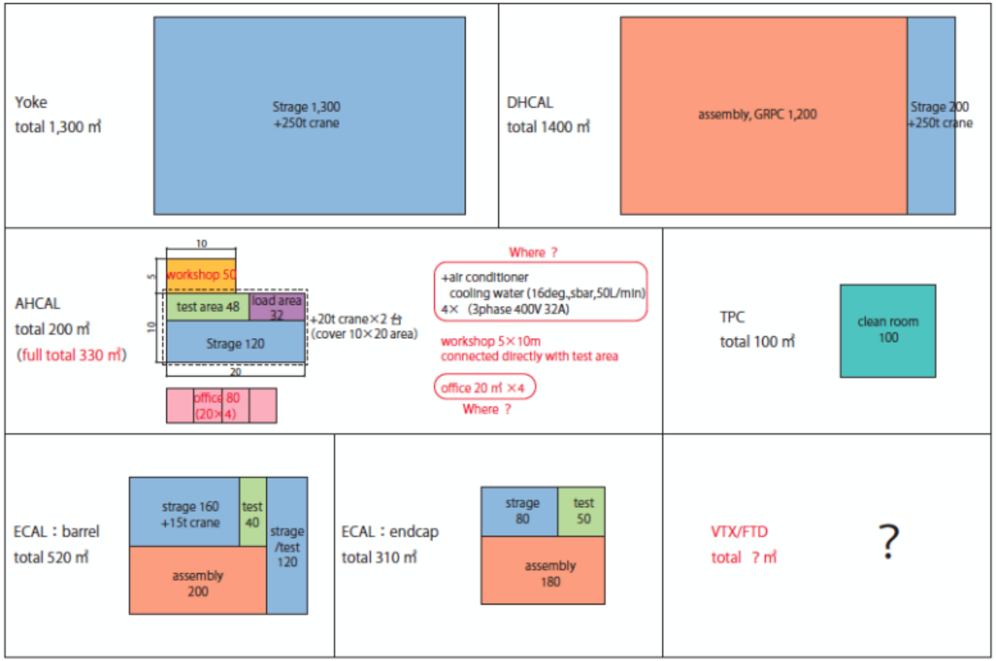
Office & cafeteria, etc… : requirement and plan
based on Sugimoto-san's plan, as well as existing facilities

By Tohoku+KEK

Facility	Room	requirment(㎡)	notes	plan (㎡)	notes
Office Building	ILD Office	710.5	3.5×5.8m×35room 70～140person、2～4person/room	713.6	3.6×5.7m×32room 5.7×10m×1room
	ILD Computer room	40	40㎡ (office×2)	41.0	7.2×5.7m
	ILD Meeting space			144.0	7.2×10m×2room
	SiD Office	710.5	3.5×5.8m×35room	713.6	3.6×5.7m×32room 5.7×10m×1room
	SiD computer room	40	40㎡(office×2)	41.0	7.2×5.7m
	SiD Meeting room			144.0	7.2×10m×2room
	ILD Control room	750	25×60m×0.5	720.0	28.8×25m
	SiD Control room	750	25×60m×0.5	720.0	28.8×25m
	Accelerator safety maintenance room	420	7㎡×60person	433.1	21.6×17.2m×1room 3.6×5.7m×3room
	Accelerator control room	625	25m×25m (CERN 25×25m)	630.0	25.2×25m
	Accelerator Computer room	200	J-PARC 194㎡、KEK 202㎡	199.8	10.8×18.5m
	Information counter	70	7㎡×10person	84.2	10.8×7.2m
	Napping room		8bedroom(men&women)shower room, locker, laundry machine, washroom,…	114.0	5.7×10m×2
	Medical office			41.0	7.2×5.7m
	Machine/Electrical room			112.3	14.4×7.8m
	Subtotal (NET)			4851.84	
	WC				
	Lounge / rest space		Mini-kitchen, refrigerator,…		
	Entrance hall, corridor…			2483.5	
	total (Gross)			7335.4	
Service,etc	Information, Exhibition space			260.6	
	Seminar room			197.8	11.3×17.5m 100seats
	Cafeteria			371.4	12.4×22.5m+5.6×16.5m 250seats
	Kitchen			197.8	11.3×17.5m
	Shop			100	Mini-convenience store
	Subtotal (NET)			1127.5	
	WC				
	corridor…				
	Total(Gross)			1440.0	

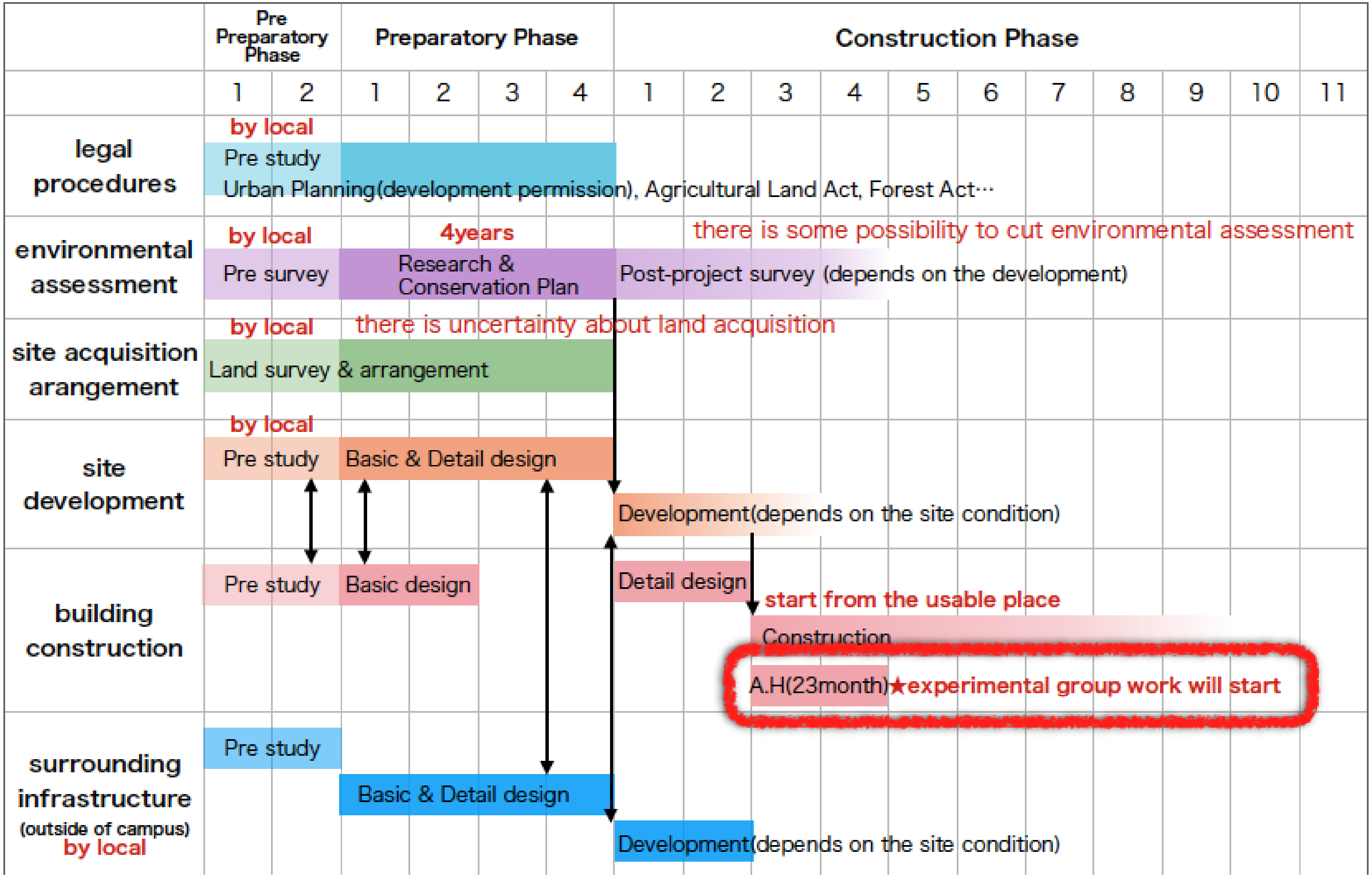
IP Campus requirements-ILD

Space besides Assembly hall for detector pre-assembly

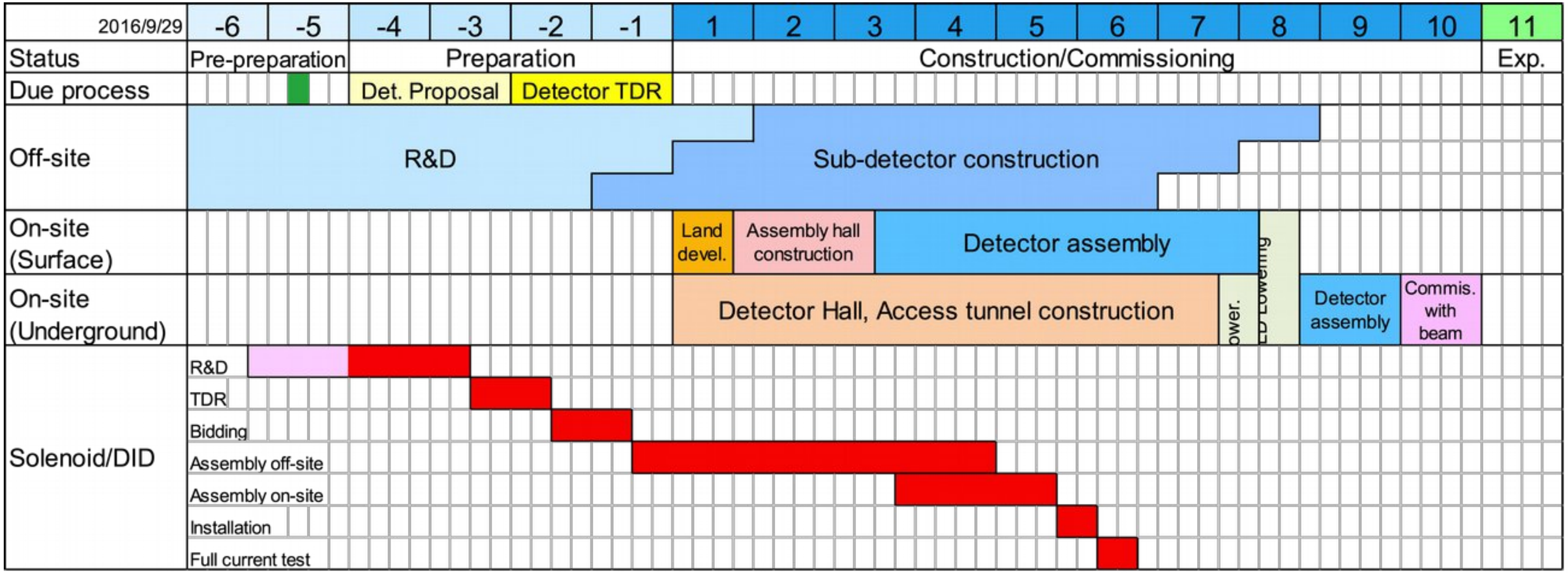


IP Campus - Schedule(based on our experience)

It is necessary to propose all requirement during pre-preparatory phase.

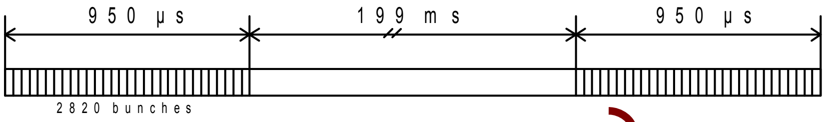


Construction détecteurs



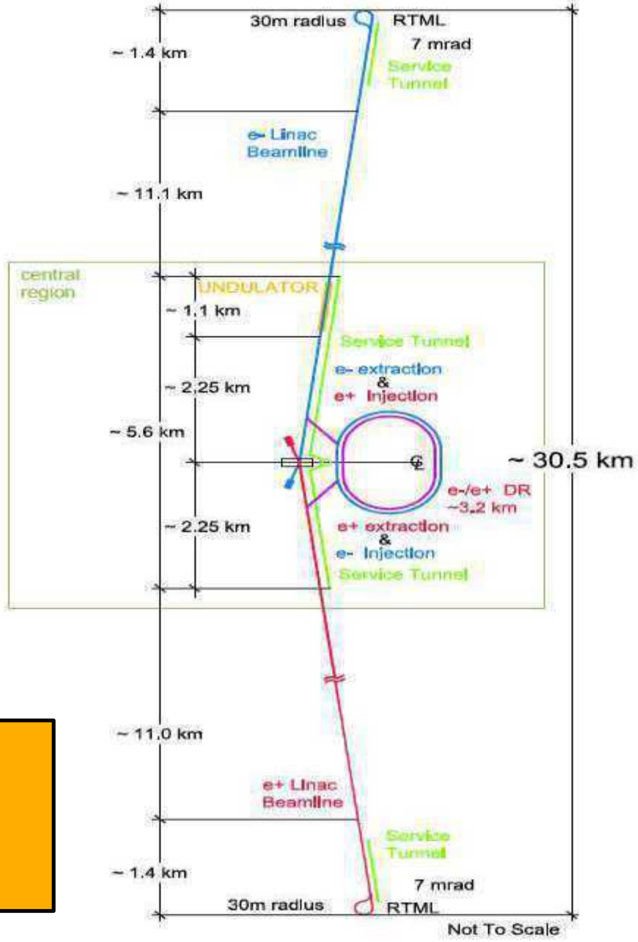
ILC parameters

Max. Center-of-mass energy	**250**–1000 (90)	GeV
Peak Luminosity	0,8–3x10^{34}	$1/cm^2s$
Beam Current	5.8	mA
Repetition rate	5	Hz
Average accelerating gradient	31.5	MV/m
Beam pulse length	0.95	ms
Total Site Length	31	km
Total AC Power Consumption	120-300	MW



- Time between collisions : 350–700 ns
- Trains of 1300–2700 Bunches
- Low detector occupancy
- Low bgd : $e^+e^- \rightarrow q\bar{q}$ ~ 0.1 / BC
  $\rightarrow \gamma\gamma \rightarrow X$ ~ 200 / BX

- High B field
- Trigger-less
- Power Pulsing (≤1%)
- Differed readout



Constrains on detectors:

Basis: sep of H → WW/ZZ → 4j

- $\sigma_Z/M_Z \sim= \sigma_W/M_W \sim= 2.7\% \oplus 2.75\sigma_{sep}$

⇒ σ_E/E (jets) < 3.8%

- Sign ~ S/√B ~ $(resol)^{-1/2}$
  60%/√E → 30%/√E ⇔ +~40% L

Large TPC

- Precision and low X_0 budget
- Pattern recognition

High precision on Si trackers

- Tagging of beauty and charm

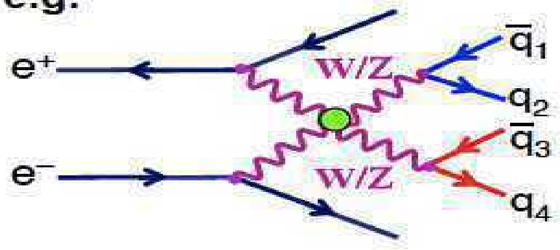
Large acceptance

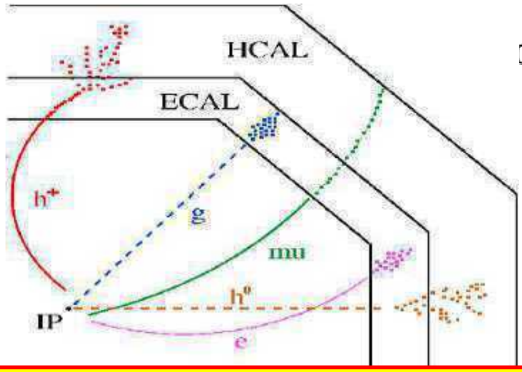
Fwd Calorimetry:

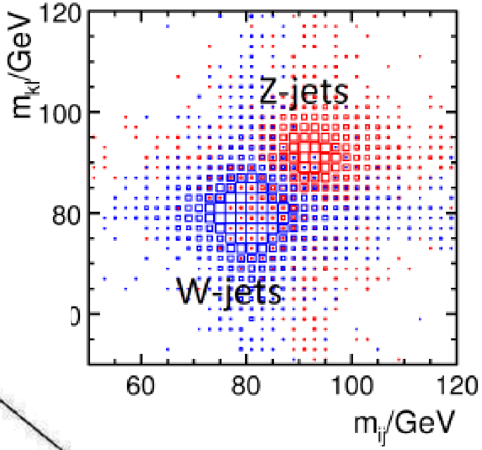
- lumi, veto, beam monitoring

Imaging Calorimetry

e.g.







Particle Flow Algorithms :

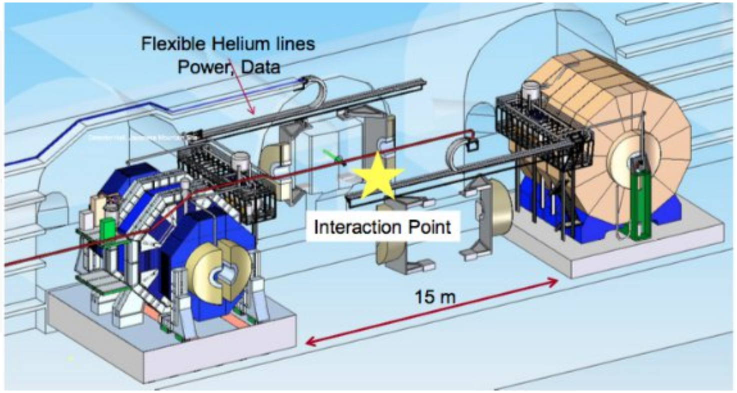
- Jets = 65% charged + 25% γ + 10% h^0
  Tracks ECAL CALO's
- TPC $\delta p/p \sim 5 \cdot 10^{-5}$; VTX $\sigma_{x,y,z} \sim 10$ µm

H. Videau and J. C. Brient, "Calorimetry optimised for jets," in Proc. 10th International Conference on Calorimetry in High Energy Physics (CALOR 2002), Pasadena, California. March, 2002.

Les détecteurs

Deux détecteurs

- push-pull sur plateforme



Raisonnable ?

- Coût
- $\sum_i \mathscr{L}_i < \mathscr{L}_{tot}$

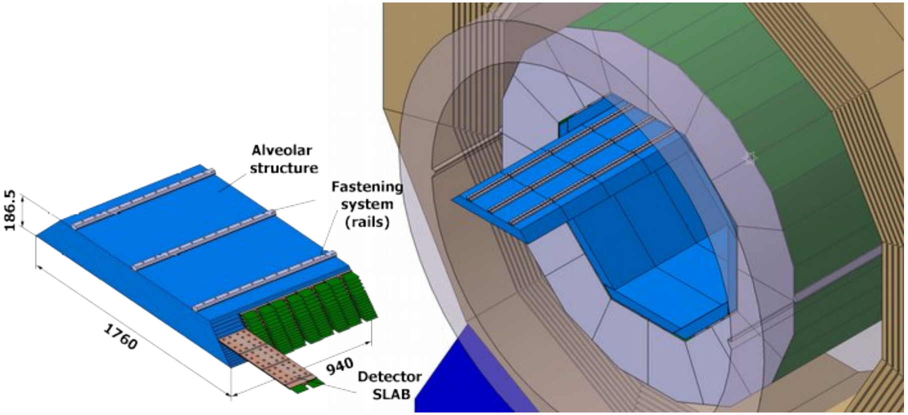
Compact (coût)
→ plus grand champs magnétique
Tracker :
5 couches de μ-strips double face

Plus grand volume → bras de levier
& separation topologique
Tracker
TPC avec ≤ ~200 points

Réduction de coût, performances ⇒ un seul détecteur

- Politique: décision la plus tardive possible.
- Possible solution: staging ? par. ex. ajout du timing. optim basse E vs haute E.

An Ultra-Granular SiW-ECAL for experiments



Particle Flow optimised calorimetry

- Standard requirements
  - Uniformity, Hermeticity, Stability, (E, , t) Resolution
- PFlow requirements:
  - Extremely high granularity
  - Compacity (density)

SiW+C baseline choice for future Lepton Colliders

Basic Choices:

- Tungsten as absorber material
  - X_0 = 3.5 mm, R_M = 9 mm, λ_I = 96 mm
  - **Narrow showers**
  - **Assures compact design**
- Silicon as active material
  - **Support compact design**
  - **Allows for ~any pixelisation**
  - **Robust technology**
  - **Excellent signal/noise ratio: ≥10**
  - **Intrisic stability (vs environment, aging)**
  - **Albeit expensive…**
- Tungsten–Carbon alveolar structure
  - **Minimal structural dead-spaces**
  - **Scalability**

Options pour ILD 1) Géométrie

Solenoïde:

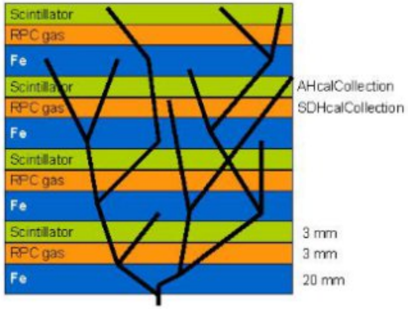
- ± anti-DID
- ± corrections

Calorimètres:

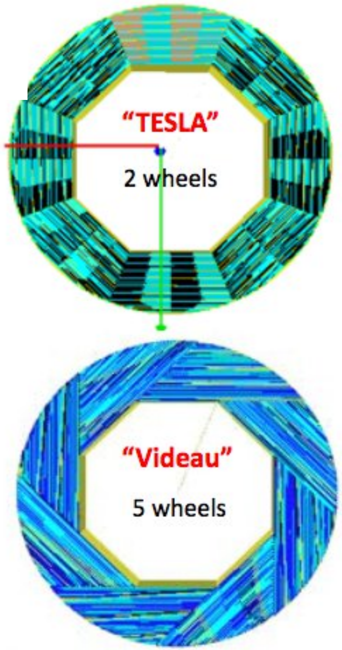
- HCAL: Scint vs **Gaz**
- ECAL: Scint vs **Silicum** vs Hybride
- Nombre de couche
- Taille elements

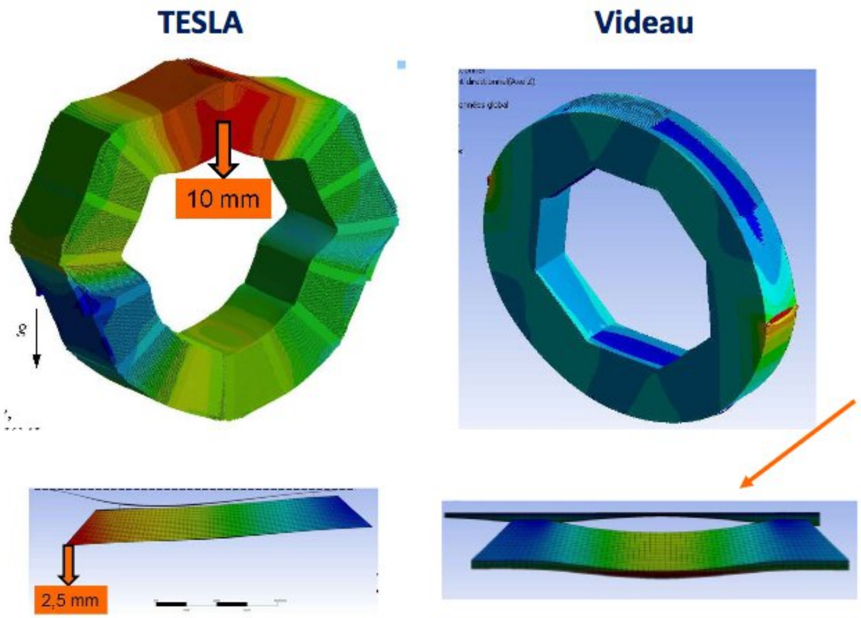
Géométrie

- $R_{\text{TPC}} \rightarrow R_{\text{ECAL, HCAL, SOLENOÏDE}}$
  - €€€, $$$, ¥¥¥, ILCU
- TESLA vs “à la Videau”



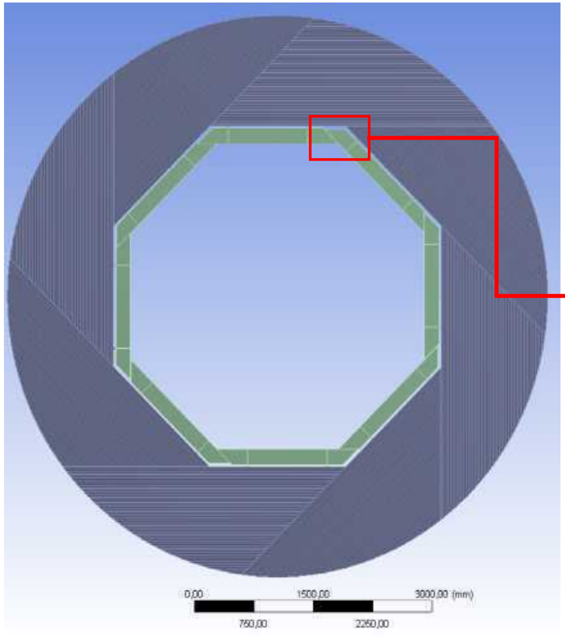
+ reconstruction Flux Particle + Analyses Performances

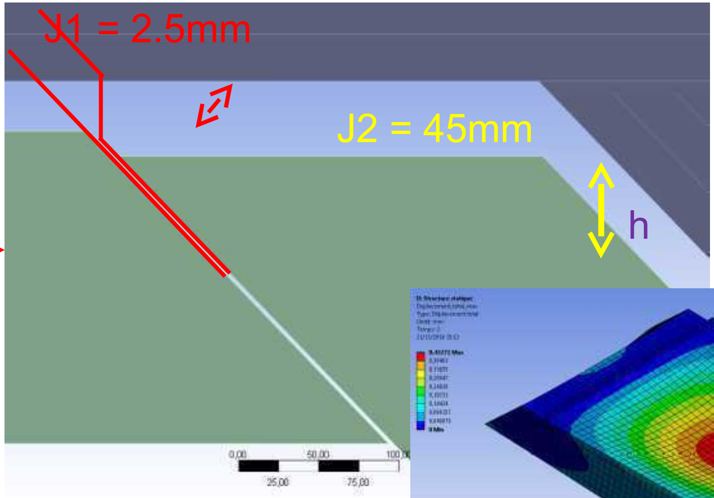




Statistique & Dynamique

Minimisation des interstices

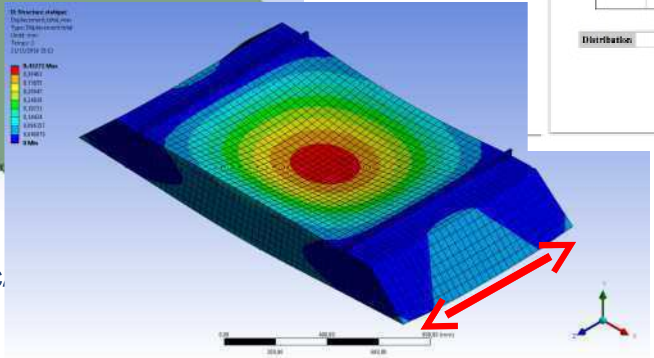




J1 = clearance between modules for the ECAL

J2 = Clearance at ECAL edges between ECAL and HCAL

h = height of the rails 30mm

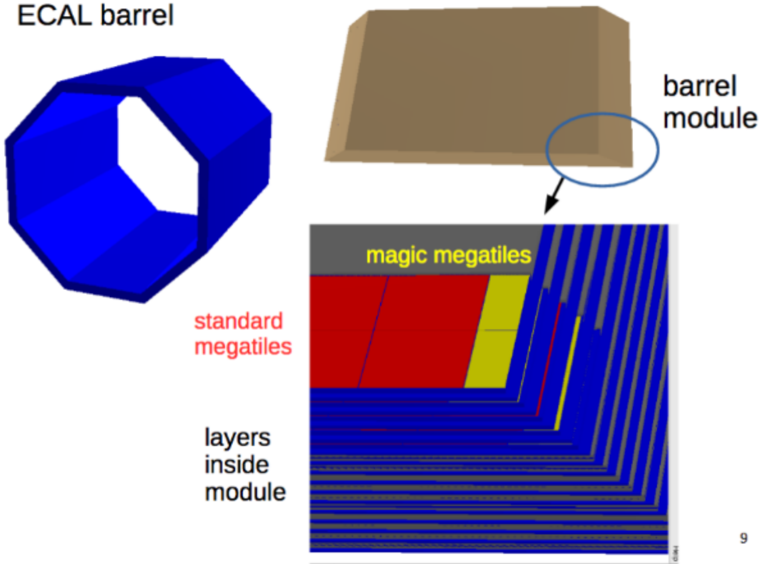


H. Videau, M. Anduze, T. Pierre-Émile

Simulation

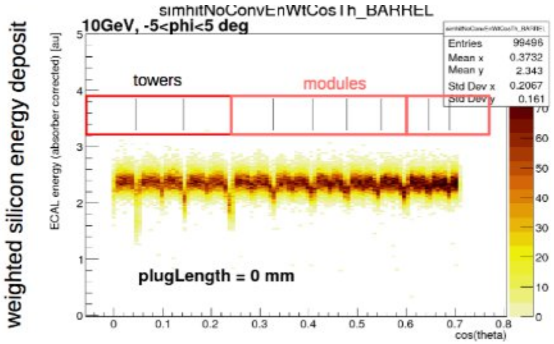
ECAL driver used in ILD models has been largely re-written (Mokka → DD4HEP)

- more modular code:
- less duplication Barrel & Endcap
- more configurable…

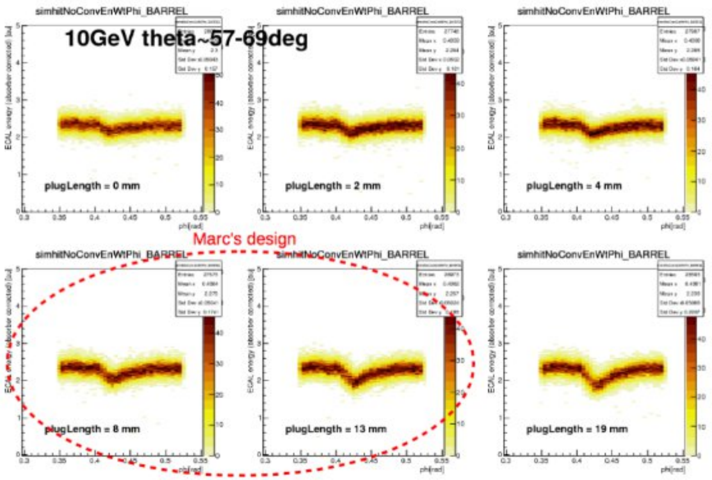


Effect of cracks [RAW= no correction at all!!]

- Drop ~ 15%



Effect of plug (missing in previous simulations)



Performances: tau reconstruction CP State analysis in H→ττ

T. Hieu et al, "Tau decay identification in ILD" arXiv:1510.05224

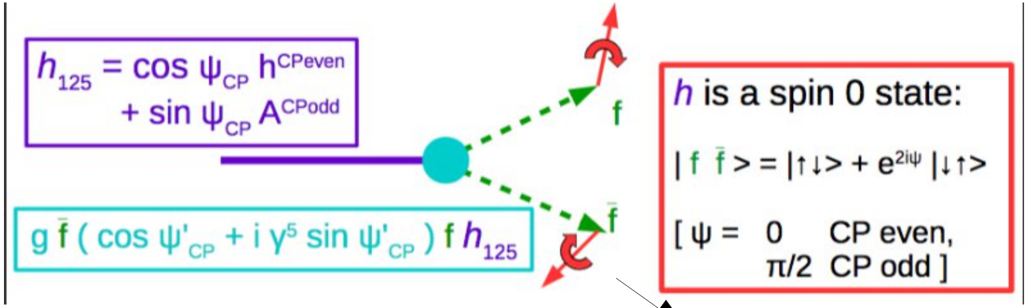
Using GARLIC

NIM A810 (2016) 51

arXiv:1507.01700

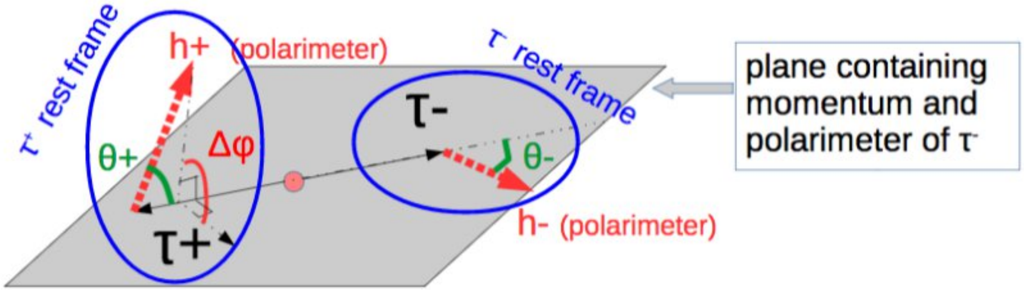
Higgs CP state and CP conservation in coupling

CP of H → $f\bar{f}$ through polarisation of f



Through decay

CP from polarimeters : taus from spin 0 parent



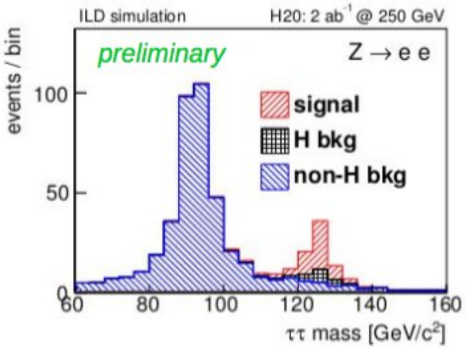
Best for τ in ee→ZH, Z→ee, qq H→ττ

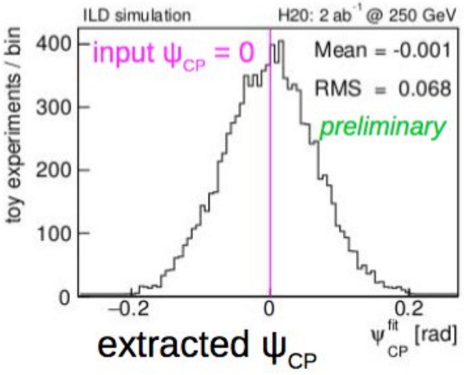
– Needs full τ reconstruction

in hadronic tau decays (# neutrino = 1), if we know

- the tau **production vertex**,
  the **impact parameters** of charged tau decay products,
  the p_T of the tau-tau system,

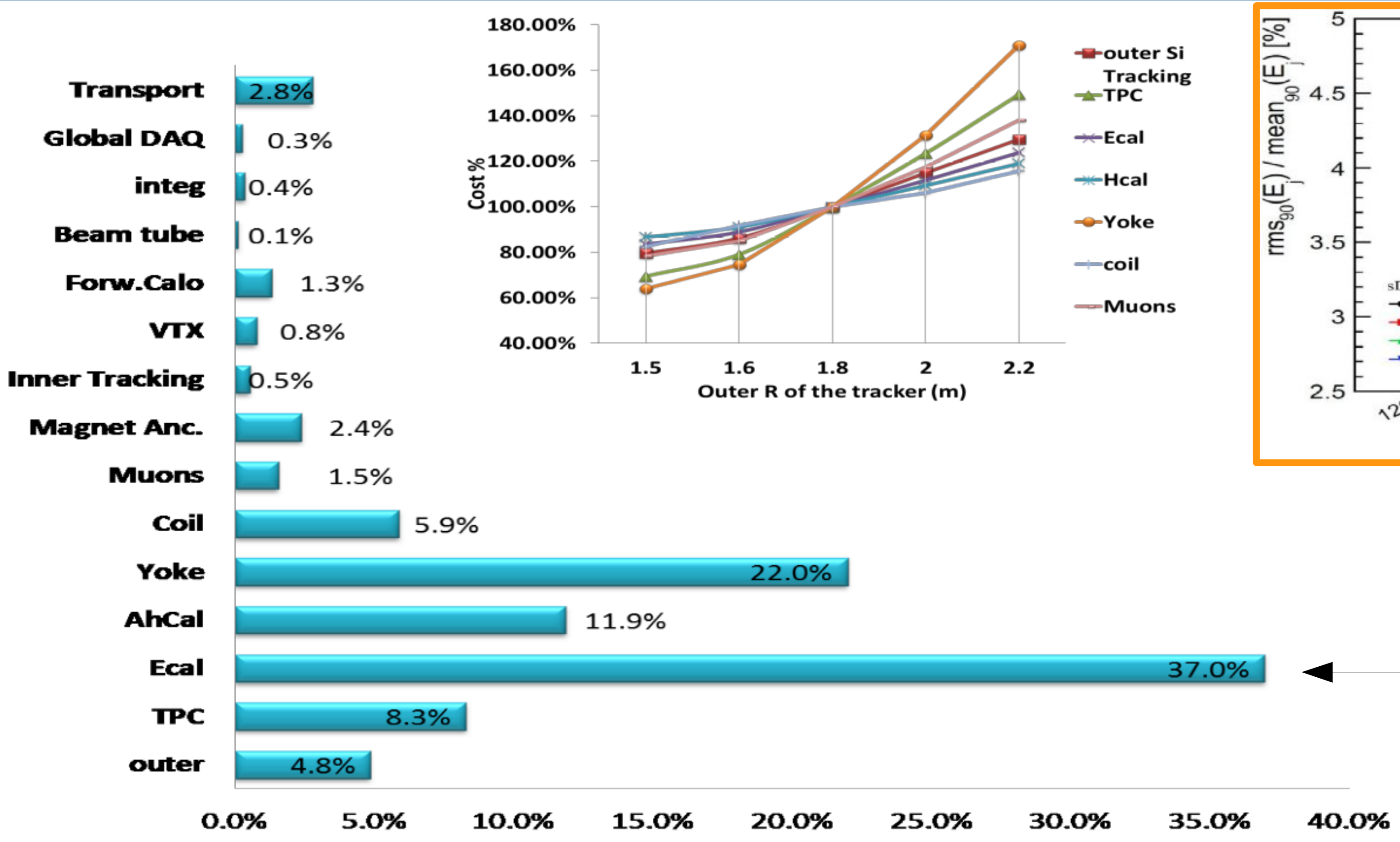
  then the neutrino momenta can be reconstructed

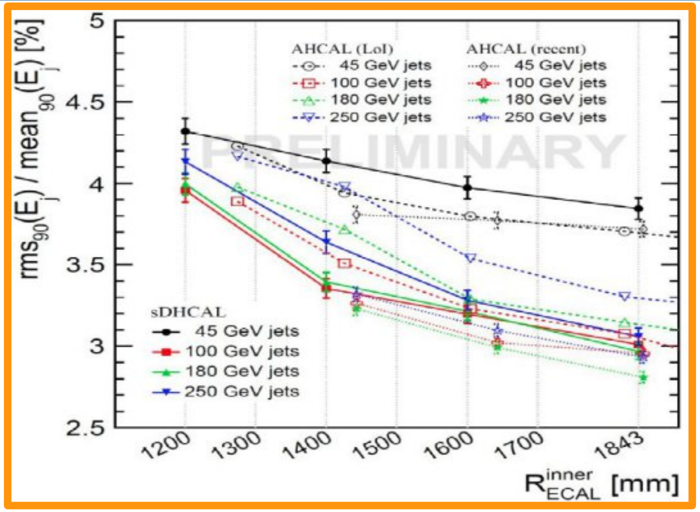




extracted ψ_{CP}

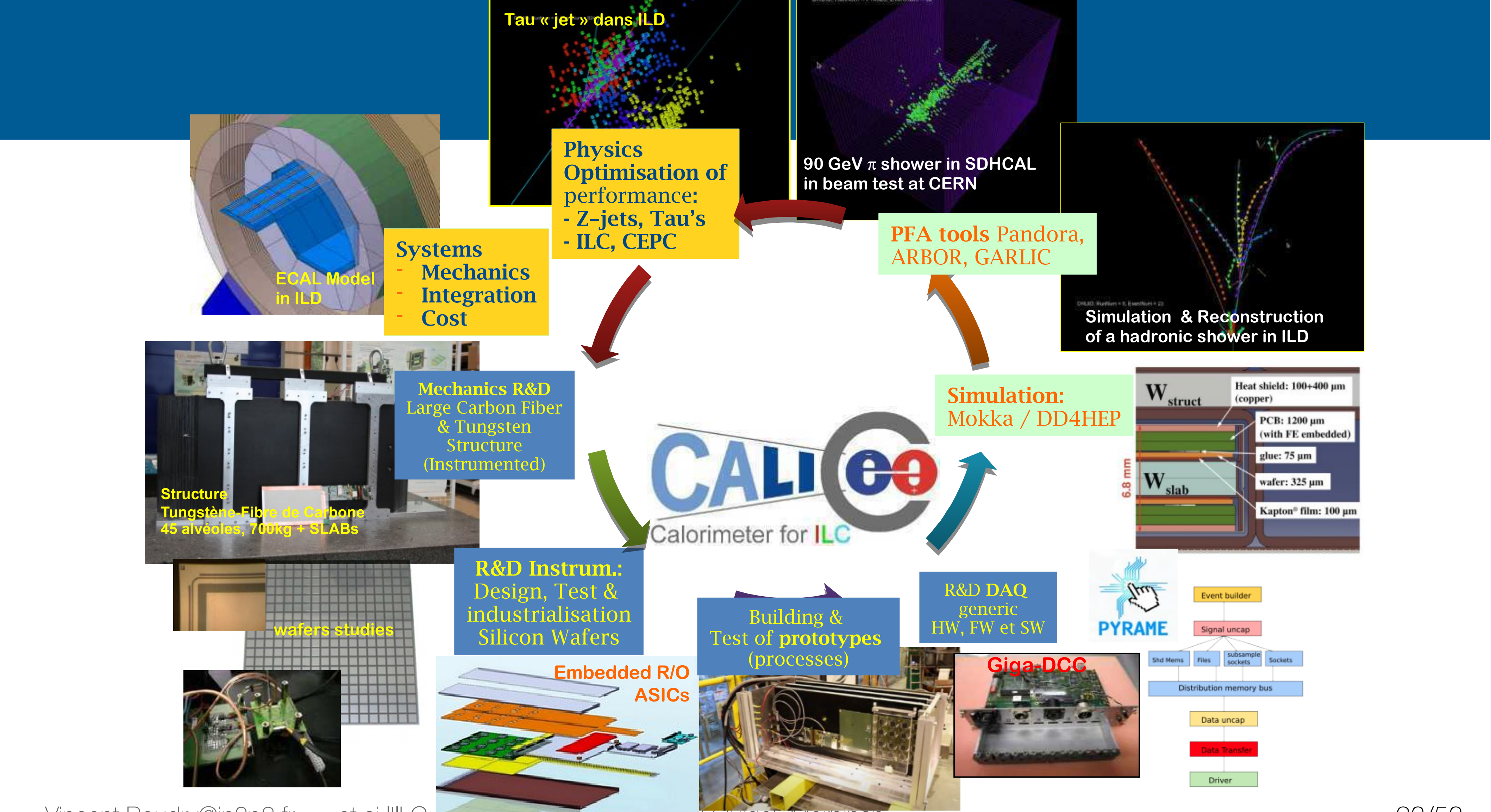
Structure de coût d'ILD





Trong Hieu Tran

Full Silicon option


Tau « jet » dans ILD
90 GeV π shower in SDHCAL
in beam test at CERN
Physics
Optimisation of
performance:
- Z–jets, Tau's
- ILC, CEPC
ECAL Model
in ILD
Systems
- Mechanics
- Integration
- Cost
PFA tools Pandora,
ARBOR, GARLIC
Simulation & Reconstruction
of a hadronic shower in ILD
Mechanics R&D
Large Carbon Fiber
& Tungsten
Structure
(Instrumented)
Structure
Tungstène-Fibre de Carbone
45 alvéoles, 700kg + SLABs
Simulation:
Mokka / DD4HEP
W struct
Heat shield: 100+400 µm
(copper)
PCB: 1200 µm
(with FE embedded)
glue: 75 µm
6.8 mm
W slab
wafer: 325 µm
Kapton® film: 100 µm
CALICE
Calorimeter for ILC
R&D Instrum.:
Design, Test &
industrialisation
Silicon Wafers
wafers studies
Building &
Test of prototypes
(processes)
R&D DAQ
generic
HW, FW et SW
PYRAME
Event builder
Signal uncap
Shd Mems
Files
subsample sockets
Sockets
Distribution memory bus
Data uncap
Data Transfer
Driver
Embedded R/O
ASICs
Giga-DCC

Physics
Optimisation of performance**:**
- Z–jets, Tau's
- ILC, CEPC

Functionnal Tools

PFA tools Pandora, ARBOR, GARLIC

Systems
- **Mechanics**
- **Integration**
- **Cost**

LoI / DBD / TDR

Simulation:
Mokka / DD4HEP

R&D Mécanique:
Large Carbon Fiber & Tungsten Structure (Instrumented)

Calorimeter for ILC

R&D Instrum.:
Design, Test & industrialisation Silicon Wafers

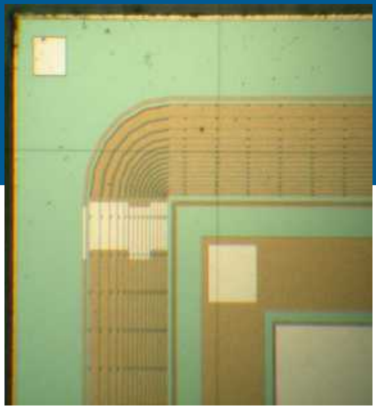
Beam Tests

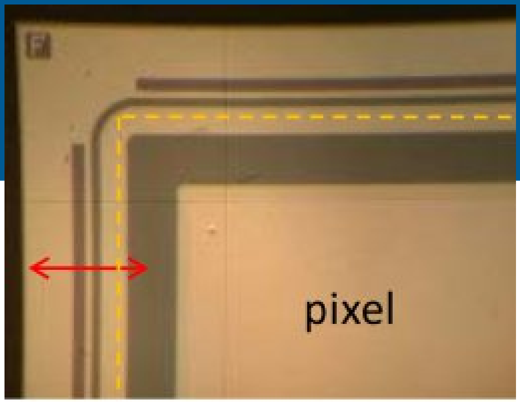
$\omega = \sim 1 / 5$ years

Building & Test of **prototypes** (processes)

R&D **DAQ**
generic
HW, FW et SW

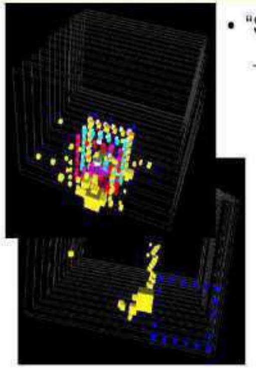
Silicon Sensors

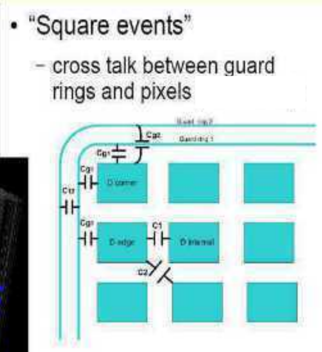




Cost driven

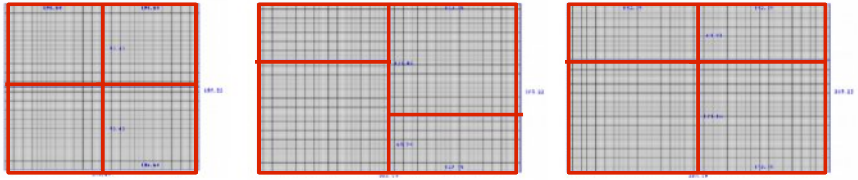
- ~30% of the total cost of the SiW-ECAL
  - ⇒ Units Cost reduction(CALIIMAX program)
- Decoupling of Guard Ring (Square Events).
- new design of ILD detector

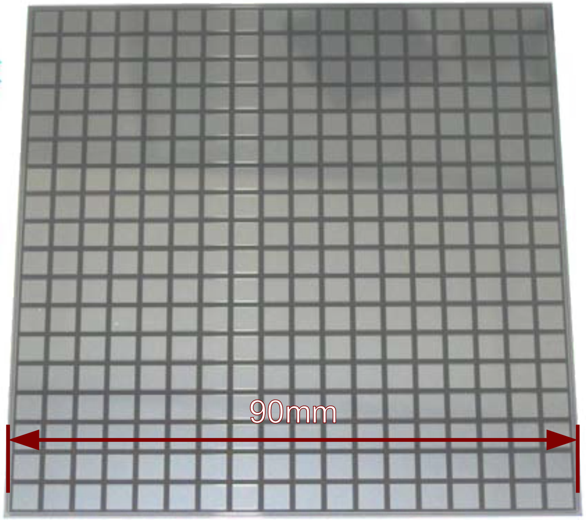




Command Sensors @ Hamamatsu

- ⚠ Minimal cost of Command ≥ 20k€
- direct contact with HPK engineers
  - (last @ LCWS’2016)
- Possibility of design for 8’’ in 186mm alveola
-





‘quantum unit’ of ILD dimensions (here 4’’ wafer)

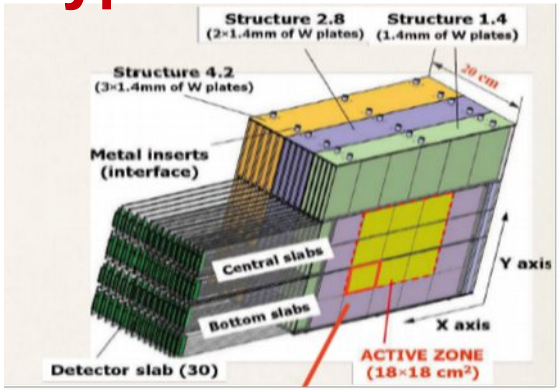
SiW ECAL: Physics & Technological prototype

Physics prototype: 2005–2011

PFA proof of concept with comparison to MC (PandoraPFA etc.)
Electronics outside

- 1cm x 1cm pixels
- full 30 layers

(used for PAMELA sat.)



16.5%(stochastic) 1–2% (constant) obtained with 1–45 GeV e^-/e^+ at 2006/2008 BT

Assess the feasibility:
Establish procedures and develop test benches for mass production : ***AIDA-2020, pre-prod test benches.***

- 10 000 SLAB's ⊃ ~75 000 ASU to be produced for ILD

Technological prototype

Embedded electronics

- SKIROC2 analog/digital ASICs
  - auto-triggered, zero suppr., PP
- pixels 5×5mm²

ILD Building blocks: SLAB's & ASU's

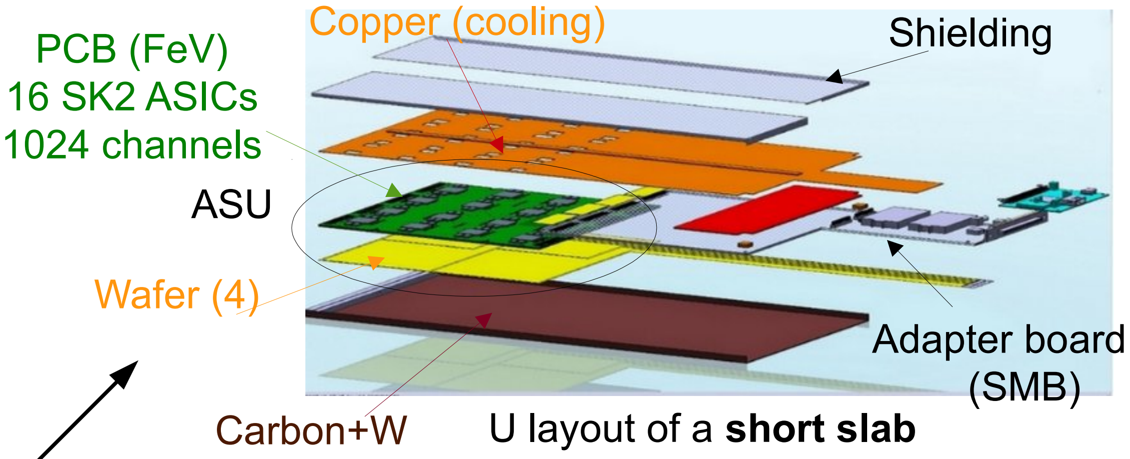
R&D for "mass production" and QA

- Quality tests & preparation of large production
- Modularity → ASU & SLABs
- Choice of square wafers
  - (≠ from hex: SiD, CMS HGCAL)

Numbers (R_{ECAL} = 1,8 m, $|Z_{Endcaps}|$=2,35m) (likely to be reduced by 30–40%)

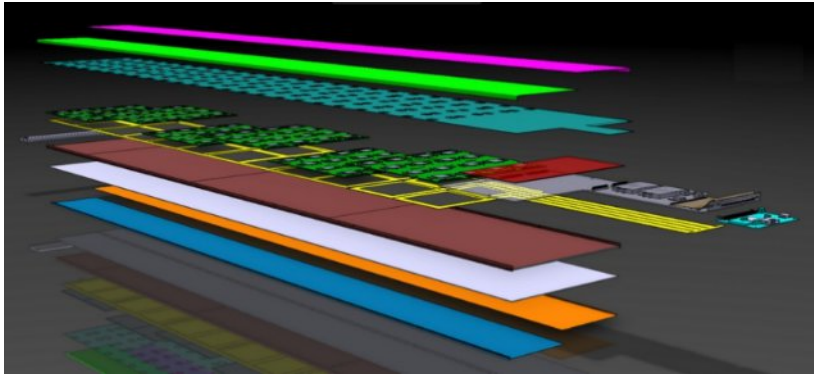
- Barrel modules: 40 (as of today all identical)
- Endcap Modules: 24 (3 types)
- ASUs = ~75,000
  - Wafers ~ 300,000 (2500 m²)
  - VFE chips ~ 1,200,000
  - Channels: 77Mch
- Slabs = 6000 (B) + 3600 (EC) = 9600
  - ≠ lengths and endings

Tests of producibility



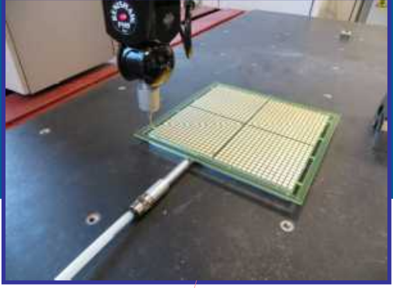
U layout of a **short slab**

Tests of feasability



U layout of a **long slab**

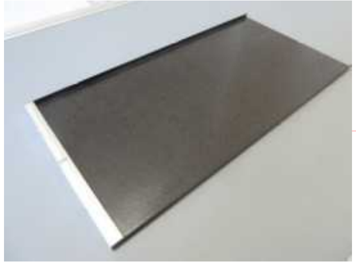
Full assembly chain

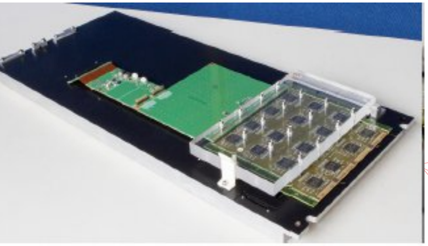


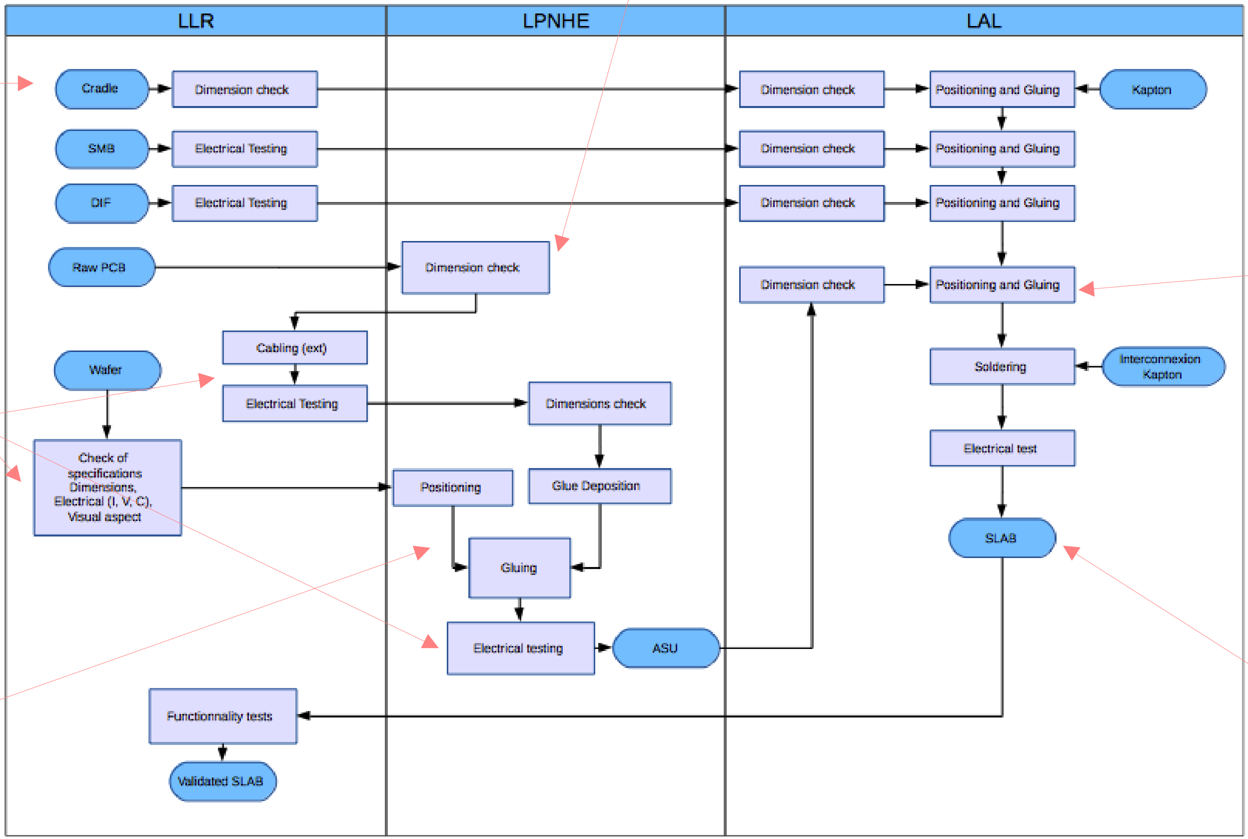
LLR, LPNHE, LAL

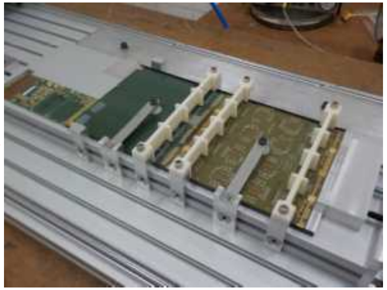
Rémi C., Jérôme, Sandrine

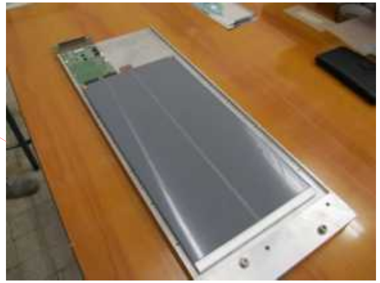
‘Simplified view’





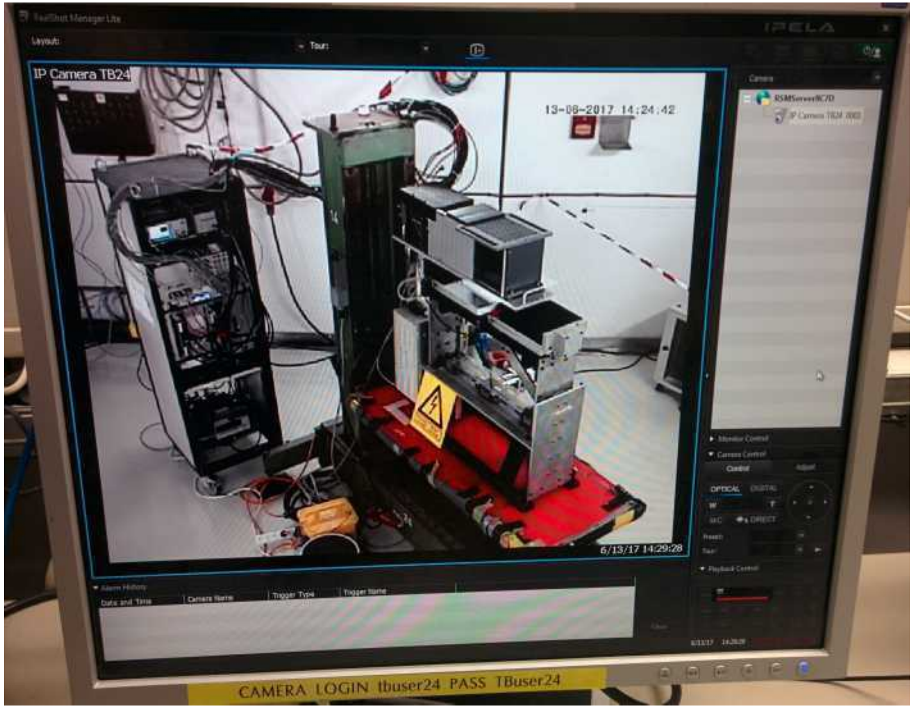






Beam Test at DESY

Frédéric, Jérôme, Guillaume, Kostya , Artur



- **CNRS-LLR, CNRS-LPNHE, CNRS-LAL,** Kyushu, SKKU
- Beamtime 12/6/17 – 23/6/17 at DESY, AIDA-2020 TA
- Detector and energy scans, plus tests in magnetic field (PCMAG)

Beam test @ DESY

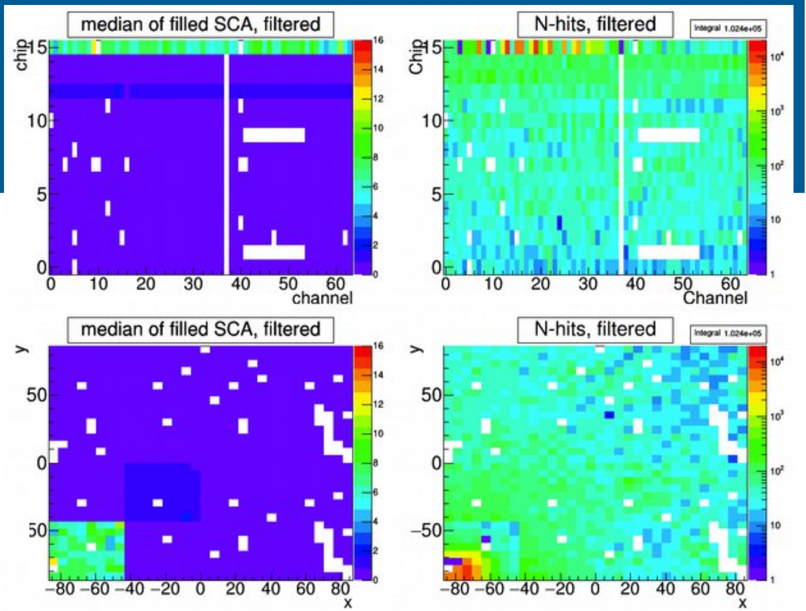
2 weeks program with support from AIDA-2020

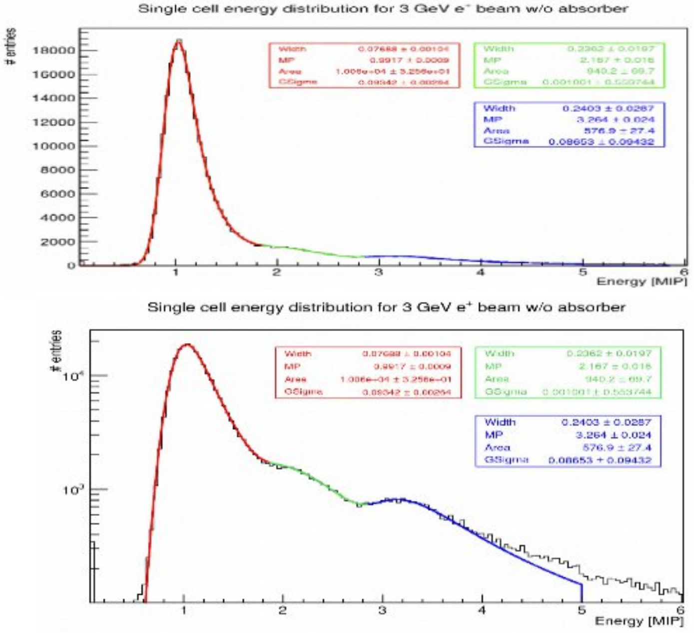
7 SLABs in 2–5 GeV electron beam, on movable stage

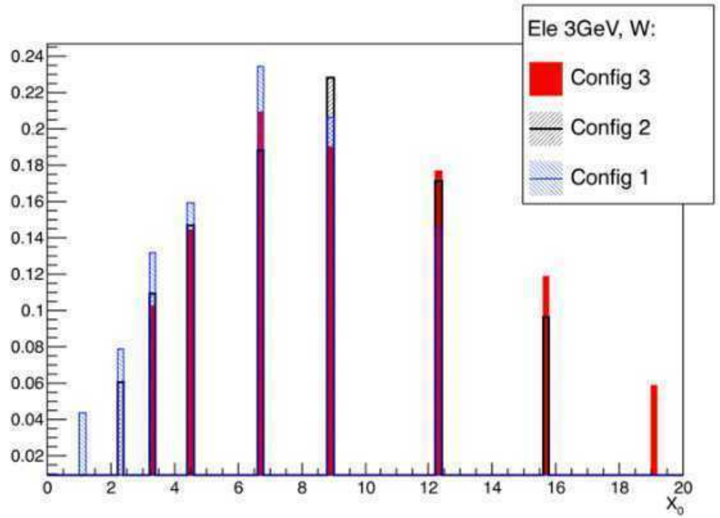
- with and with W absorbers (3 different configurations)
- runs at 0 and 45°
- 1 SLAb with 0–1 T magnetic field

Successful operation:

- Long phase or preparation : cosmics and noise runs
  ⇒ SLAB passports
  - Conservatve approach of Masking of noisy channels :
    6-8% of channels +
    1 @ 24% (1 Wafer)
- beam spot seen in minutes, operation with scripts (night runs)







Electronic long slab: are we able to operate 1.5m long slabs ?

Frédéric, Jérôme, Guillaume, Marc

Scale

- 4+8 ASUs = ~2,40 m
- Support of SMB
- Total access to upper and lower parts

Movable: table and to beam test

Rotable verticaly

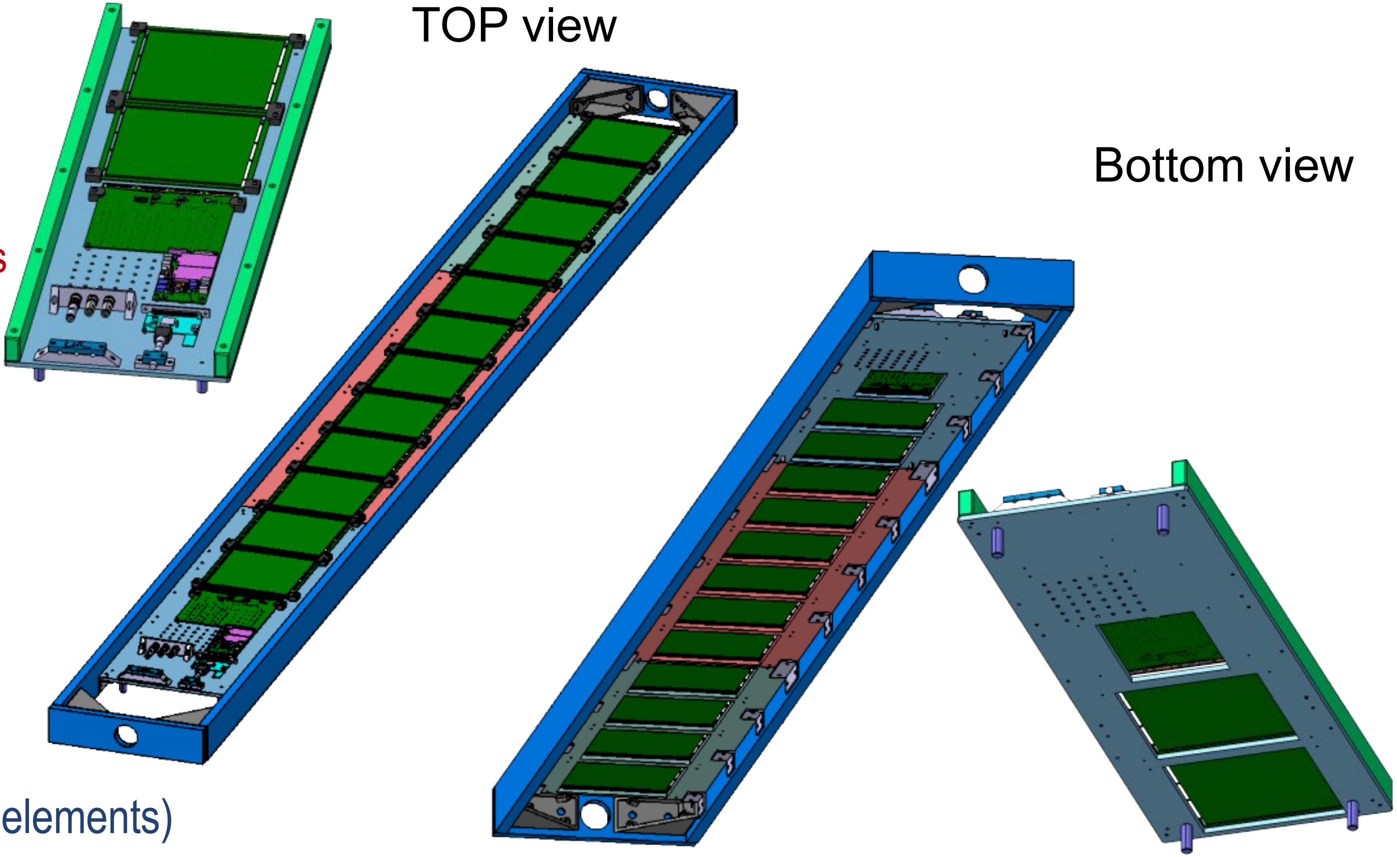
Rigidity : ~1mm over 2 m.

No electrical contacts scale/ cards

Shielding

- vs Light and CEM

… Production on-going → mi-Sept (1st elements)



Prospective

Les techniques accélérateurs sont prêtes

- Cavités
- Focus final (taille faisceau)

Campus en cours d'étude

- Taille, services
- Achat terrain
- Alimentations

Discussion intergouvernementales

- En marche et s'accelérant
- $\Rightarrow$ Reduction des coûts (US $\rightarrow$ Japon)

Détecteurs

- 2 $\rightarrow$ 1 : quand ? ALARA
- Decision Geometries, R_{ECAL}
  - Simulations / Rec / Perf.
- Choix technologies: quand ? ALARA

SiW-ECAL

- Faisabilité des solutions:
  - Electronique, Assemblage, Mécanique: Slab courts & Long
  - Procedure de montage hors et sur site
- Industrialisation
  - "Module 0"
- Organisation

Autres risques

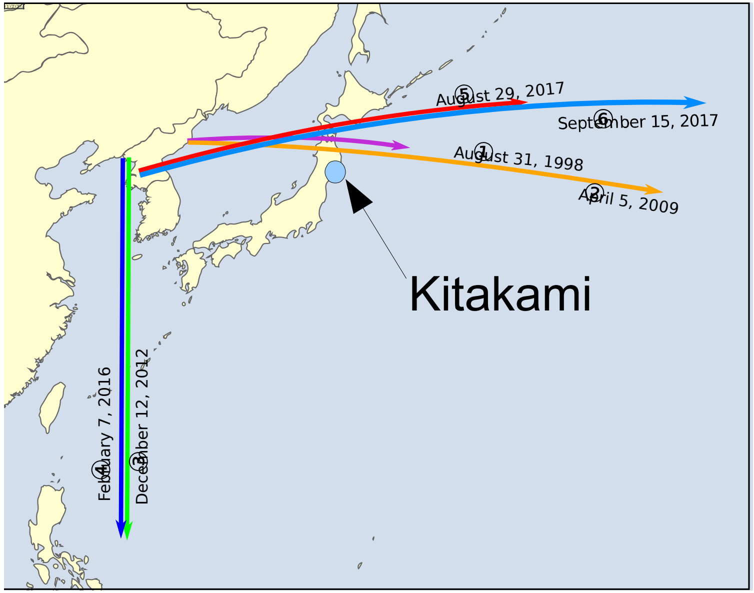
EXECUTIVE OFFICE OF THE PRESIDENT 5 positions

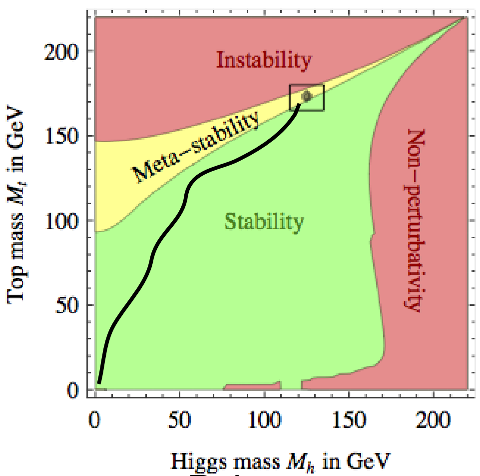
NO NOMINEE Director, Office of Science and Technology Policy

FY18 Department of Energy Budget Request

America First Budget

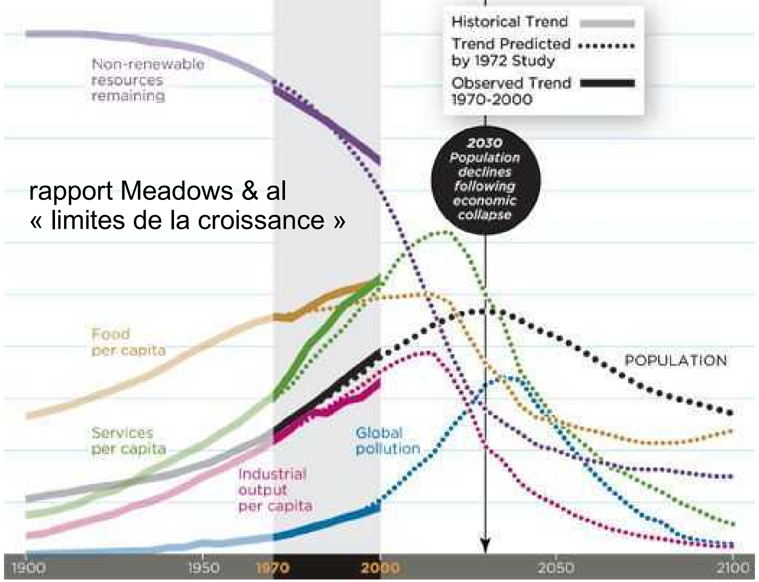
- Proposed 18% reduction in Office of Science budget ($900 million)
- HEP received proposed cut of $122 million
- National Labs also received significant cuts





Consommation

Puissance



rapport Meadows & al
« limites de la croissance »

LCB: Foreign governments would need T. Nakada, AWLC'17

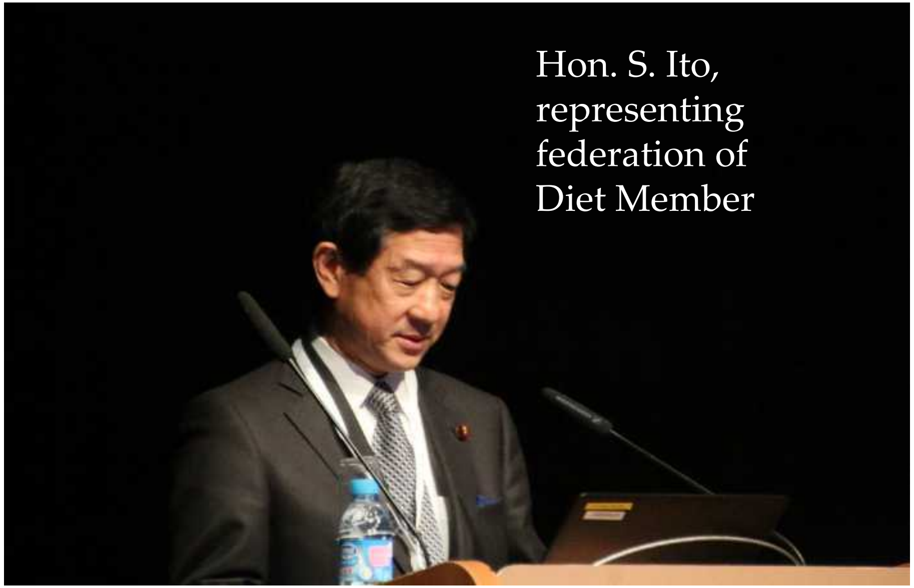
- a declaration by the Japanese government on her intension/interest to have the ILC in Japan,
- a signal that Japan would provide a "substantial" contribution to the project if realised,
- idea by the Japanese government on steps to be taken with time scale, in order to engage serious discussion on their participation and contribution to the project (I think).

"Europe looks forward to a proposal from Japan…" a proposal has not emerged yet from the European point of view.

- LCB will start discussion on the 250 GeV machine in August and deliver its conclusion to the ICFA in October.
- If the ICFA conclusion is positive, LCB should help generating an environment for the Japanese government to make the first step.

Extras

"LC WINDOW" TO FRANCE AND EU



Hon. S. Ito,
representing
federation of
Diet Member

Oct. 31, 2016 - Grand Opening Ceremony:
chaired by Rolf Heuer
attended by ~ 1000 part. (2500 conf. registrants)

C. Trautmann
Former French Minister of Culture
Former EU Parliament member
Former Mayor of Strasbourg

Hon. T. Shina,

The importance of broadening scientific, technological/industrial and cultural partnership between the EU and other

A Year before LCWS2017 … 2016 IEEE NSS/MIC Conference in Strasbourg

"ILC/AAA INTERACTION" with EU/US INDUSTRIES

IEEE exhibition hosted 80 company booths from Europe / US / Asia

→ 10 were reserved for AAA and ILC interested industries in Japan

AAA Delegation headed by:

Trump Administration Budget Request

Christopher Romans
Senior Manager for Government Relations
Mitsubishi Heavy Industries America

HEP is Entering a Period of Considerable Budget Risk

FY18 Department of Energy Budget Request

America First Budget

- Proposed 18% reduction in Office of Science budget ($900 million)
- HEP received proposed cut of $122 million
- National Labs also received significant cuts

Congressional Response

"Dead on Arrival"

- House E&W Appropriations Subcommittee proposed Office of Science funding levels same as enacted FY17 levels.
- Sen. Alexander has signaled his intent to mirror the House levels for his bill.
- **However, the odds of regular order being followed are low.**

Staffing Challenges

Christopher Romans
Senior Manager for Government Relations
Mitsubishi Heavy Industries America

MITSUBISHI HEAVY INDUSTRIES

wp TRUMP TRANSITION | Cabinet rumors and nominees | **Explore 561 key positions** | Search

DEPARTMENT OF ENERGY 2 positions

NO NOMINEE	Under secretary for science	–
NO NOMINEE	Director, Office of Science	–

DEPARTMENT OF HOMELAND SECURITY 1 position

NO NOMINEE	Under secretary for science and technology	–

DEPARTMENT OF THE INTERIOR 1 position

NO NOMINEE	Assistant secretary for water and science	–

EXECUTIVE OFFICE OF THE PRESIDENT 5 positions

NO NOMINEE	Director, Office of Science and Technology Policy	–
NO NOMINEE	Associate director for environment, Office of Science and Technology Policy	–
NO NOMINEE	Associate director for science, Office of Science and Technology Policy	–
NO NOMINEE	Associate director for technology, Office of Science and Technology Policy	–
NO NOMINEE	Associate director for national security and international affairs, Office of Science and Technology Policy	–

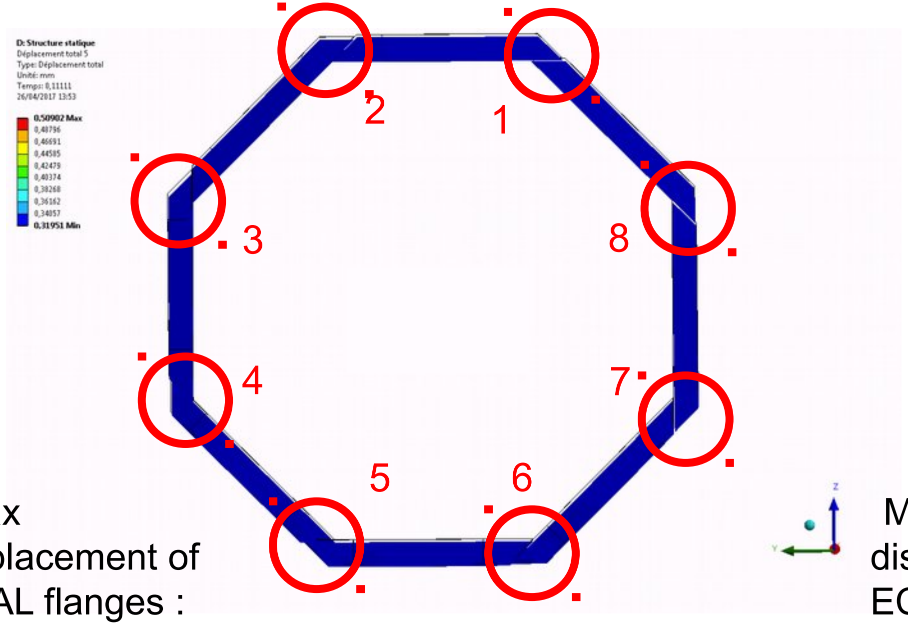
NATIONAL SCIENCE FOUNDATION 1 position

NO NOMINEE	Deputy director	–

ECAL gap analysis

For Videau

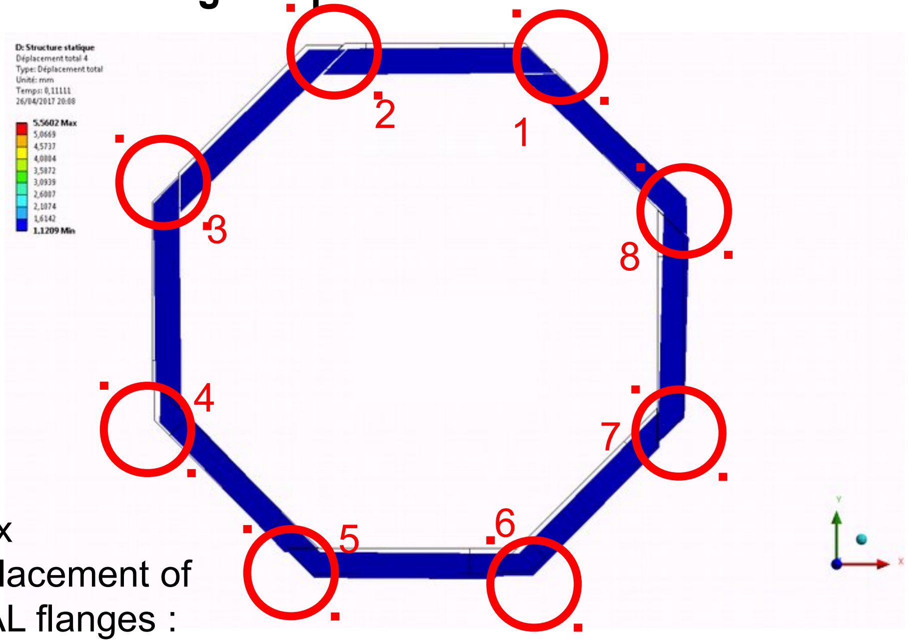
ECAL flange displacement



Max displacement of ECAL flanges : 0.51mm

For Tesla

ECAL flange displacement



Max displacement of ECAL flanges : 5.6mm

One can see a difference between the two cases with a ratio of about 10.9 between the Ecal module flanges displacement

European XFEL SRF being Completed

Media.xfel.au, Dec. 2015

Progress:

2013: Construction started

2015: SRF cav. (100%) completed

CM (70%) progressed

Further Plan:

2016: E- XFEL acc. completion

2016/E: E-XFEL beam to start

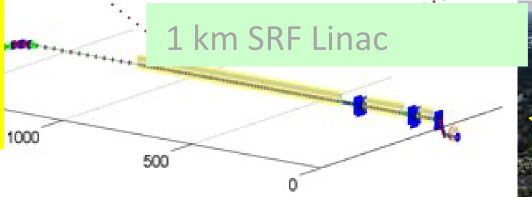
Acc. : ~ 1/10 scale to ILC-ML

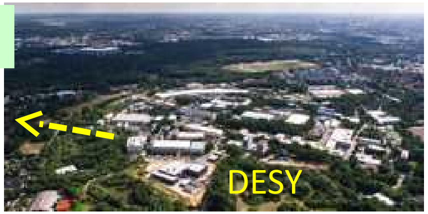
SRF system: ~ 1/20 scale to ILC-SRF

1.3 GHz / 23.6 MV/m

808 SRF acc. Cavities

101 Cryo-Modules (CM)

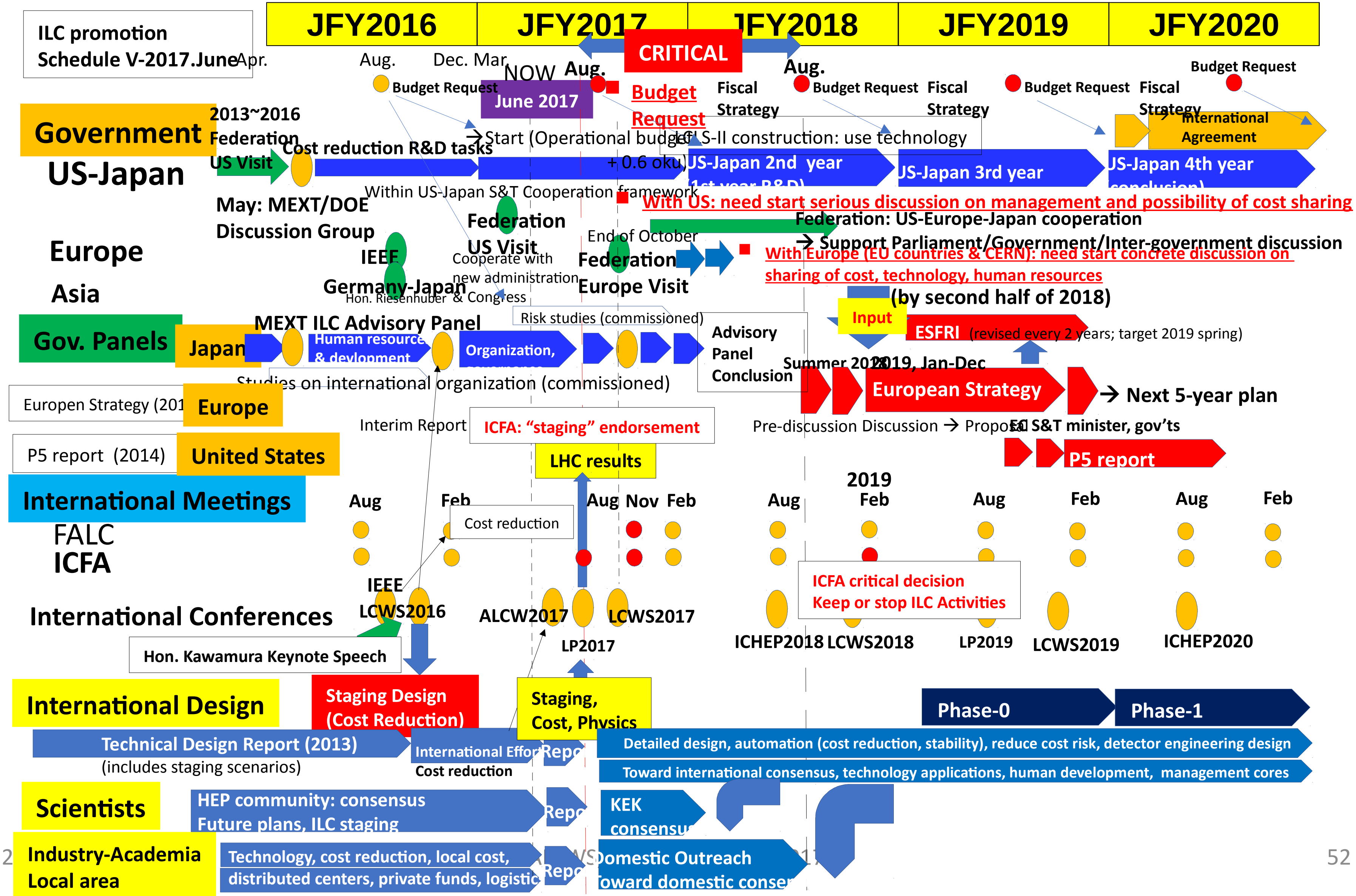




Challenges for ILC250

Synergy is Key

Challenging tasks for ILC250	Solutions with Synergy
Higgs Full Width	HL-LHC: custodial symmetry (K_W/K_Z = 1) Replace Γ_{HZZ} with Γ_{HWW} $\Gamma_{total}=\Gamma_{HWW}/Br(H\rightarrow WW)$ → comparable with ILC500 precision
Self-coupling HHH (challenging with ILC500)	Baryon number violation → EWBG or LG (T2K, double beta decay) EW baryogenesis HL-LHC, ILC250, SuperKEKB, Gravitational waves ILC250 possible
Higgs coupling	HL-LHC (Yt) Lattice (mb,mc,αs uncertainty) → comparable with ILC500 SuperKEKB (Lattice examination)
Search	Electroweak gaugino search based on naturalness Higgsino mass < ~200GeV Dark matter search (<62GeV)
Top mass	HL-LHC(0.2~0.3GeV) SM precision sufficient Precision sufficient for vacuum stability discussion (if a detailed probe of high scale physics needed, upgrade to ILC350)



ILC promotion Schedule V-2017.June
JFY2016
JFY2017
JFY2018
JFY2019
JFY2020
CRITICAL
Apr.
Aug.
Dec.
Mar.
NOW
Aug.
Aug.
Budget Request
June 2017
Budget Request
Fiscal Strategy
Budget Request
Fiscal Strategy
Budget Request
Fiscal Strategy
Budget Request
International Agreement
Government
2013~2016 Federation US Visit
Cost reduction R&D tasks
→Start (Operational budget)
LCLS-II construction: use technology
+ 0.6 oku
US-Japan
US-Japan 2nd year
1st year R&D)
US-Japan 3rd year
US-Japan 4th year
conclusion)
Within US-Japan S&T Cooperation framework
With US: need start serious discussion on management and possibility of cost sharing
May: MEXT/DOE Discussion Group
Federation US Visit
Federation: US-Europe-Japan cooperation
→ Support Parliament/Government/Inter-government discussion
Europe
Asia
IEEE
Germany-Japan
Hon. Riesenhuber
Cooperate with new administration & Congress
End of October
Federation Europe Visit
With Europe (EU countries & CERN): need start concrete discussion on sharing of cost, technology, human resources
(by second half of 2018)
Gov. Panels
Japan
MEXT ILC Advisory Panel
Human resource & devlopment
Organization, governance
Risk studies (commissioned)
Advisory Panel Conclusion
Input
ESFRI (revised every 2 years; target 2019 spring)
Studies on international organization (commissioned)
Summer 2018
2019, Jan-Dec
Europen Strategy (2013)
Europe
European Strategy
→ Next 5-year plan
Interim Report
ICFA: “staging” endorsement
Pre-discussion Discussion → Proposal
EC S&T minister, gov’ts
P5 report (2014)
United States
LHC results
P5 report
International Meetings
Aug
Feb
Aug
Nov
Feb
Aug
2019 Feb
Aug
Feb
Aug
Feb
Cost reduction
FALC
ICFA
ICFA critical decision
Keep or stop ILC Activities
IEEE
LCWS2016
ALCW2017
LCWS2017
LP2017
ICHEP2018
LCWS2018
LP2019
LCWS2019
ICHEP2020
International Conferences
Hon. Kawamura Keynote Speech
International Design
Staging Design (Cost Reduction)
Staging, Cost, Physics
Phase-0
Phase-1
Technical Design Report (2013)
(includes staging scenarios)
International Effort
Cost reduction
Report
Detailed design, automation (cost reduction, stability), reduce cost risk, detector engineering design
Toward international consensus, technology applications, human development, management cores
Scientists
HEP community: consensus
Future plans, ILC staging
Report
KEK consensus
Industry-Academia Local area
Technology, cost reduction, local cost, distributed centers, private funds, logistics
Report
Domestic Outreach
Toward domestic consensus