News from ILD Meeting

Karsten Buesser

Mini-Workshop on ILC Infrastructure for Physics and Detectors
KEK, 23.02.2018


Let's bring the ILC to Tohoku
ILCを東北に
INNOVATION FROM HERE
ILCを東北に
We support the ilc
Let's bring the ILC to Tohoku
ILCを東北に
INNOVATION FROM HERE
ILCを東北に

ILD Meeting

- February 20-22 2018 at Ichinoseki
- 64 registered participants

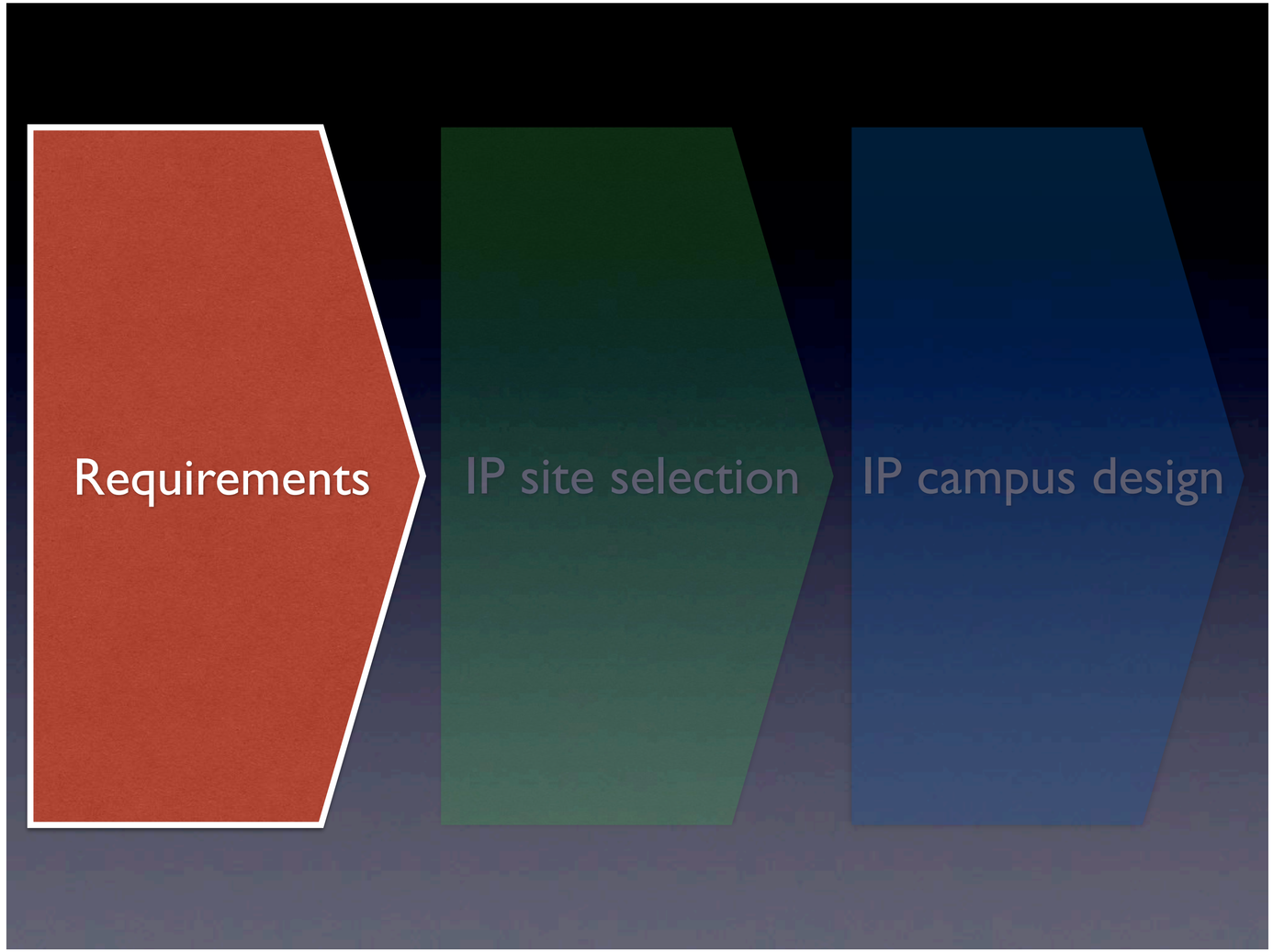
- Concentrated discussions about preparing the ILD concept for a positive decision on the ILC


禁煙
Wi-Fi
Wi-Fi
Wi-Fi

ILD and the IR

ILD Requirements

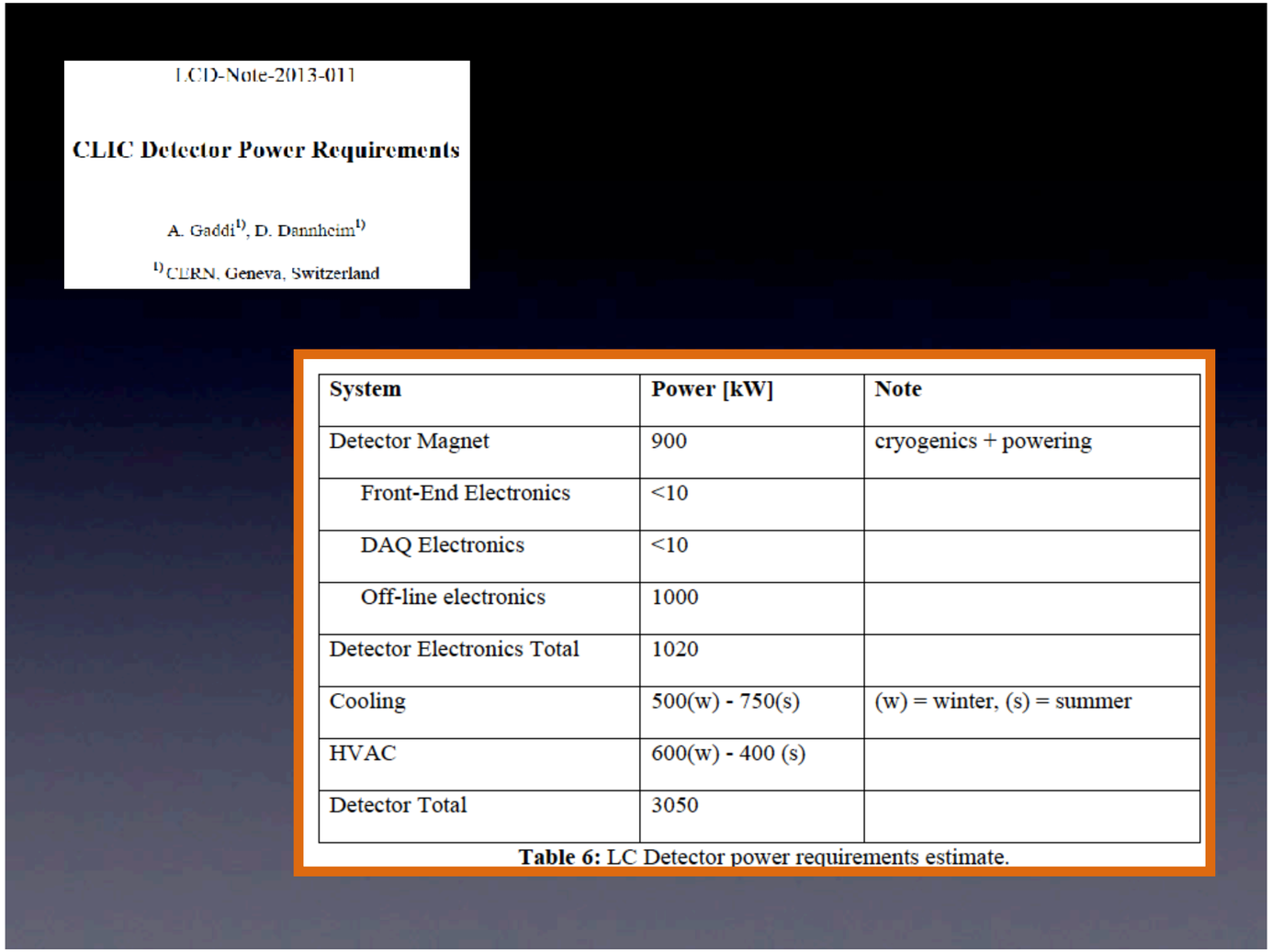
- IR design is being adapted to local conditions
- Decisions must be based on requirements!
- In focus:
  - Space for detector services and utilities
  - Assembly space
  - IT infrastructure
  - Power requirednts



Power!

- Power estimates for ILD are very rough and have been done a long time ago
  - Based on a rough scaling from LHC experiments
- More detailed numbers exist for CLIC detector study
  - ~3 MW
  - But different power pulsing scheme
- Need to do a bottom-up study within ILD to come to more reliable numbers

- Power for detectors at IP campus cannot be neglected!



LCD-Note-2013-011

CLIC Detector Power Requirements

A. Gaddi[1], D. Dannheim[1]

[1] CERN, Geneva, Switzerland

System	Power [kW]	Note
Detector Magnet	900	cryogenics + powering
Front-End Electronics	<10	
DAQ Electronics	<10	
Off-line electronics	1000	
Detector Electronics Total	1020	
Cooling	500(w) - 750(s)	(w) = winter, (s) = summer
HVAC	600(w) - 400 (s)	
Detector Total	3050	

Table 6: LC Detector power requirements estimate.

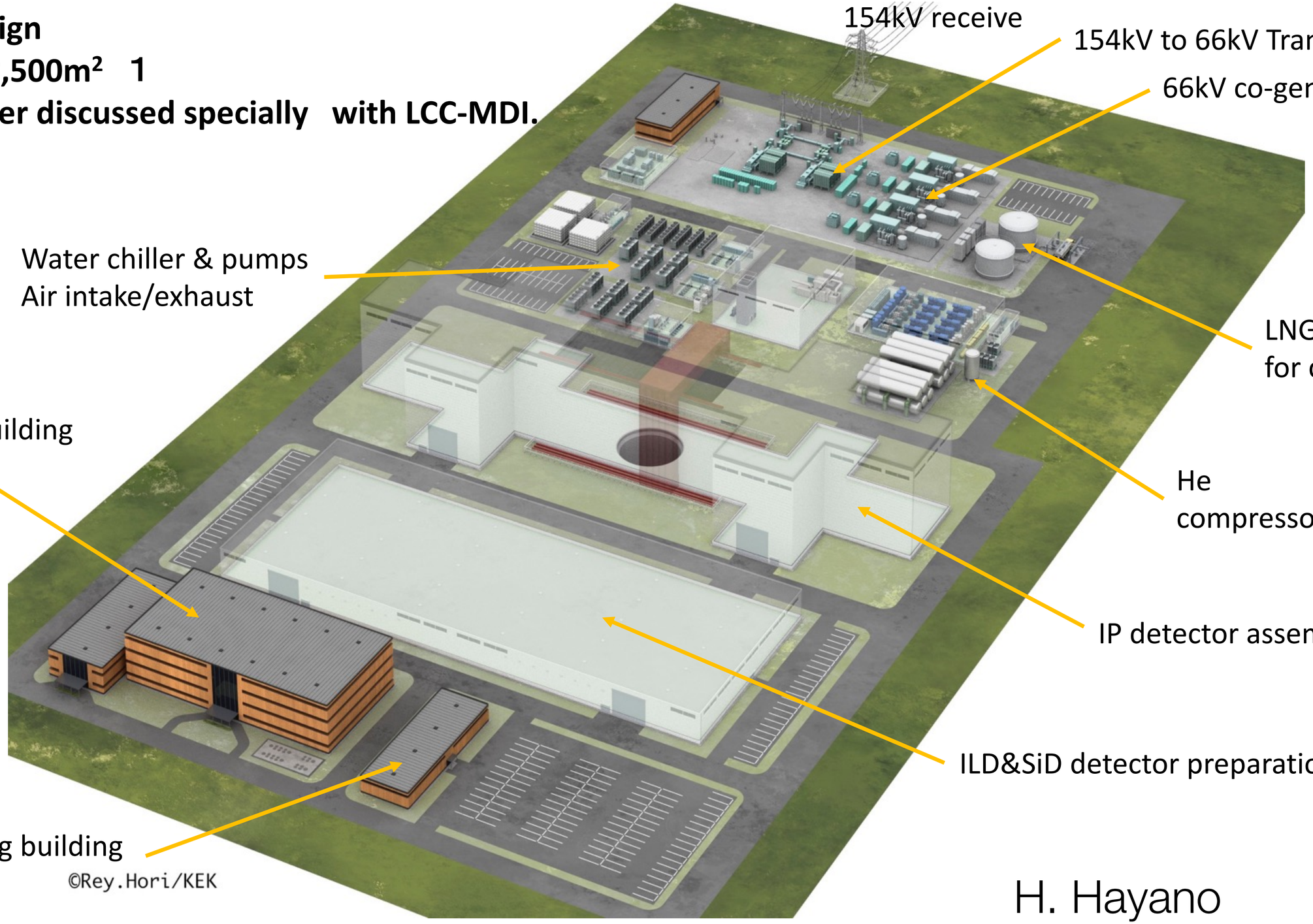
Where is the IP?

- Two IP candidate areas
- One more flexible, the other associated with less cost
- Decision can only be done based on requirements

	Area A	Area B
Cost	-	+
Flexibility	+	-

Can’t pin down IP

surface design
IP area 78,500m² 1
to be further discussed specially with LCC-MDI.



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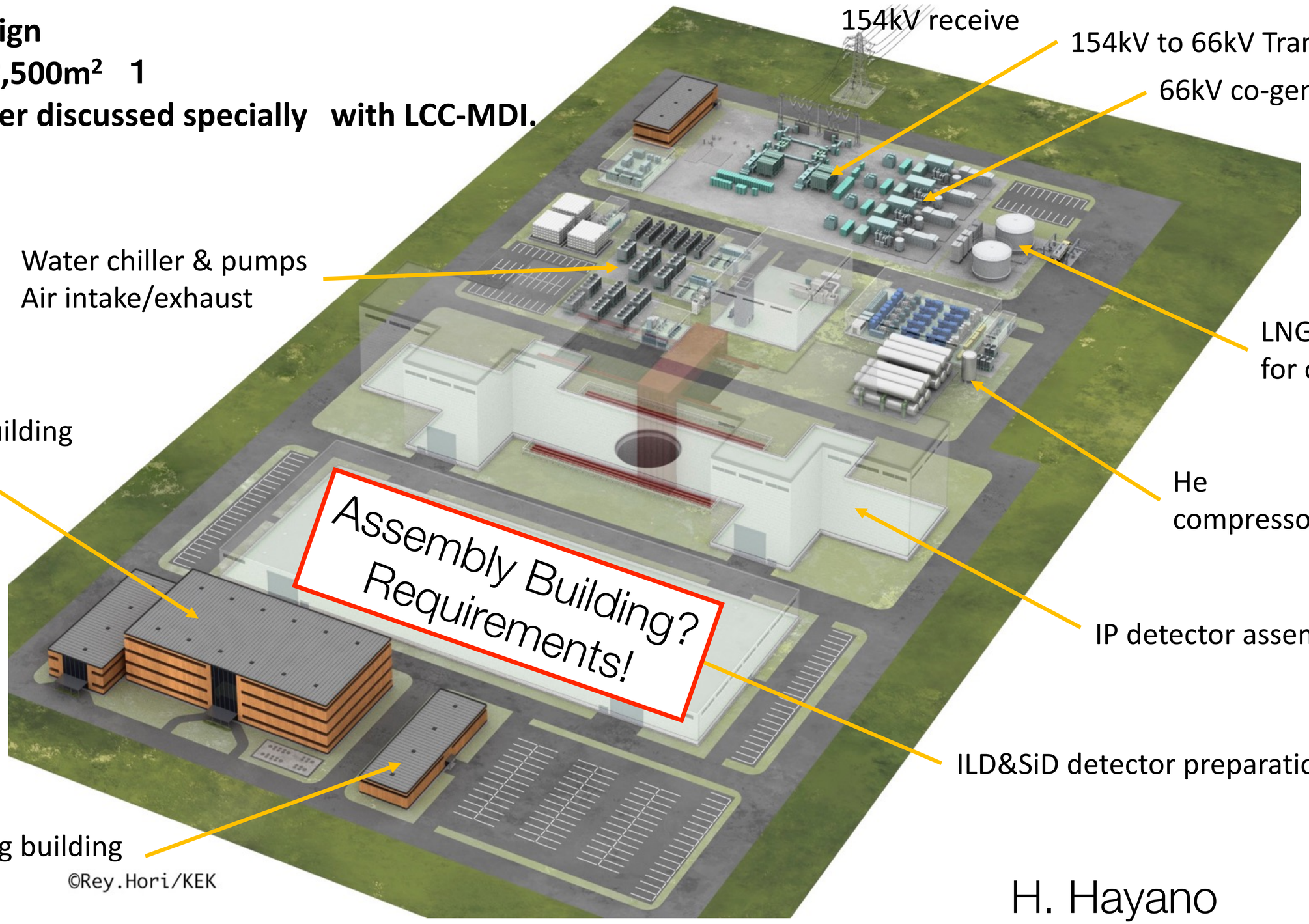
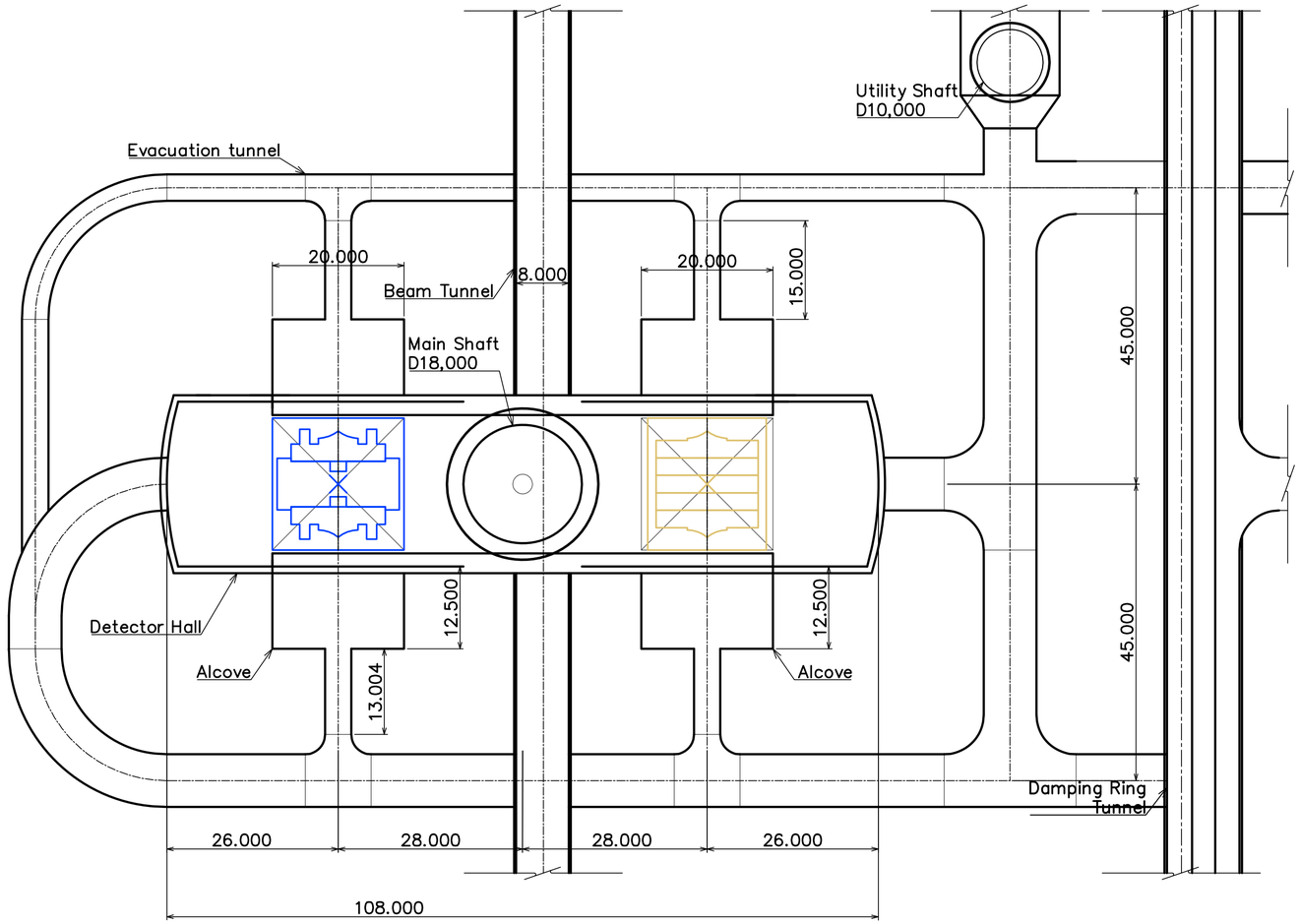
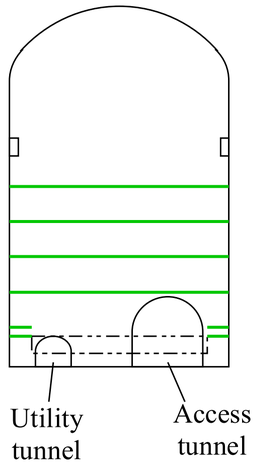


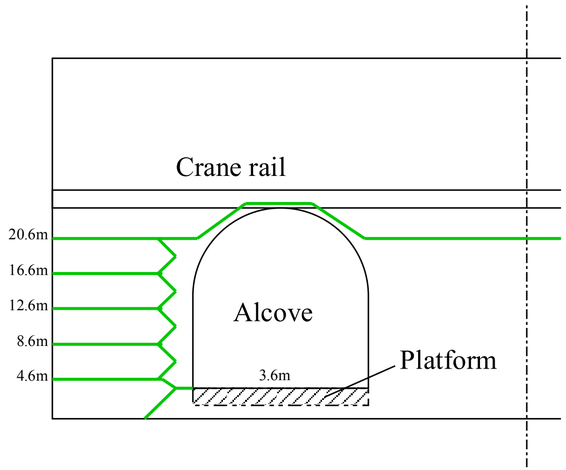
H. Hayano

Underground Areas



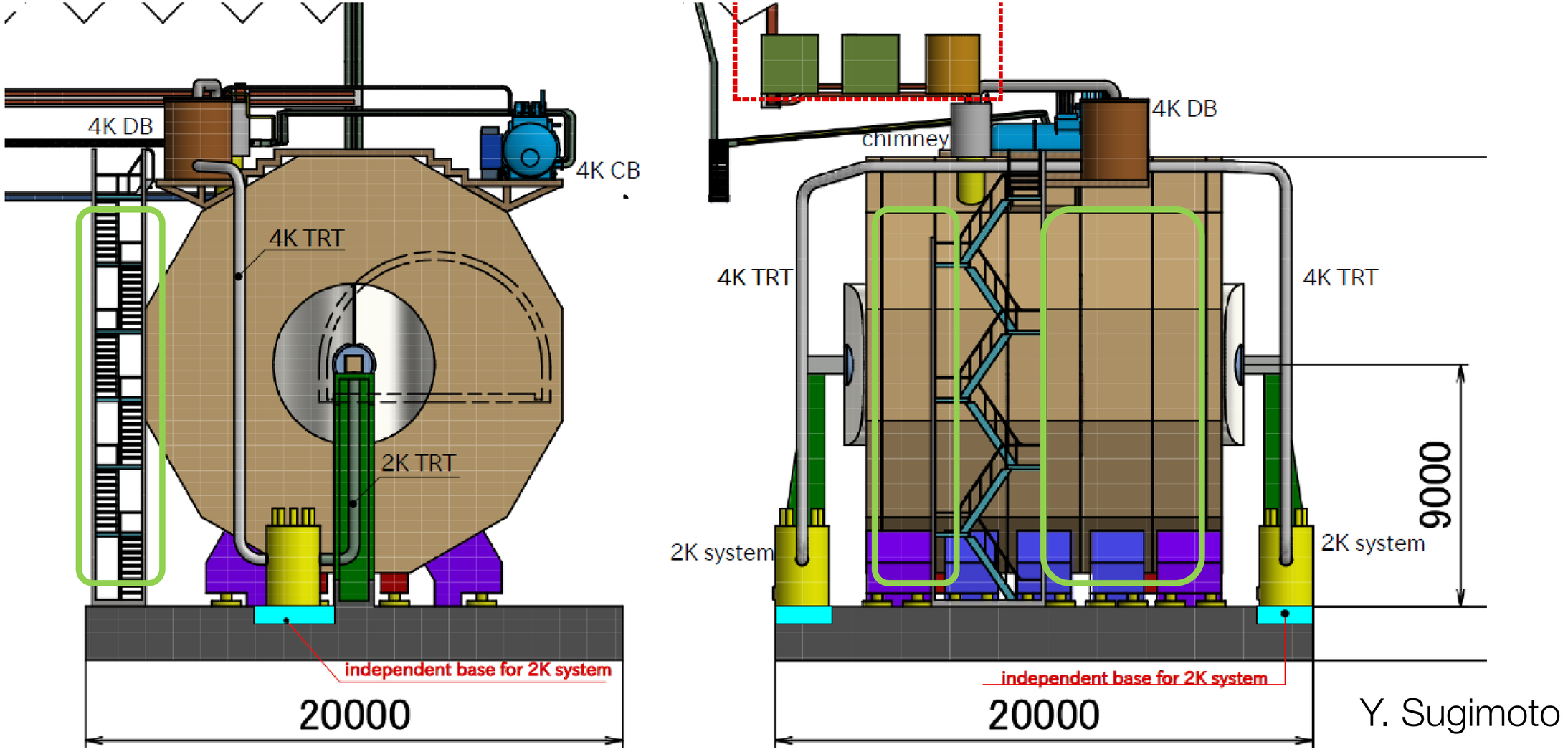
Service gallery





Y. Sugimoto

Detector Platform



Y. Sugimoto

: Space for electronics racks

Survey for Sub-Detectors Requirements in Preparation

Items to be clarified

- Electronics (19 inch) racks
  - Number and location (platform, service gallery, or somewhere else)
  - AC power (Quite large power consumption (>1 MW) for CMS o ATLAS. What about in the ILD case?)
  - Heat loss (= AC power-DC power to the detector)
- Sub-detector cooling system
  - Location (Utility/Service Cavern?) and space requirement
  - Request for the cooling water (LCW, chilled, or normal?, how much power?) for the 2nd loop of the cooling system
- Gas system
  - Location and space requirement
- Laser system
  - Location (Utility/Service Cavern?) and area
- PC farm for data processing (data reduction, event build, etc.)
  - Location (Underground or surface?) and area
  - AC power consumption

Items to be clarified

- An excel file for survey is under construction

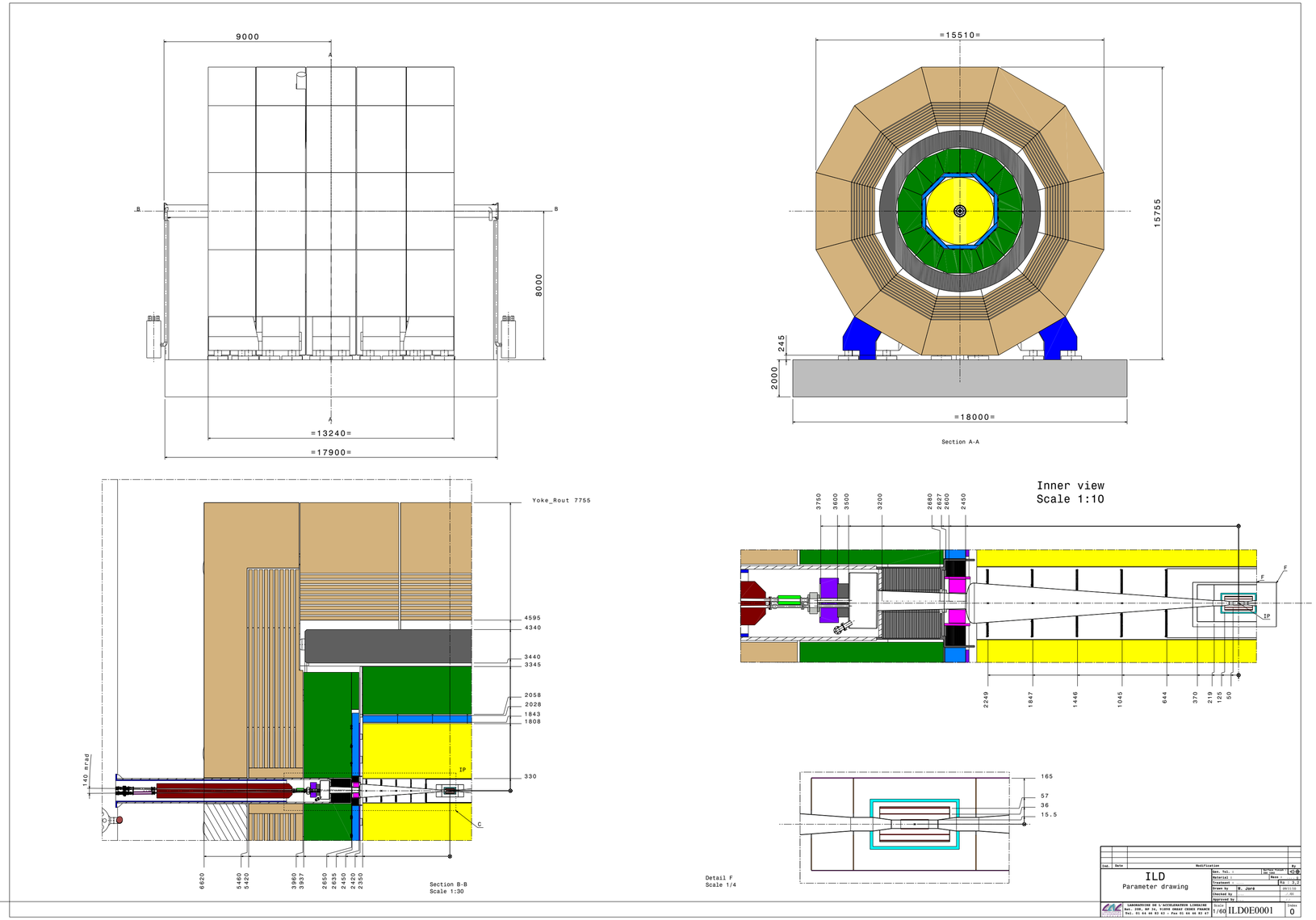
			VTX	SIT	FTD	TPC	ECAL	AHCAL	SDHCAL	Muon	FCAL	PC farm	Off-line	Solenoid	QF1
Electronics Racks	Platform	Number													
		AC power (kW)													
		Heat loss (kW)													
	Service gallery	Number													
		AC power (kW)													
		Heat loss (kW)													
	U/S cavern	Number													
		AC power (kW)													
		Heat loss (kW)													
	Surface	Number													
		AC power (kW)													
		Heat loss (kW)													
Sub-detector cooling system	Space requirement	Location													
		WxDxH (m^3)													
		AC power (kW)													
	Cooling water	Type													
		Heat bad (kW)													
Gas system	Platform	WxD (m^2)													
	Service gallery	WxD (m^2)													
	U/S cavern	WxD (m^2)													
	Surface	WxD (m^2)													
Laser system	Space requirement	Location													
		WxD (m^2)													
Magnet ancillaries	DC power supply	AC power (kW)													
	Cooling water for power supply	Type													
		Heat bad (kW)													
	Cryogenics	AC power (kW)													
	Space requirement	Location													
		WxDxH (m^3)													
	Cooling water for cryogenics	Type													
		Heat bad (kW)													
	Cooling water for dump resister	Type													
		Heat bad (kW)													

Y. Sugimoto

ILD Engineering Model

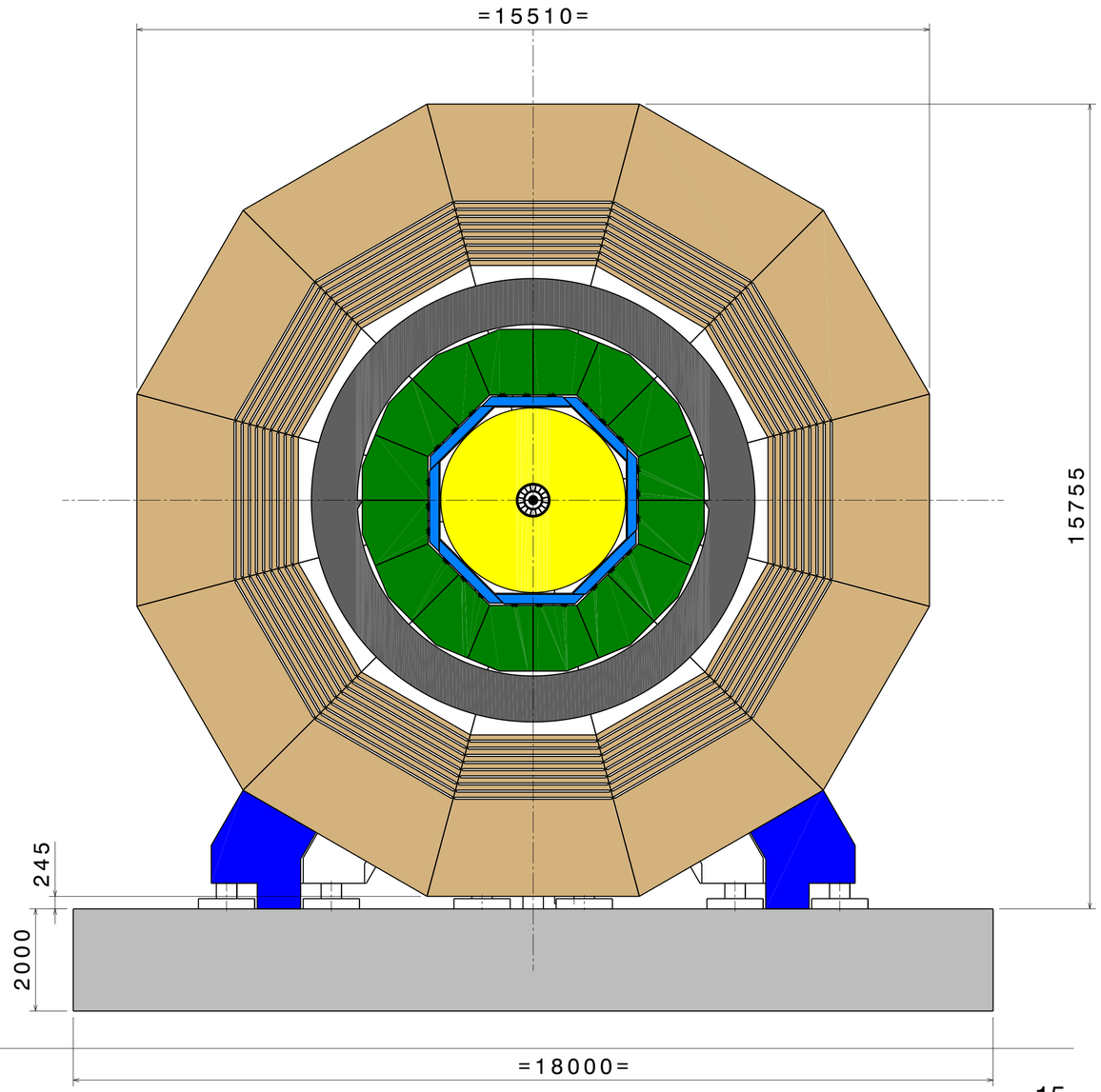
ILD Engineering Model

- An integrated model of ILD had been developed for the LoI, updated for the DBD
- The model is under control of Christian Bourgeois and Alexandre Gonnin (LAL)
- Kept in ILC-EDMS (DESY)



ILD Engineering Model Update

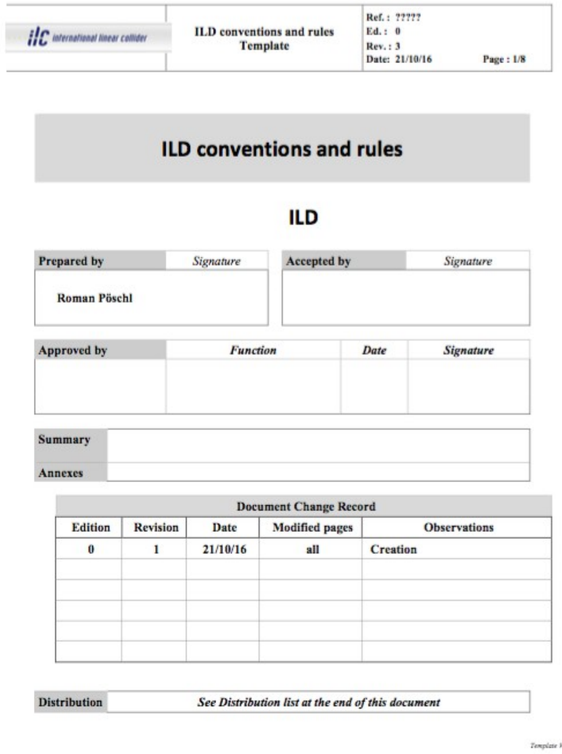
- Good reasons to update the technical model:
- Changes in ILD geometry:
  - new forward region (L*)
  - two options - large and small ILD
- More realism:
  - better understanding of electronics (cables!)
  - more detailed mechanical models
  - more realism w.r.t. boundary conditions
    - integration with the machine at Kitakami site
    - seismic issues
    - local regulations on safety etc.
- Enable technical studies on options
  - e.g. Tesla vs Videau HCAL structure
- Give best possible input for physics simulations on dead zones, support structures, etc.



ILD Interface Documents

Three documents

Document on ILD Conventions and rules



ILC international linear collider | ILD conventions and rules Template | Ref. : ????? Ed. : 0 Rev. : 3 Date: 21/10/16 | Page : 1/8

ILD conventions and rules

ILD

Prepared by	Signature	Accepted by	Signature
Roman Pöschl			

Approved by	Function	Date	Signature

Summary	
Annexes	

Document Change Record

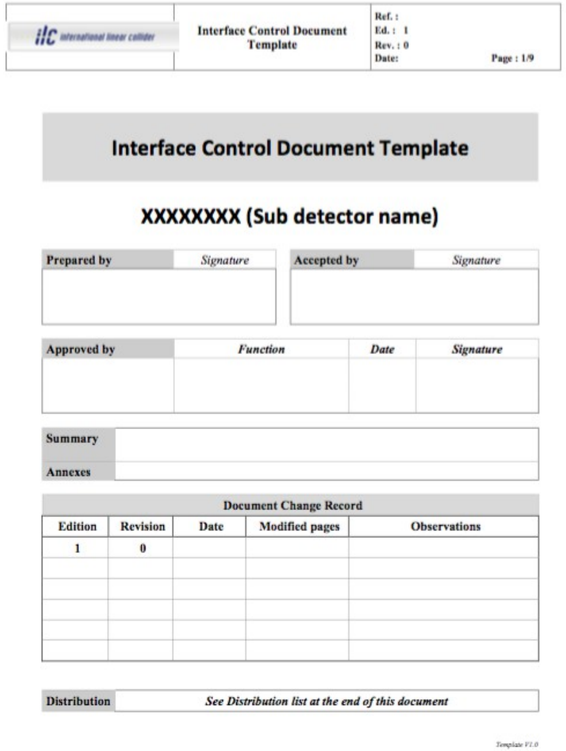
Edition	Revision	Date	Modified pages	Observations
0	1	21/10/16	all	Creation

Distribution	See Distribution list at the end of this document

Template V1.0

Obligatory document:
Author: Central Integration Group

Actual ICD



ILC international linear collider | Interface Control Document Template | Ref. : Ed. : 1 Rev. : 0 Date: | Page : 1/9

Interface Control Document Template

XXXXXXXX (Sub detector name)

Prepared by	Signature	Accepted by	Signature

Approved by	Function	Date	Signature

Summary	
Annexes	

Document Change Record

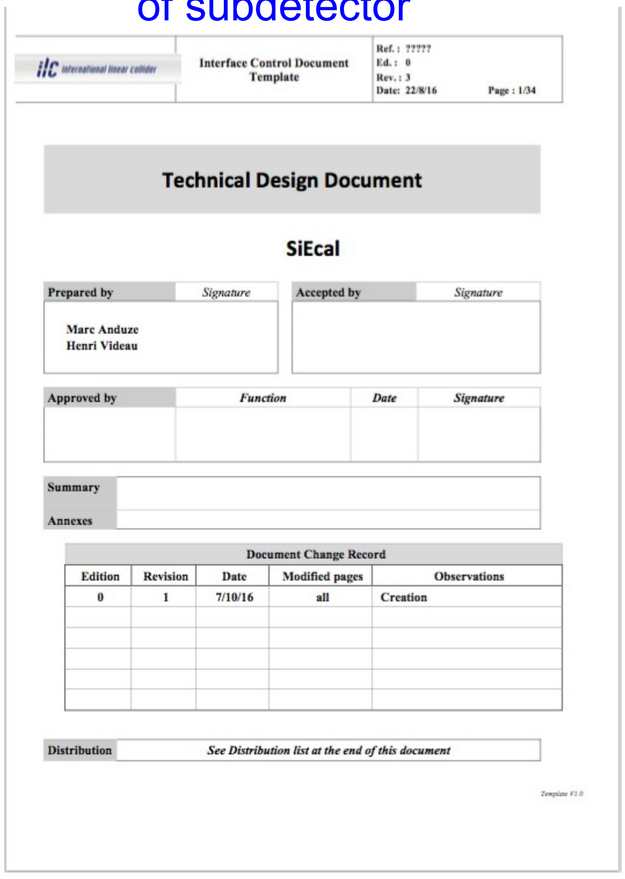
Edition	Revision	Date	Modified pages	Observations
1	0			

Distribution	See Distribution list at the end of this document

Template V1.0

Obligatory document
Author: Subdetector group

Technical Design Document of subdetector



ILC international linear collider | Interface Control Document Template | Ref. : ????? Ed. : 0 Rev. : 3 Date: 22/8/16 | Page : 1/34

Technical Design Document

SiEcal

Prepared by	Signature	Accepted by	Signature
Marc Anduze Henri Videau			

Approved by	Function	Date	Signature

Summary	
Annexes	

Document Change Record

Edition	Revision	Date	Modified pages	Observations
0	1	7/10/16	all	Creation

Distribution	See Distribution list at the end of this document

Template V1.0

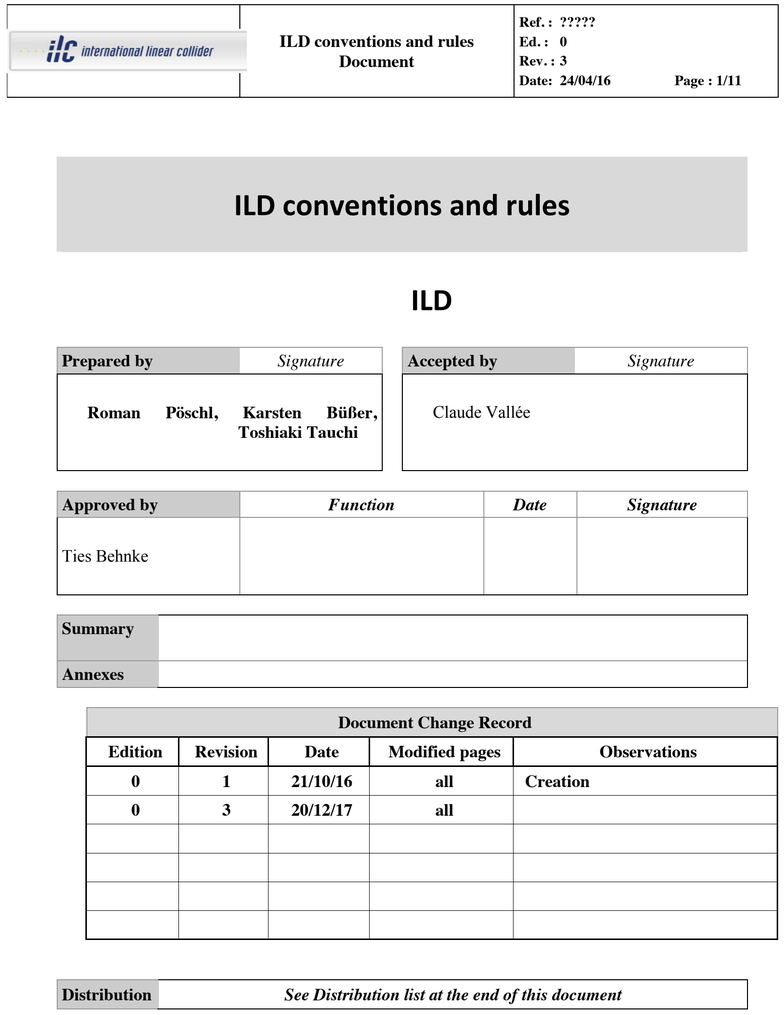
Optional document
(Highly recommended)
Author: Subdetector group
-> See talks by Henri and Marc

R. Poeschl

Convention and Rules Document

- Drafted by conveners of Central Design and Integration Group:
  - KB, R. Poeschl, T. Tauchi

- Still work in progress
- Meeting at DESY on December 20/21 2017 to work on document:
  - Draft 0.3.1 Available on EDMS:
    - EDMS ID : D*1156315,D,1,2
    - https://edmsdirect.desy.de/item/D0000001156315,D,1,2



ilc international linear collider	ILD conventions and rules Document	Ref. : ????? Ed. : 0 Rev. : 3 Date: 24/04/16 Page : 1/11

ILD conventions and rules

ILD

Prepared by	Signature	Accepted by	Signature
Roman Pöschl, Karsten Büßer, Toshiaki Tauchi		Claude Vallée	

Approved by	Function	Date	Signature
Ties Behnke			

Summary	
Annexes	

Document Change Record

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0	1	21/10/16	all	Creation
0	3	20/12/17	all	

Distribution	*See Distribution list at the end of this document*

Template V1.0

Contents

- Definition of Names and Units
- The ILD Coordinate System
- Mechanical Constraints
  - every component has to stick to its envelope
  - only CDI group can change envelopes
  - shared spaces (cable paths, etc.) under control of CDI group
  - safety!
- Electrical, Cooling, Other Services
  - electrical and cooling requirements for each component
  - remove your heat yourself!
  - general cabling scheme under control of CDI group
- External Constraints
  - site-specific, accelerator related
- Transportation and Assembly
  - 25t limit, 80t exceptionally
- Legal Issues and Other Constraints
  - collection of Japanses rules on safety etc.
  - electrical standards (60/50 Hz!)

Coordinate System

- Problem: define horizontal plane. Usually done as the plane in which the beams are, but this could be tilted (beams traverse solenoid field under horizontal crossing angle). Now: relate to gravitational vector.

Let **p-** and **p+** be the nominal axes of the incoming electron (-) and positron (+) beam momenta.

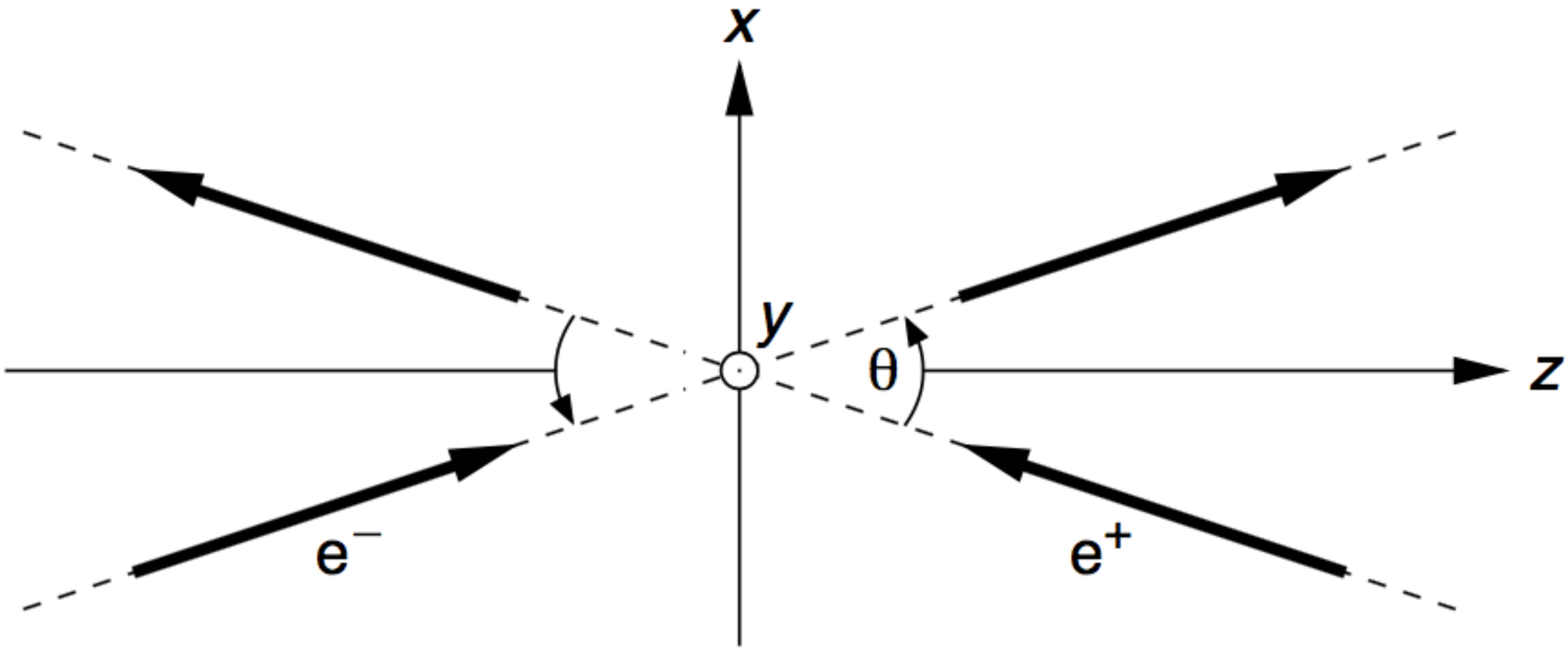
The origin of the ILD coordinate system is the nominal ILC interaction point, as defined by the machine lattice. The vertical y-axis is anti-parallel to the gravitational acceleration **g** at the interaction point. The horizontal plane is the plane that is normal to the y-axis and contains the nominal interaction point[1]. The mean beam direction is the bisecting line of the (smaller) angle between **p-** and **p+**. The z-axis is the projection of the mean beam direction onto the horizontal plane. The x-axis completes a Cartesian right-handed coordinate system.

The crossing angle, here denoted by θ_{cr}, is defined as follows: $\theta_{cr} \in (-\pi, +\pi]$ is the angle by which **p+** has to be rotated around the y-axis such that it becomes antiparallel to **p-**. If the rotation is right-handed then $\theta_{cr}>0$, if it is left-handed then $\theta_{cr}<0$. Note that θ_{cr} will always have the same sign as p_x- and p_x+.[2]

- Note: translation of coordinate system into the detector for alignment needs to be discussed.

ILD Coordinate System

- To Do: 3D graphics



$\vec{g}$ ⊗

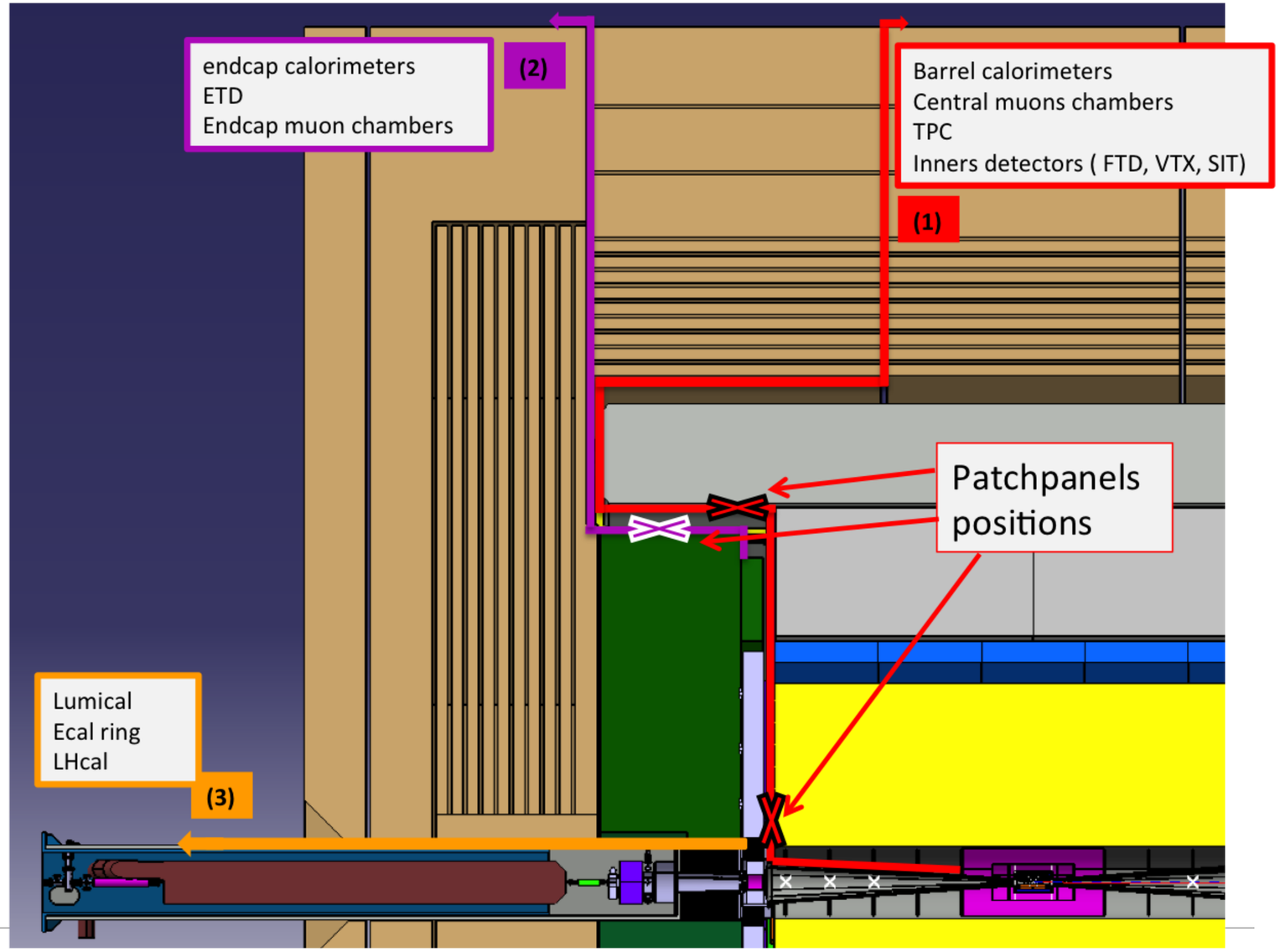
Interface Control Documents - Status

Subdetector	
VTX	in progress
SIT/FTD/ETD	discussions have started
TPC	draft on EDMS
Si-ECAL	draft on EDMS
Sc-ECAL	draft on EDMS
A-HCAL	discussions have started
SD-HCAL	in progress
FCAL	draft on EDMS
Yoke/Muon	???
ILD Conventions/Rules	draft on EDMS

Cables and Services

Cable Paths

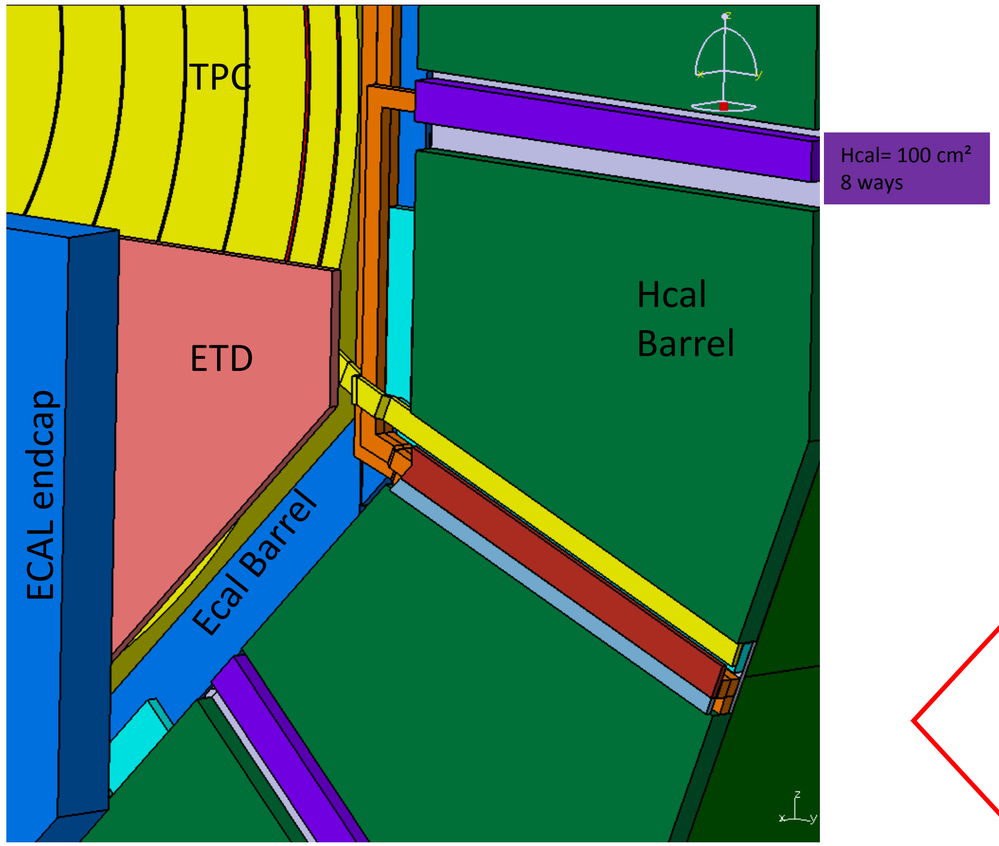
- Defined for DBD (were different for LoI)
- Central Detector:
  - via endcap/barrel region around coil through gap between yoke rings
- End Caps:
  - via endcap/barrel region along yoke endcap
- Forward Calorimeters
  - along QD0 magnet



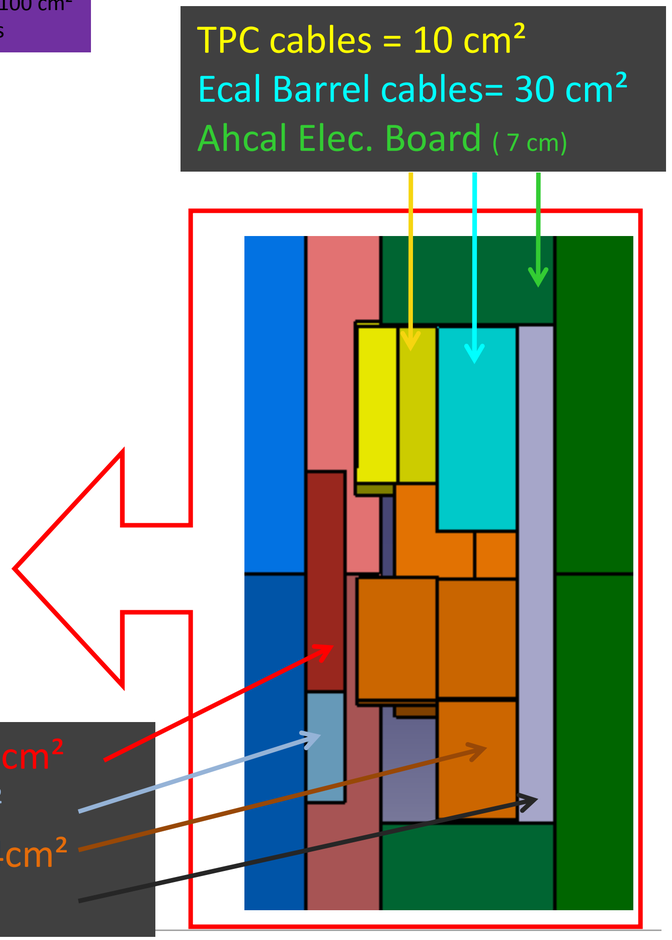
Barrel-Endcap Gap

- „Trenches“ between AHCAL electronics
- Completely occupied by services (cables and cooling)
  - TPC
  - ECAL
  - AHCAL

Gap : Barrel-endcaps

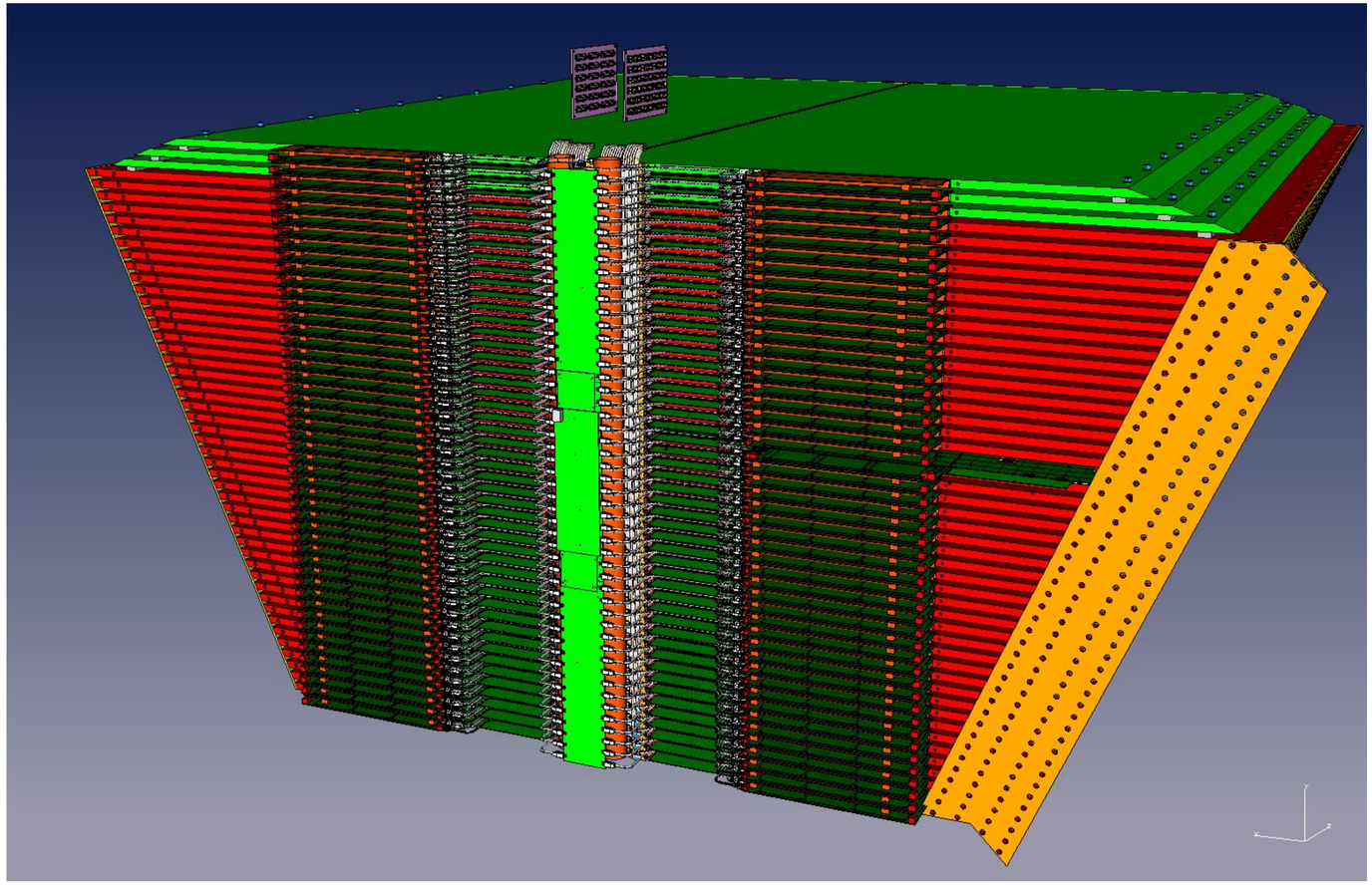


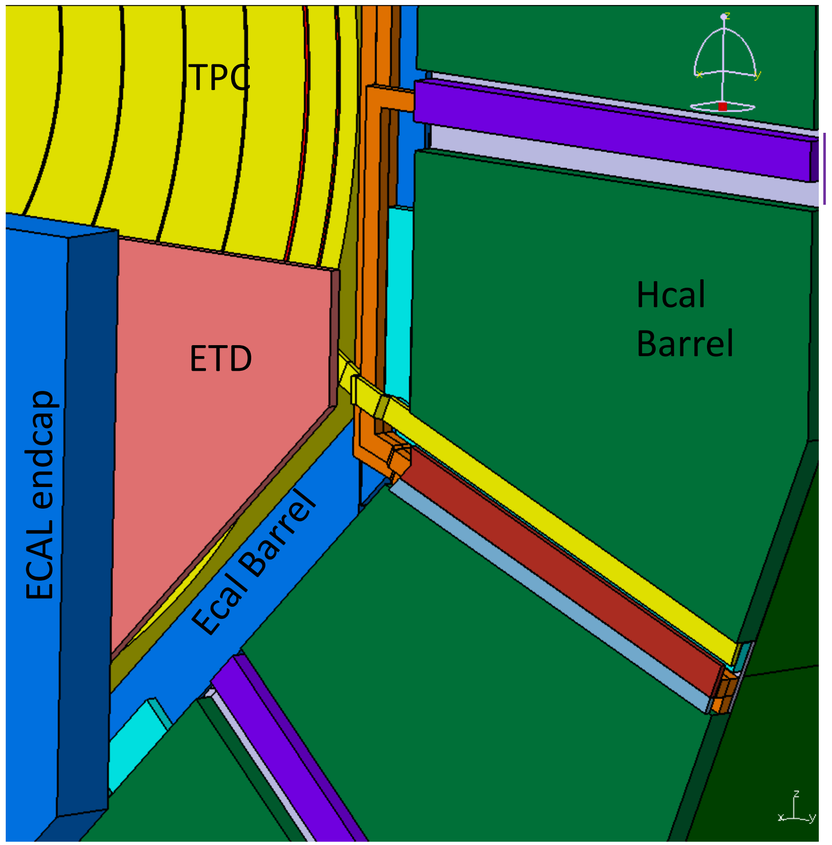
C. Clerc, 2010



AHCAL Services - Recent Updates

- Detailed design of the AHCAL services:





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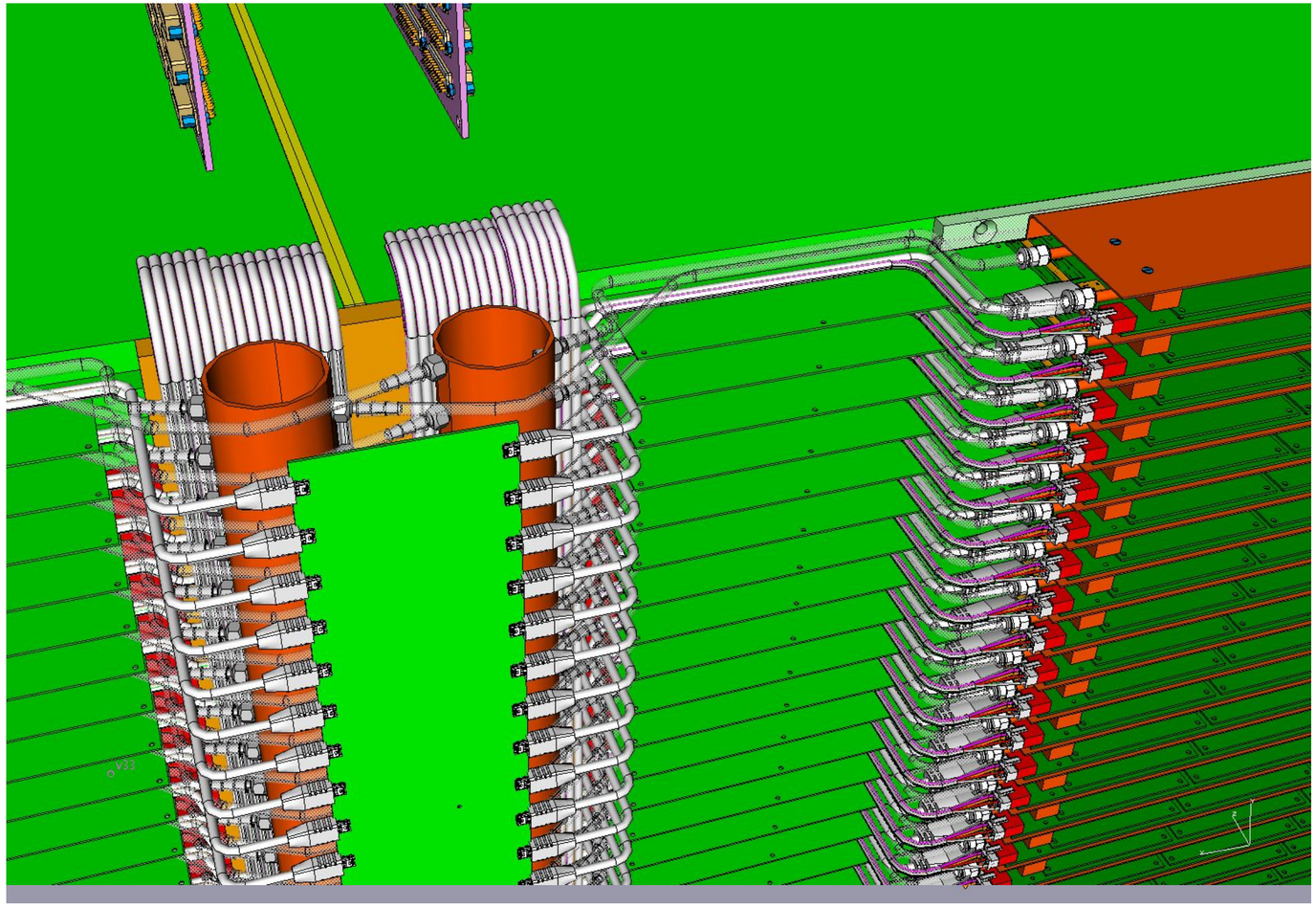

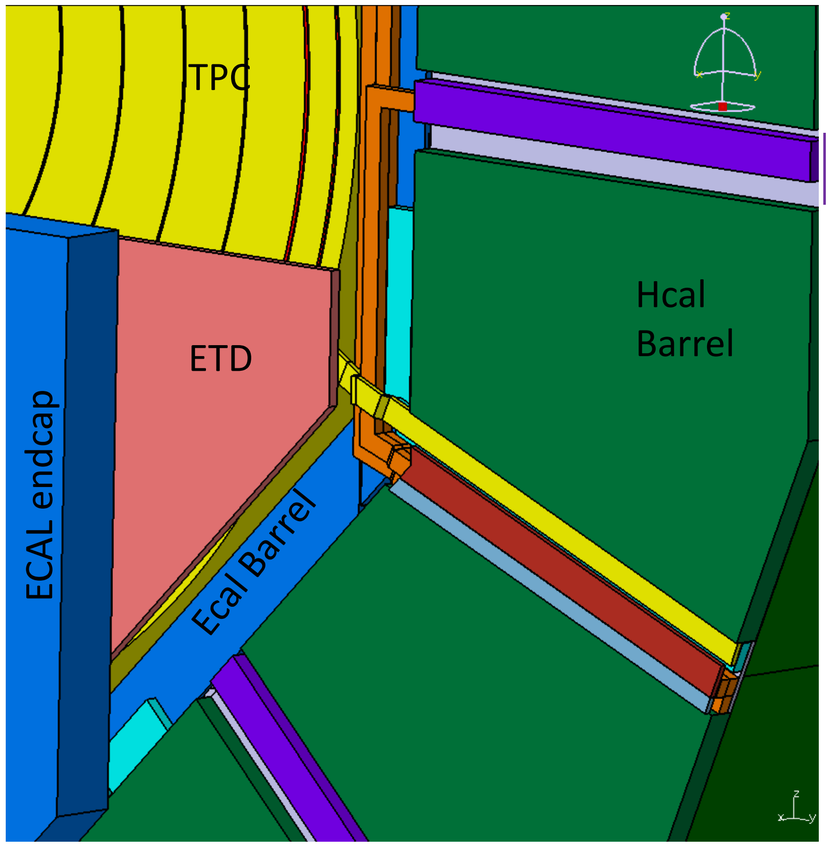

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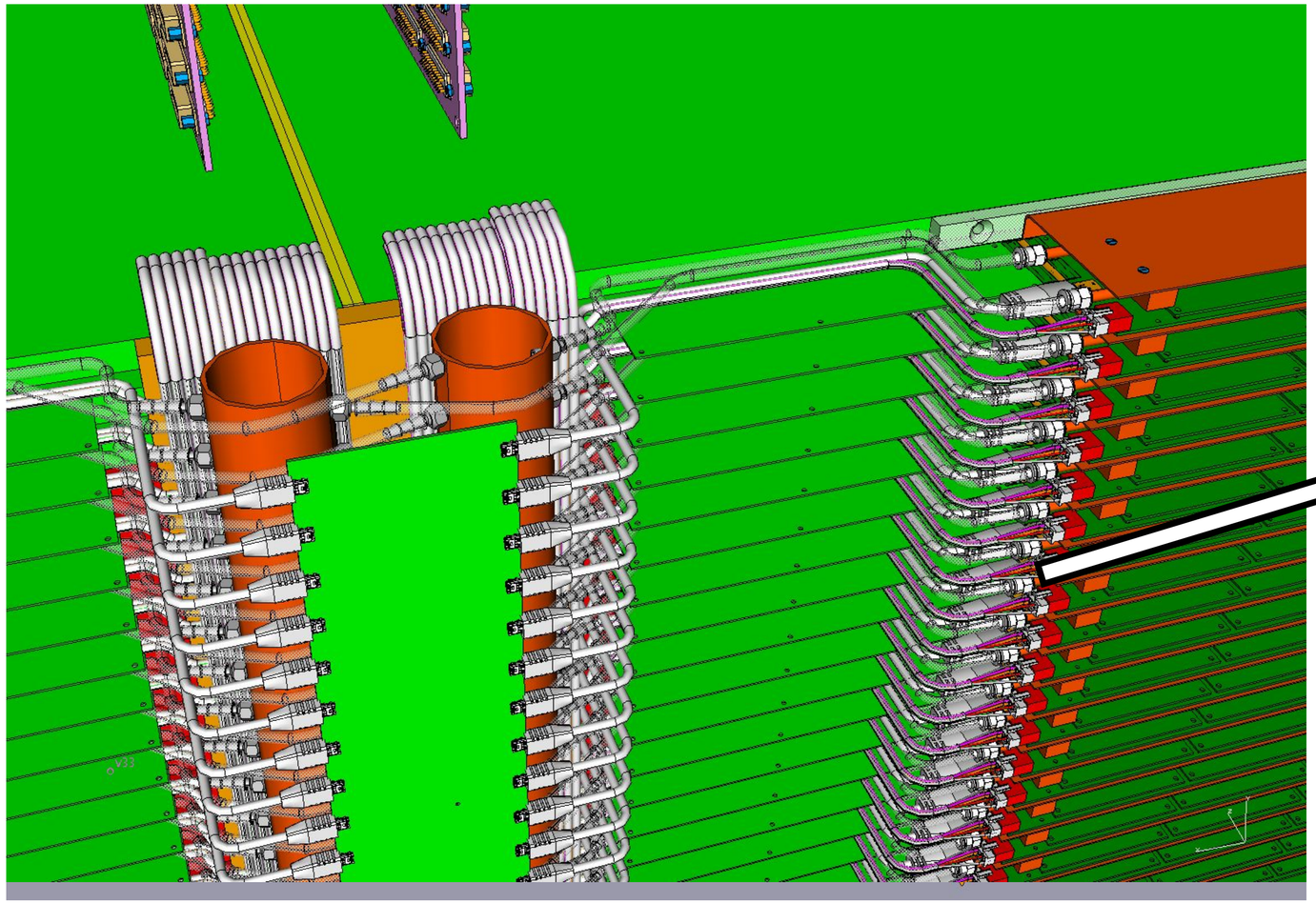
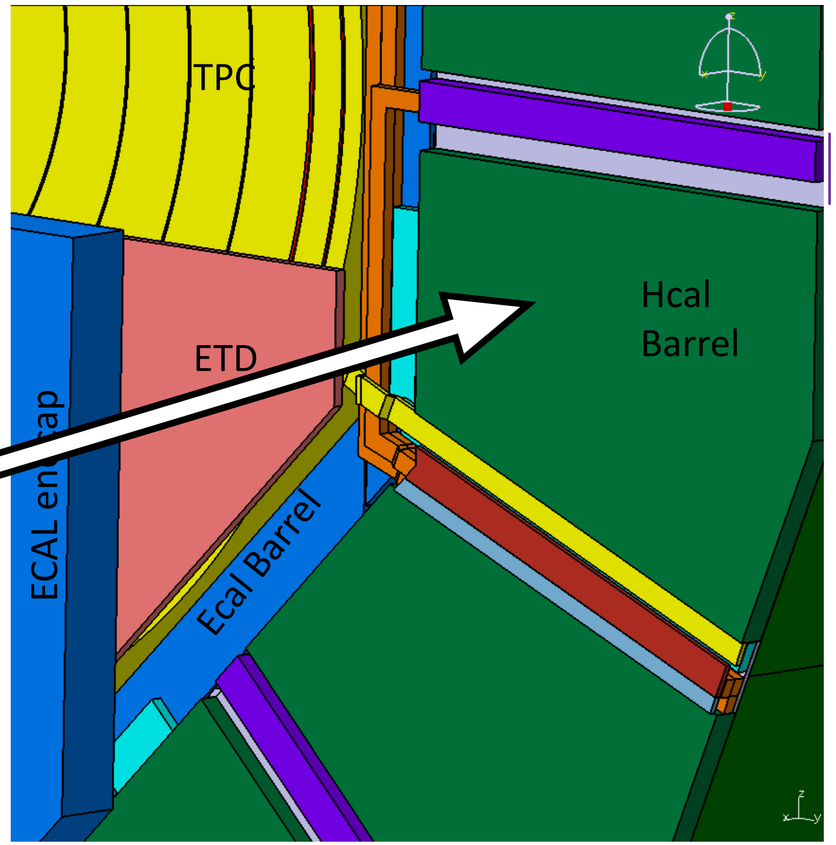




Cables and Services Outlook

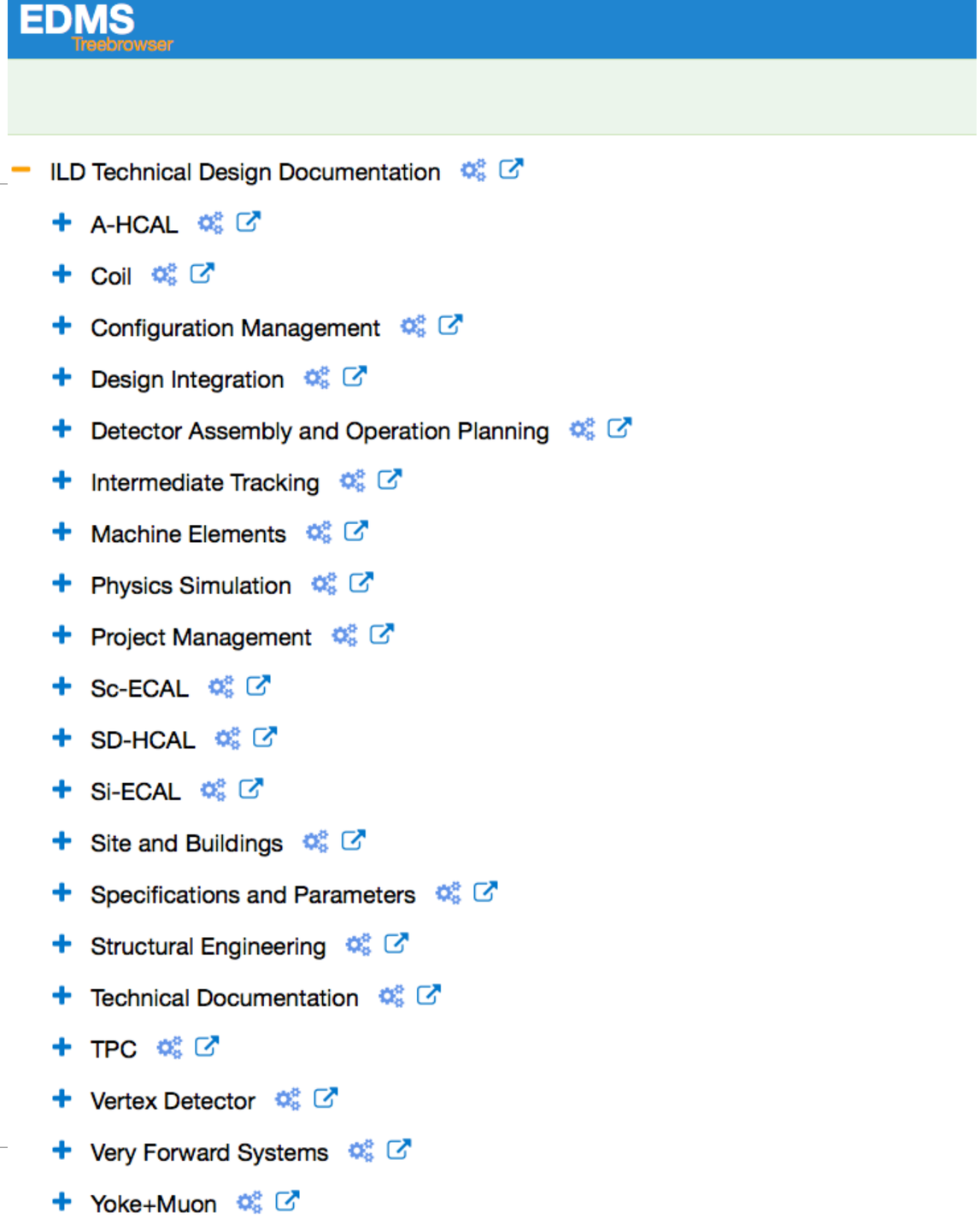
- We will have a current idea about the subdetector requirements for cables and other services from the Interface Control Documents soon
- Setup a small working group on services to
  - Check existing ILD model for cables and services
  - Update requirements
  - Adapt global cable paths and shared spaces for both, large and small ILD
  - Work on open questions:
    - where are the patch panels?
    - other infrastructure, e.g. DC/DC converters?
    - do cable require cooling?
    - Where will the external infrastructure go (electronics, gas systems, etc.)
    - …

ILD Technical Documentation

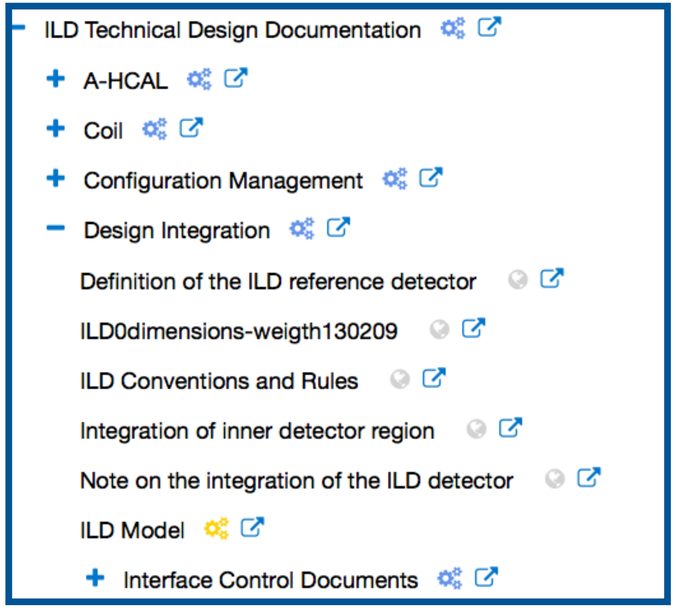
Interface to EDMS

- Everyone can use EDMS now!
- Go to: edmsdirect.desy.de -> „ILD TDR“
  - linked from ILD Confluence
- Access ILD Work Breakdown Structure Tree
- Just view and/or download all public ILD documents in WBS
- Some documents are restricted, need EDMS account to access those

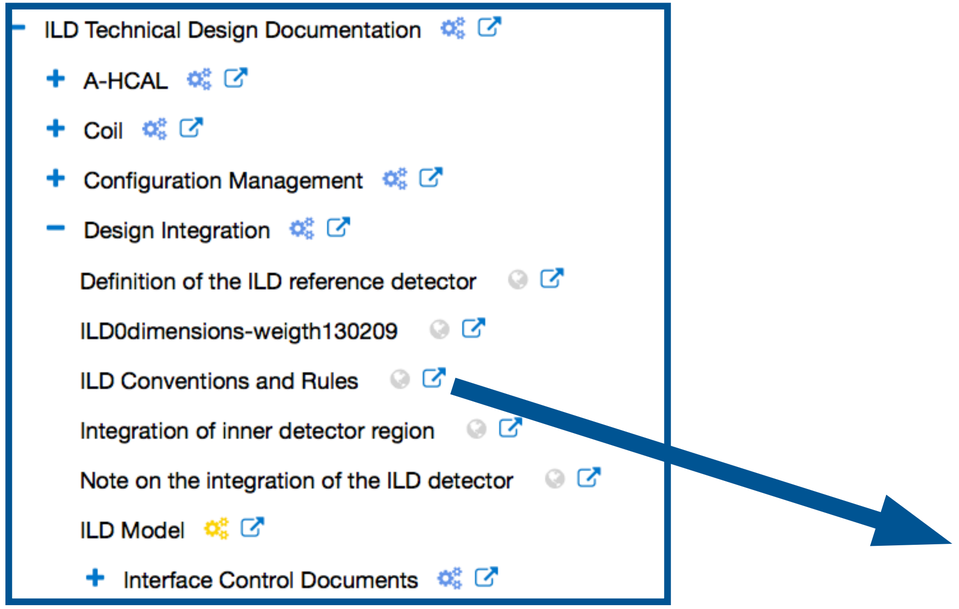
- This can be made available for other groups as well - SiD, Machine?



Example


ILD Technical Design Documentation
A-HCAL
Coil
Configuration Management
Design Integration
Definition of the ILD reference detector
ILD0dimensions-weigth130209
ILD Conventions and Rules
Integration of inner detector region
Note on the integration of the ILD detector
ILD Model
Interface Control Documents

Example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Example

- ILD Technical Design Documentation
  - + A-HCAL
  - + Coil
  - + Configuration Management
  - − Design Integration
    - Definition of the ILD reference detector
    - ILD0dimensions-weigth130209
    - ILD Conventions and Rules
    - Integration of inner detector region
    - Note on the integration of the ILD detector
    - ILD Model
    - + Interface Control Documents

EDMS DIRECT

Info

Name : ILD Conventions and Rules

EDMS ID : D00000001156315,D,1,2

Item Type : ILC Document

Status : Released

Description : ILD Conventions and Rules

Project Name : ILD_Integration

Files

PDF (stamped)

PDF

JPEG

Relations

No relations found

Seite: 1 von 11 — Automatischer Zoom

ilc international linear collider	**ILD conventions and rules Document**	**Ref. :** ????? **Ed. :** 0 **Rev. :** 3 **Date:** 24/04/16 **Page :** 1/11

ILD conventions and rules

ILD

Prepared by	*Signature*	Accepted by	*Signature*
Roman Pöschl, Karsten Büßer, Toshiaki Tauchi		Claude Vallée	

Approved by	*Function*	*Date*	*Signature*
Ties Behnke			

Summary	
Annexes	

Document Change Record

Edition	Revision	Date	Modified pages	Observations
0	1	21/10/16	all	Creation
0	3	20/12/17	all	

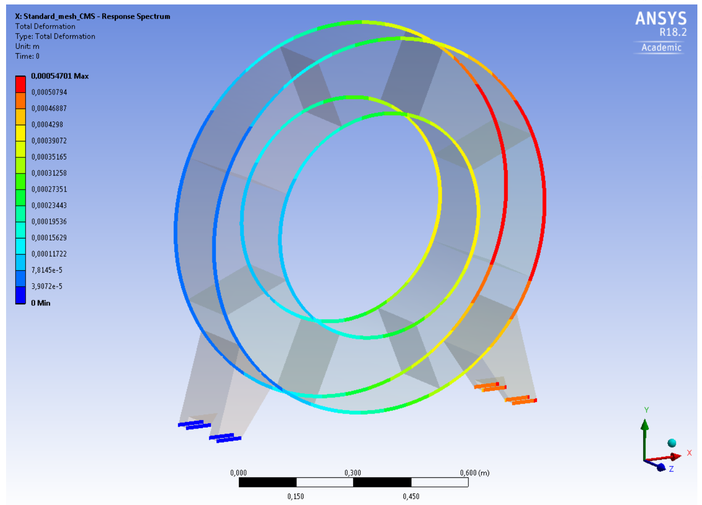
- Dat.: 22. Dec 2017

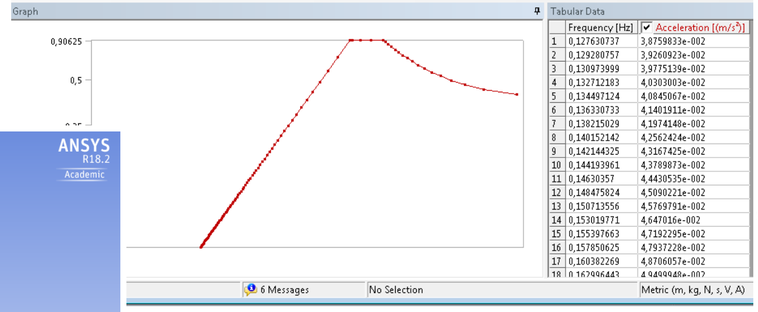
EDMS

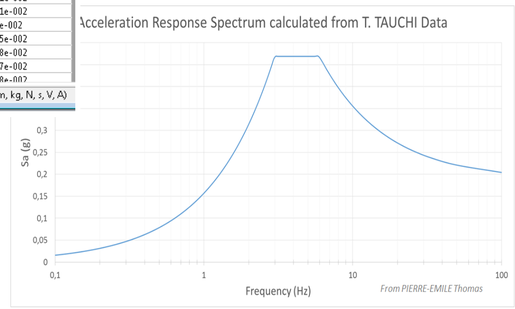
Impact of Earthquakes

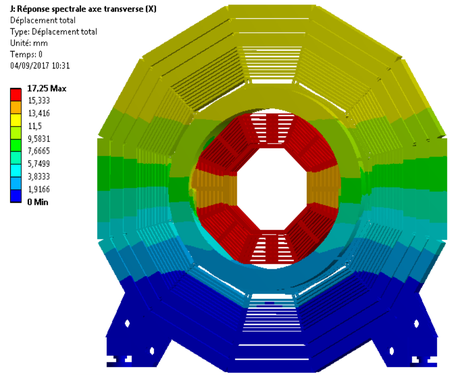
Seismic Simulations

- Two subdetector groups are now looking into impact of seismic events on ILD (see talk be Felix)









Maximum displacement:
17,3 mm
Smallest gap between ECAL rings along z:
0,98 mm
Smallest gap between ECAL module along phi: **1,89mm**

- Plan: Create repository with real earthquake spectra for common use (T. Tauchi)
  - Data from Japanese seismic networks available (NIED), analytic description by international standards

Summary

Summary

- Work on an updated technical/engineering model of ILD has been re-started
- Interface Control Documents of the sub-detectors are coming together
  - important input for engineering model w.r.t mechanics, cables, etc.
- ILD Conventions and Rules are being worked out
- This will bring updated information about the requirements on the IR and general infrastructure
- Plan to create a common repository with earthquake data for seismic studies
- Keep an eye on ILD integration with the machine and the local infrastructure

- ILD Technical Design Documentation is online:
  - edmsdirect.desy.de -> ILD TDR
  - it will evolve
  - check it out!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Welcome to the ILD meeting 2018
in Ichinoseki, IWATE
20-22 February 2018 Ichinoseki, Japan/Ichinoseki Cultural Center
Sponsored by the Iwate Prefecture ILC Promotion Council
岩手県国際リニアコライダー推進協議会

Outlook


18 A 窓側 WINDOW B 中央 CENTER C 通路 AISLE

ILD - Moving full steam ahead!