ILD: Status and Plans

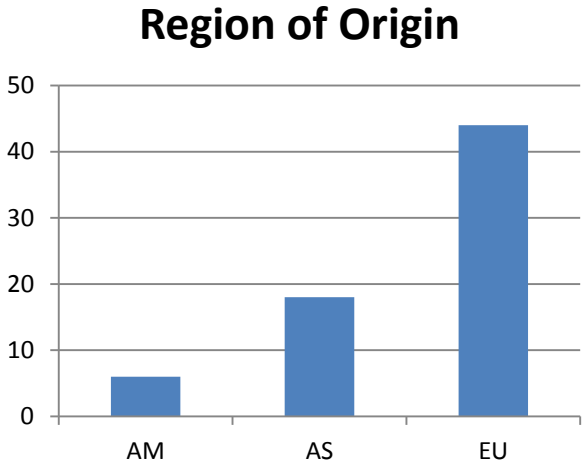
Ties Behnke, DESY, 24.3.2016

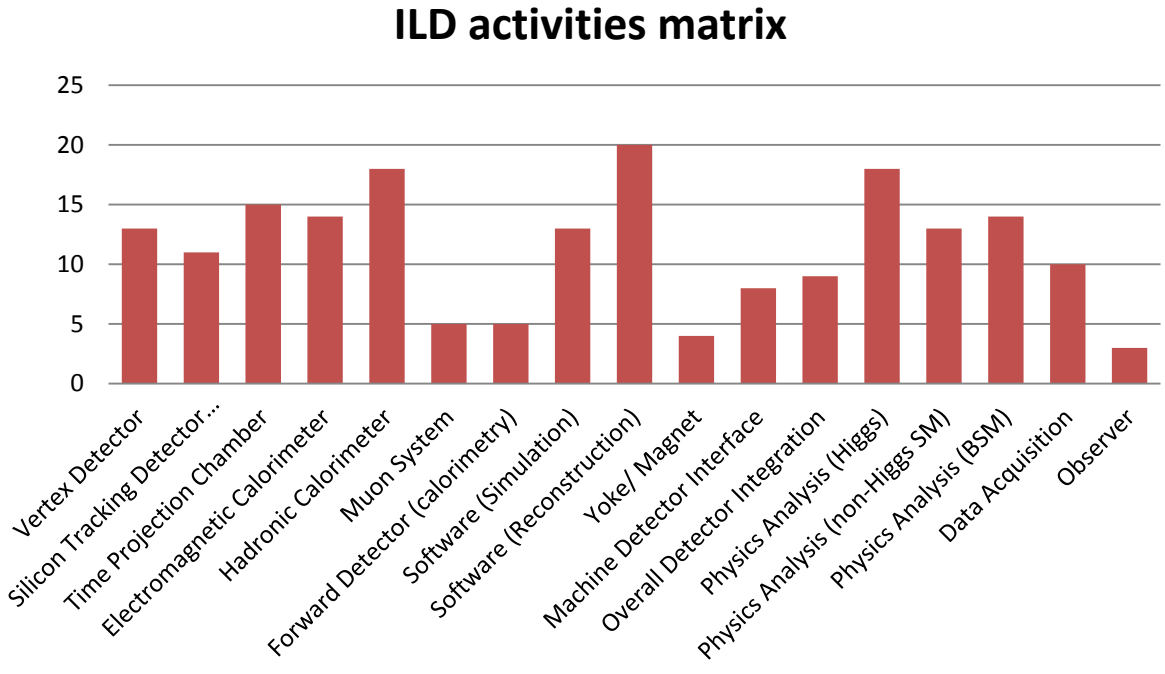
French Linear Collider Days

ILD: The Group

ILD:

Currently 68 groups signed up






Greenland
Iceland
Finland
Sweden
Norway
Russia
Canada
United States
Mexico
North Atlantic Ocean
North Pacific Ocean
Ukraine
Kazakhstan
Mongolia
China
Italy
Turkey
Iraq
Iran
Afghanistan
Pakistan
India
Thailand
Algeria
Libya
Egypt
Saudi Arabia
Mali
Republic of Niger
Sudan
Nigeria
Ethiopia
Kenya
DR Congo
Tanzania
Angola
Namibia
Botswana
South Africa
Madagascar
Indonesia
Papua New Guinea
Australia
New Zealand
Indian Ocean
South Pacific Ocean
South Atlantic Ocean
Venezuela
Colombia
Peru
Brazil
Bolivia
Chile
Argentina

ILD System Coverage

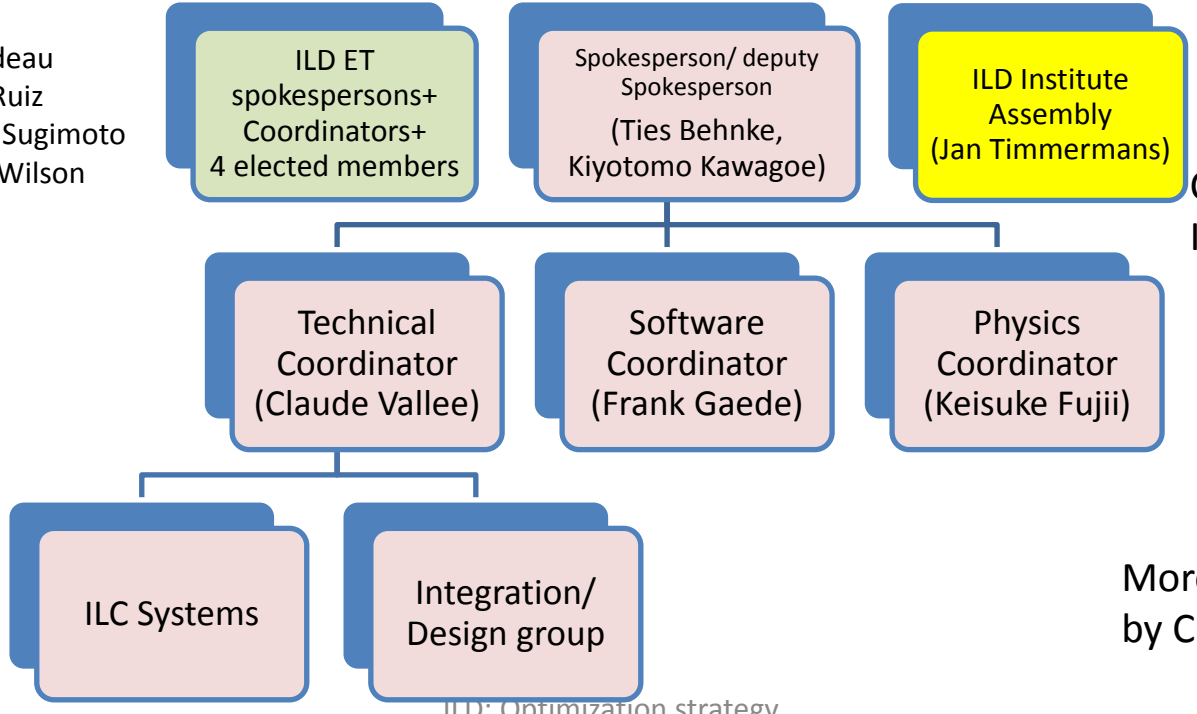
Interest does not equal commitment (only major player shown):

Vertex:	France/ Germany/ Japan
Silicon tracking	
Central:	?
Forward:	Spain
TPC	France/ Germany/ Netherlands/ Japan/ Canada/ China/ (US)
ECAL	France/ Japan
HCAL	France/ Germany/ Czech/ Russia/ Japan/ (US)
FCAL	Germany/ Poland/ Czech/ Israel/ Japan
Muon	Russia/ (US)/ (China)
Core Software:	Germany/ Japan/ UK
MDI/ Integration:	France/ Germany/ Japan
Trigger/ DAQ	France/ UK/ Germany

ILD Organisation

Move ILD towards a real collaboration

Henri Videau
Alberto Ruiz
Yasuhiro Sugimoto
Graham Wilson



Current Status of ILD organisation

More details: see talk by Claude

Goals/ Strategies

Make the scientific case for the ILC

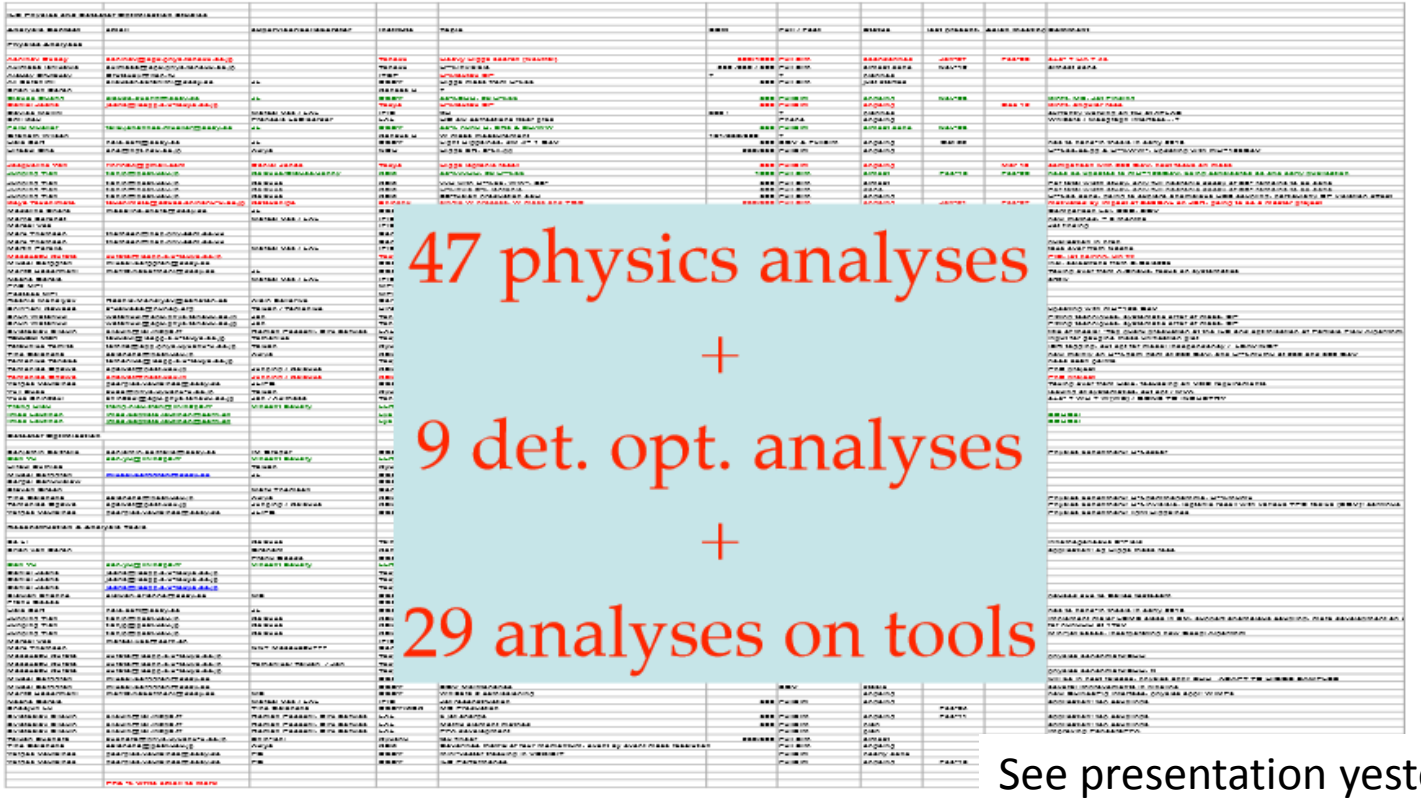
Move forward as one community
Join forces with SiD
Integrate Theory and experiment
Interact with the Japanese review process

Adapt the ILD design for the Japanese site

Optimize ILD

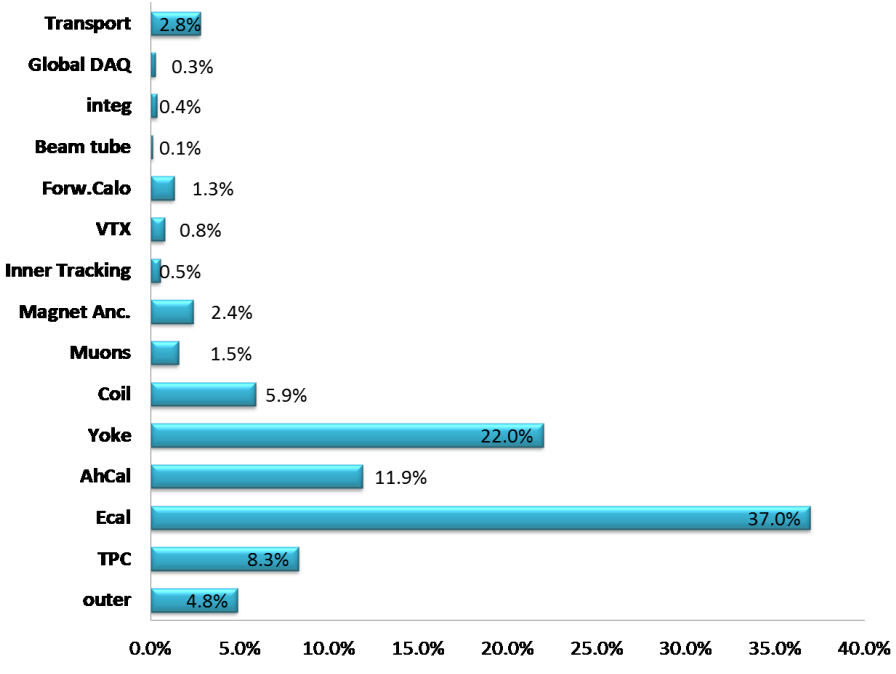
Integrate ILD

Making the case: ILD analyses



See presentation yesterday by Keisuke

The ILD Concept



Excellent overall performance

Large Detector, optimized for science return

- Technologically advances
- Focussed on the physics we want to do

- Cost has been criticized: can we justify this?

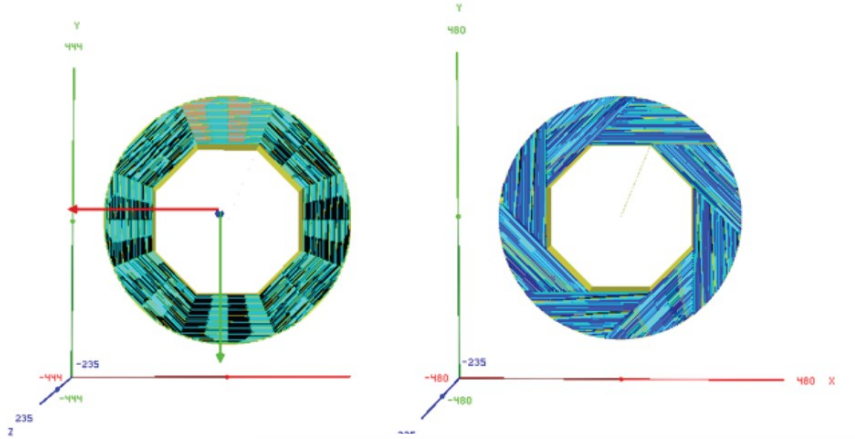
- Careful study needed of cost vs. performance
- Strong focus on making the connection between the detector design and the physics performance explicit.

Total cost about 400 Mio ILCU (2012 costs)

ILD Options

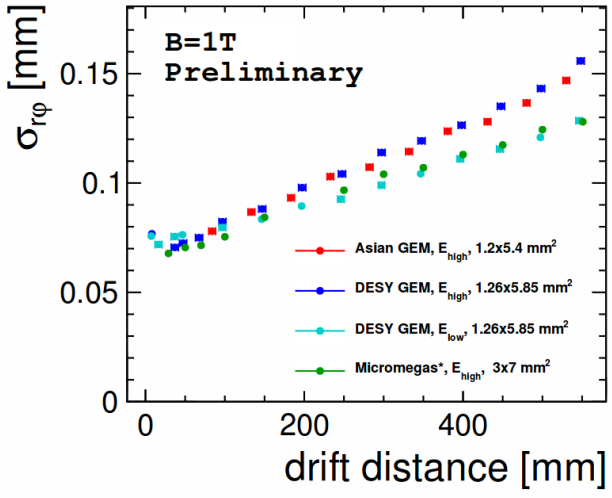
ILD maintains a number of
different options for subdetectors.

This is a strength, not a weakness!

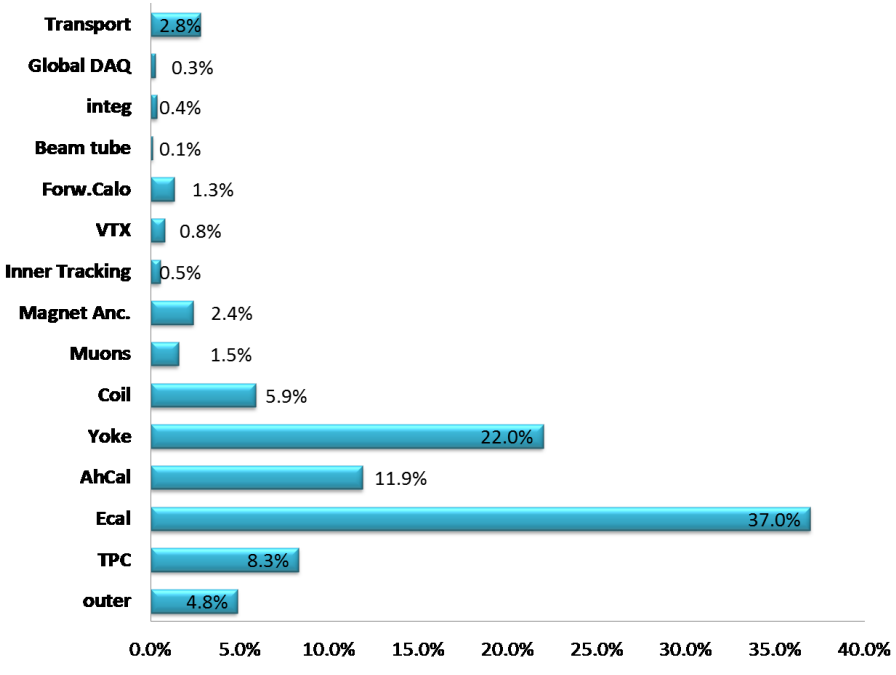


Strategy for moving forward:

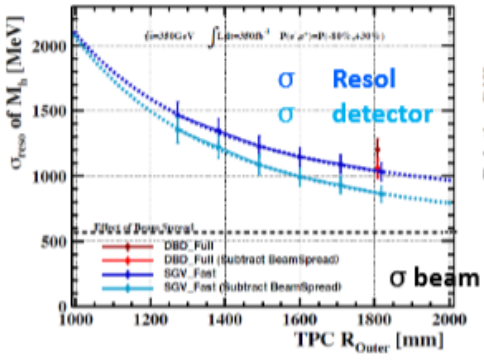
- We do not intend to make a technology choice soon.
- We intend to make technologies comparable within ILD
  - Agree on benchmarks
  - Agree on how to measure performance
  - Agree on list of open issues
  - Maintain an open and constructive climate of interchange and discussion

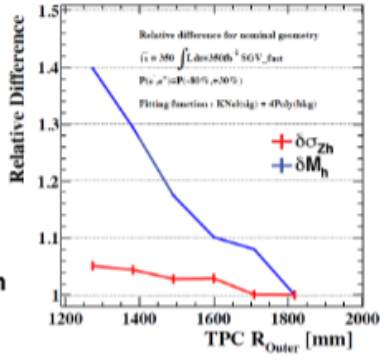


ILD Optimization



350 GeV L=350fb^{-1}





T. Owaga

Degradation **(R:1.8 m ➔ 1.4m)**

σ_resolution : **~25%**
σzh precision: **> 5%**
Mh precision: **~30%**

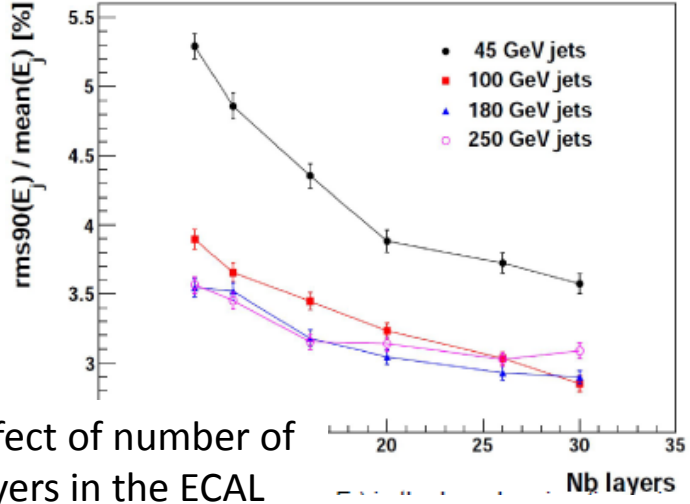
69% more data needed to recover nominal precision

Degradation **(R:1.8 m ➔ 1.6m)** Mh precission **~10%**

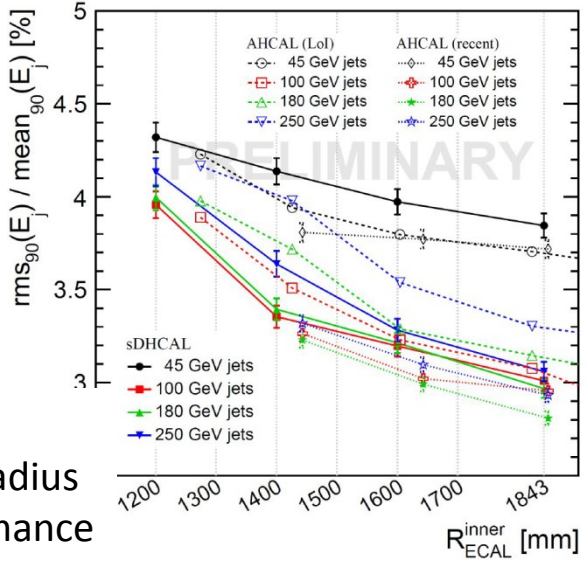
ILD Optimization

Lots of detailed progress over the last year on optimization issues.

- ECAL optimization (focus on smaller ILD size)
- HCAL optimization (detailed study on cracks, dead material, cell size optimzation)
- Tracking (TPC overall performance, low momentum tracking, etc.)

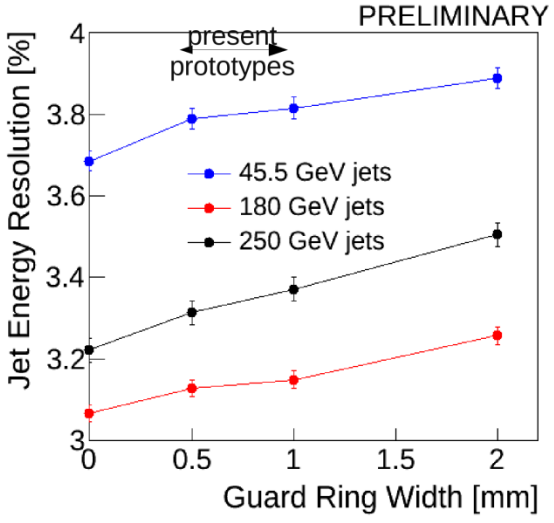


Effect of number of layers in the ECAL



Effect of detector radius on performance

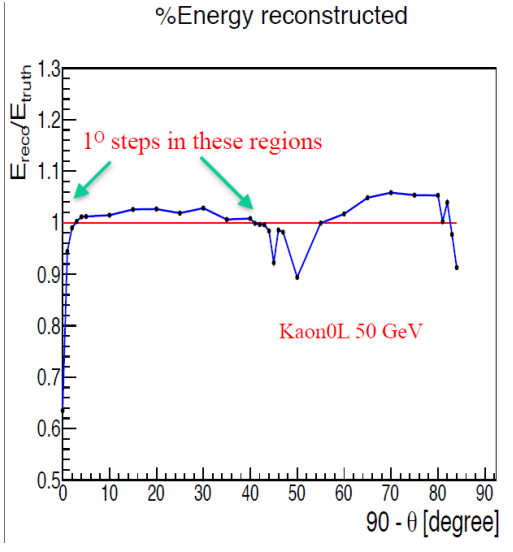
Level of Detail



Impact of the guard ring thickness on the Si-ECAL performance

Significant invest into

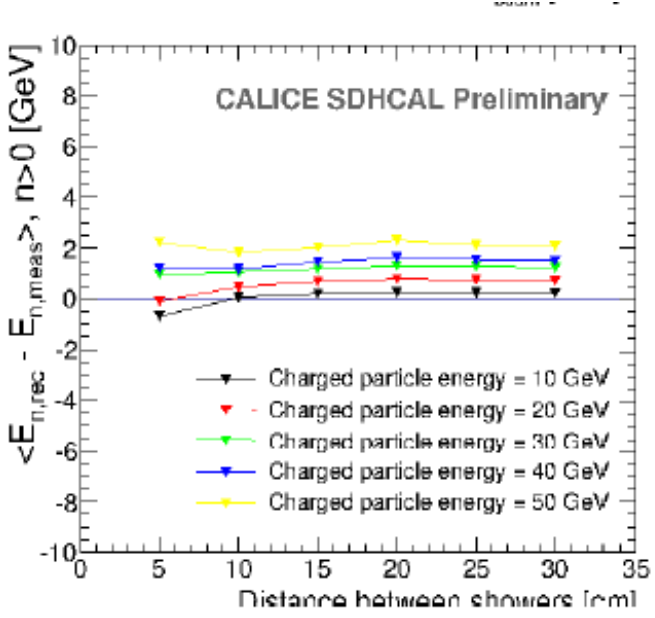
- Detailed description
- Understanding of tools
- Checking of simulations

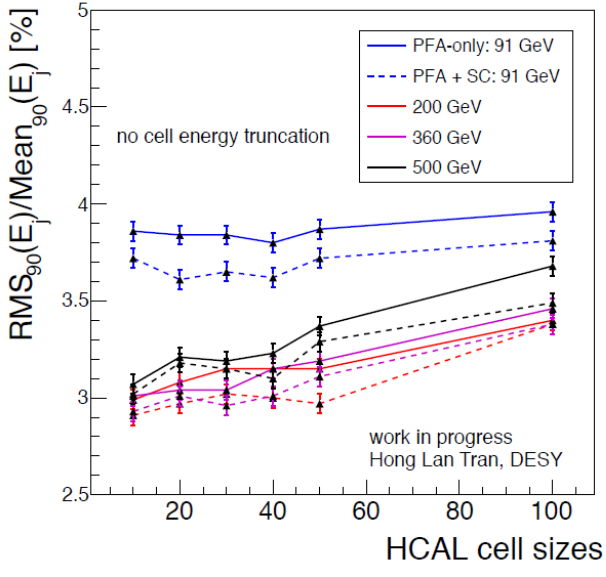


Effects of cracks in the AHCAL

Understanding Systems

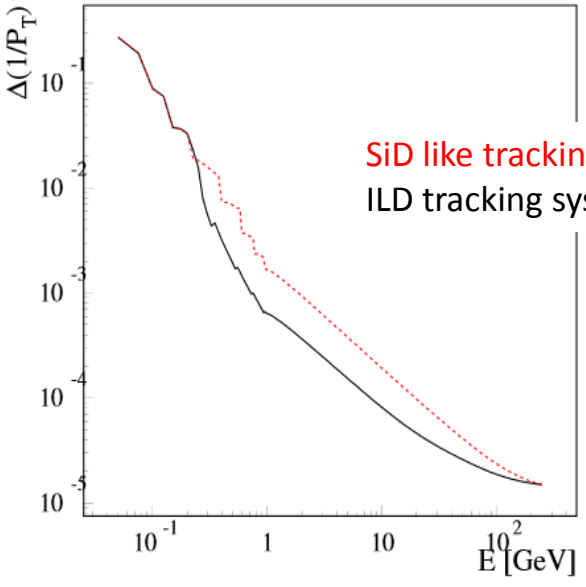
Much improved understanding of the scaling with detector parameters:
AHCAL and SDHCAL





Understanding Performance

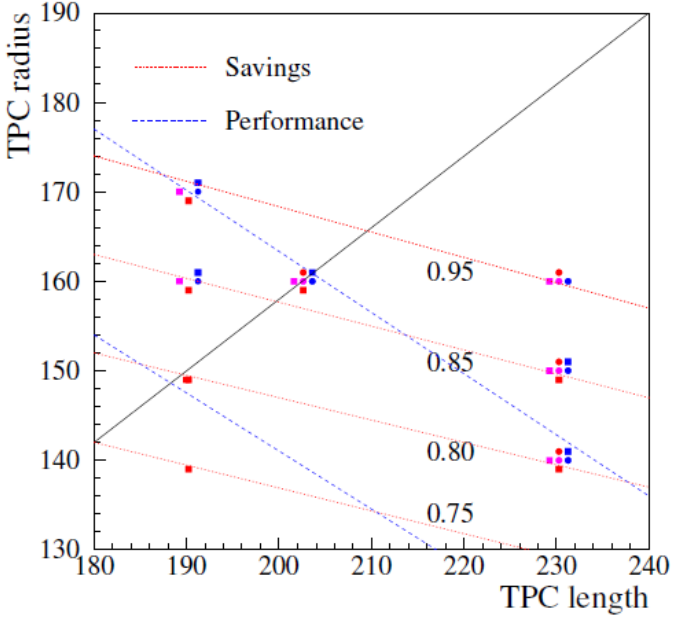
Why have we chosen our technologies?



SiD like tracking system in ILD

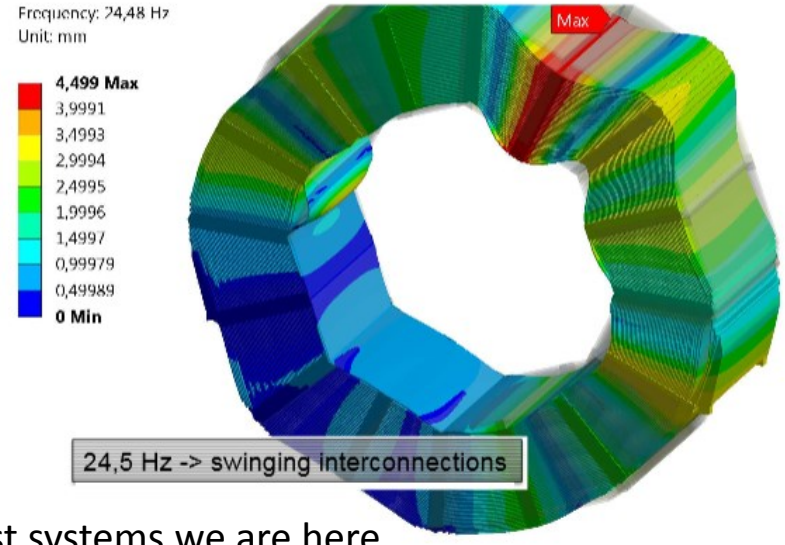
ILD tracking system

Do we understand our results?



Technologies

Study of vibrations of HCAL system (relevant for seismic stability)



- Idea
- First prototypes
- Proof of concept
- System Test
- Engineering Design
- Fully engineered and costed design
- Construction

For most systems we are here

For large-scale serious engineering we lack resources!

Software

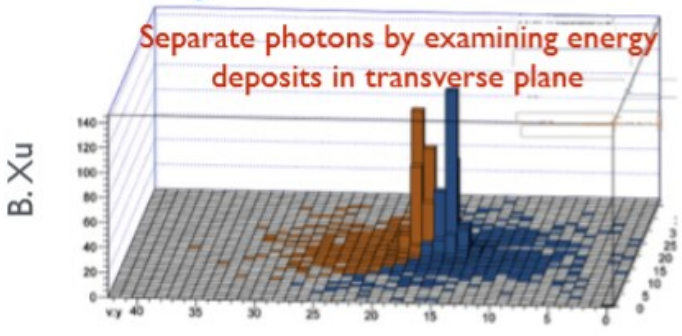
New “DD” type ILD software is getting there

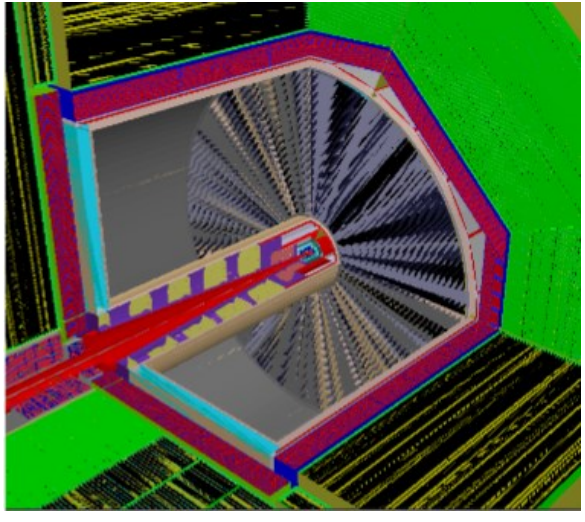
- Enormous progress
- We do have a new system – see this workshop
- Now: focus has to shift to validation in the sub-detectors

Photon “separation”
in the latest PANDORA

Alternative Ansatz;
Arbor

Very nice to see
broad “non-ILD”
applications





Goals/ Plans

Proposal (to be discussed):

Redefine and document our baseline within O(2) years

- Based on significant studies with different models (production schedule?)
- Based on a close loop with the physics working group

Write a light-weight document (LOI V2) to describe and define the new baseline

This would enable us to move quickly when (in 2018?) things are moving on the political arena.

Tokyo ILD meeting April 2015

How do we proceed: Proposal

Define N ILD detector models

- DBD as a comparison detector (R=180cm)
- Intermediate scale (R=160 cm) ?
- Extreme case (R=140cm) ?

Other parameters (length, etc) need a detailed review to make sure we have not missed any major point.

To be discussed

Implement these detectors in DD4HEP and Ddsim
Validate

Produce sufficient events to study the benchmark reactions

Need to be clever, since we might not need to produce all backgrounds for all models, needs study

Time Scale

Now: from now until summer define the number and parameters of the new models

by studying things like tau, photon reconstruction, tracking, PFLOW, etc.

Edges? Endcap? etc etc.: many detailed studies needed

and common sense

Summer: finalise the definition of the models, finalise the models, start validation

Fall: validation finished

Clearly we are delayed compared to the plans in spring.
But we have much better confidence now in our tools.

Discuss update to the schedule today.

Summary

ILD is moving forward, in spite of problems with the funding and overall delays in the ILC programm

ILD is assembling the tools needed for a serious optimization

There is great progress in understanding ILD

Challenges to deal with:

- R&D funding in Japan
- Maintain a healthy effort in Europe
- Find more collaborators in the US

Summary

ILD is moving forward, in spite of problems with the funding and overall delays in the ILC programm

ILD is assembling the tools needed for a serious optimization

There is great progress in understanding ILD

Challenges to deal with:

- R&D funding in Japan
- Maintain a healthy effort in Europe
- Find more collaborators in the US

Next ILD Meeting:

Santander meeting,
Friday to Sunday, June 3-5, 2016