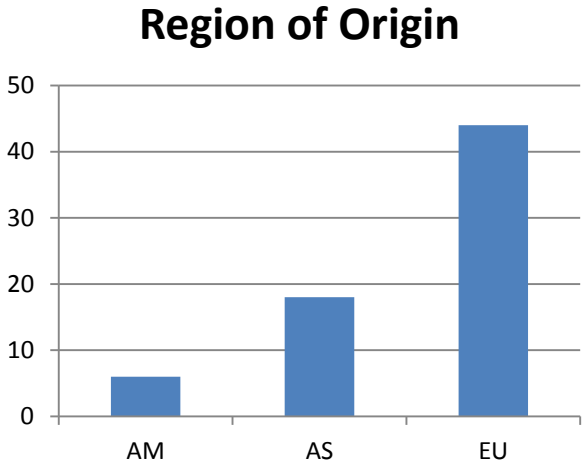
ILD: Status and Plans

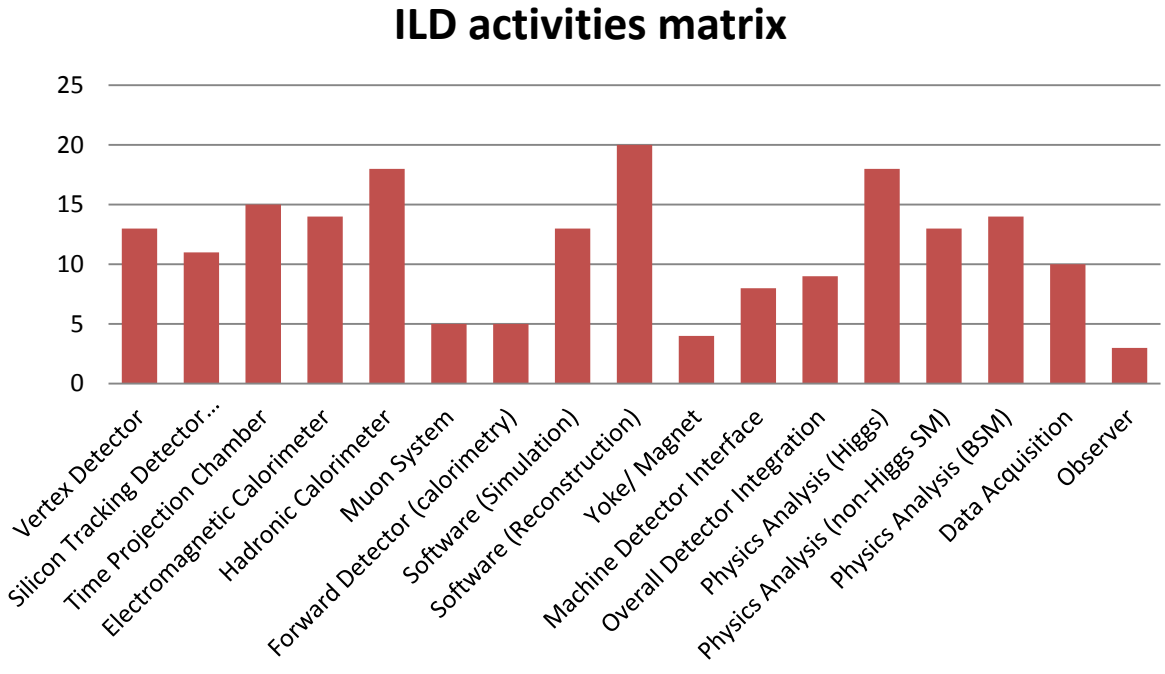
Ties Behnke, DESY, 25.2.2016

ILD: The Group

ILD:

Currently 68 groups signed up



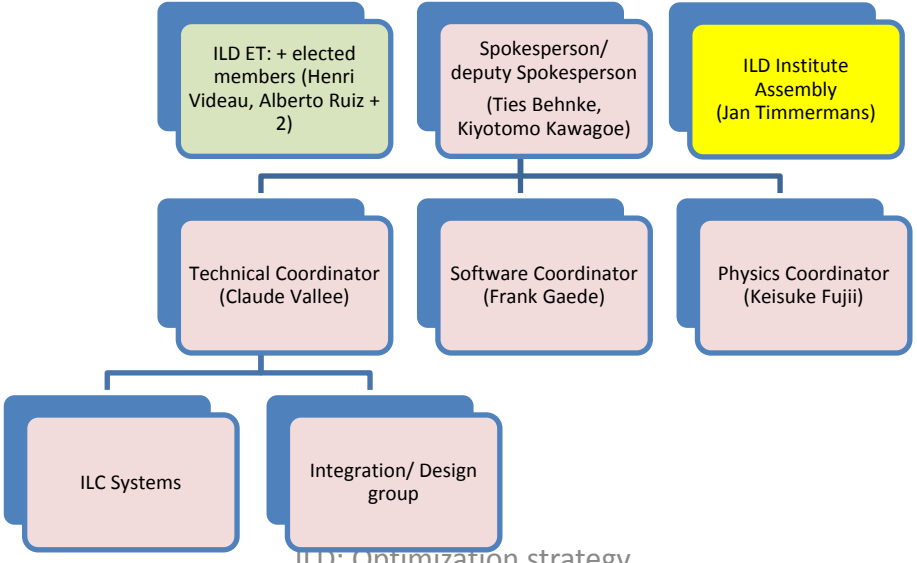



Greenland
Iceland
Finland
Sweden
Norway
Russia
Canada
United States
Mexico
North Atlantic Ocean
North Pacific Ocean
Ukraine
Kazakhstan
Mongolia
China
Italy
Turkey
Iraq
Iran
Afghanistan
Pakistan
India
Thailand
Algeria
Libya
Egypt
Saudi Arabia
Mali
Republic of Niger
Sudan
Nigeria
Ethiopia
Kenya
DR Congo
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 Organisation

Move ILD towards a real collaboration

- Well defined structures and decision lines
- Have organisation prepared to move forward as needed



Current Status of ILD organisation

(2 ET members still to be elected)

Goals/ Strategies

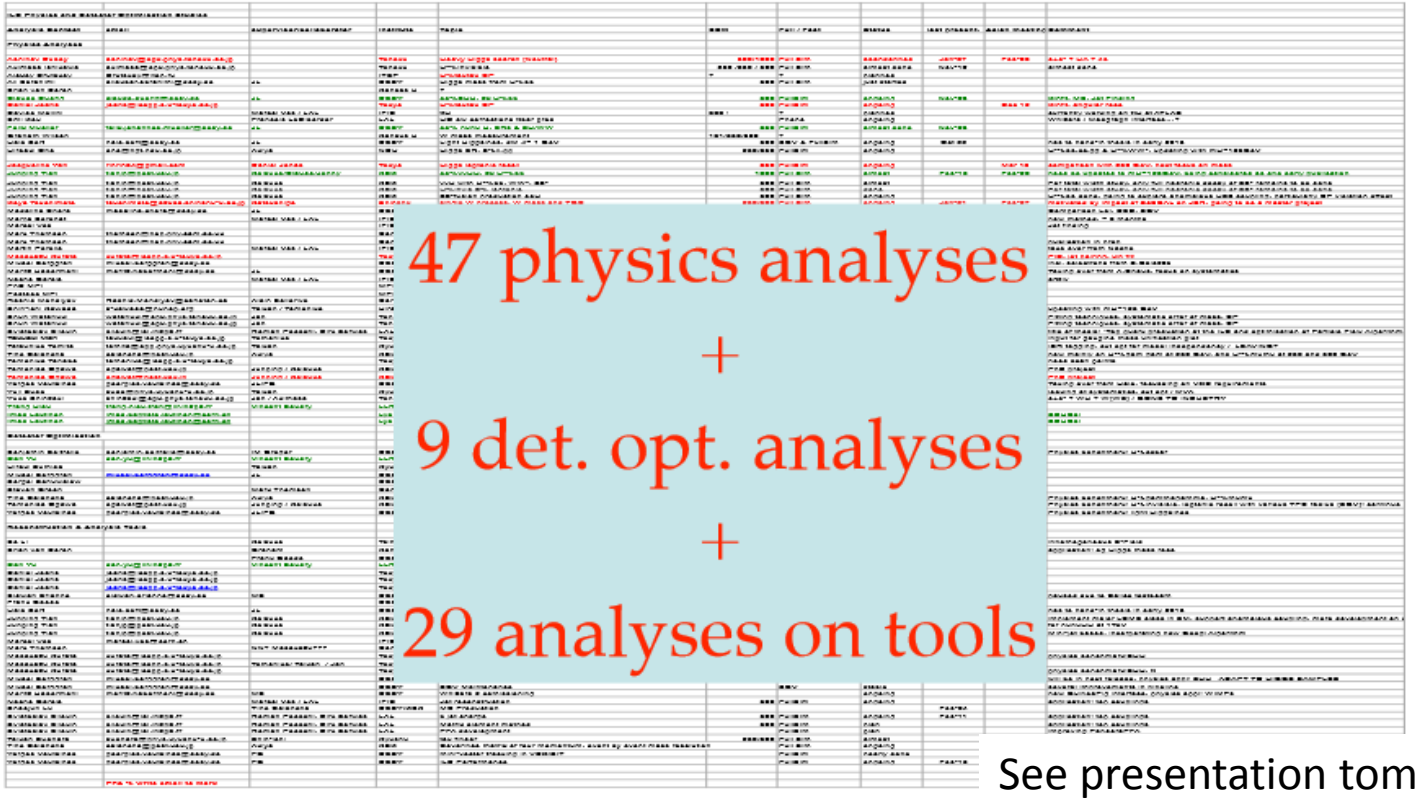
Make the scientific case for the ILC

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

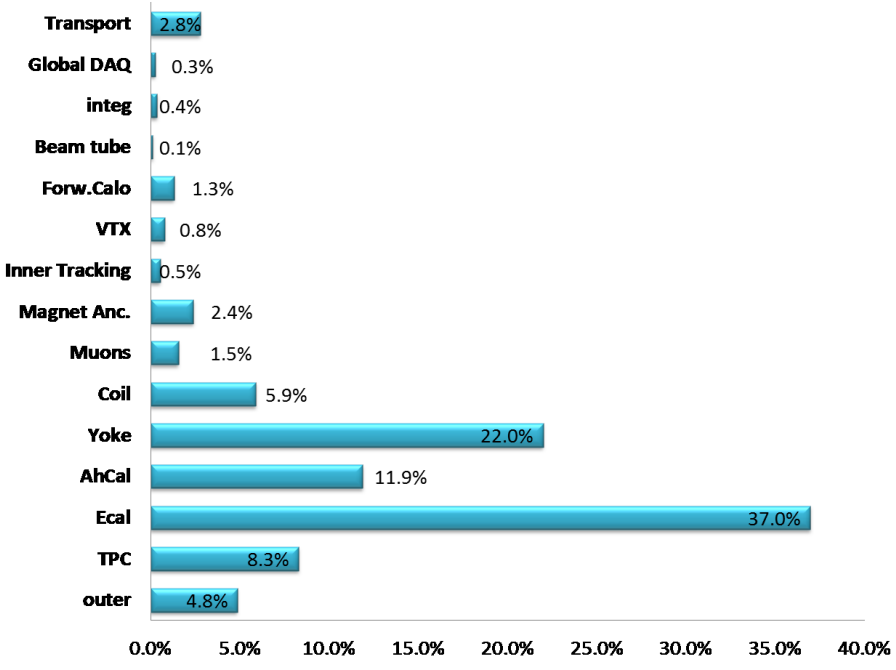
Optimize ILD

Making the case: ILD analyses



See presentation tomorrow by Keisuke

ILD Optimization



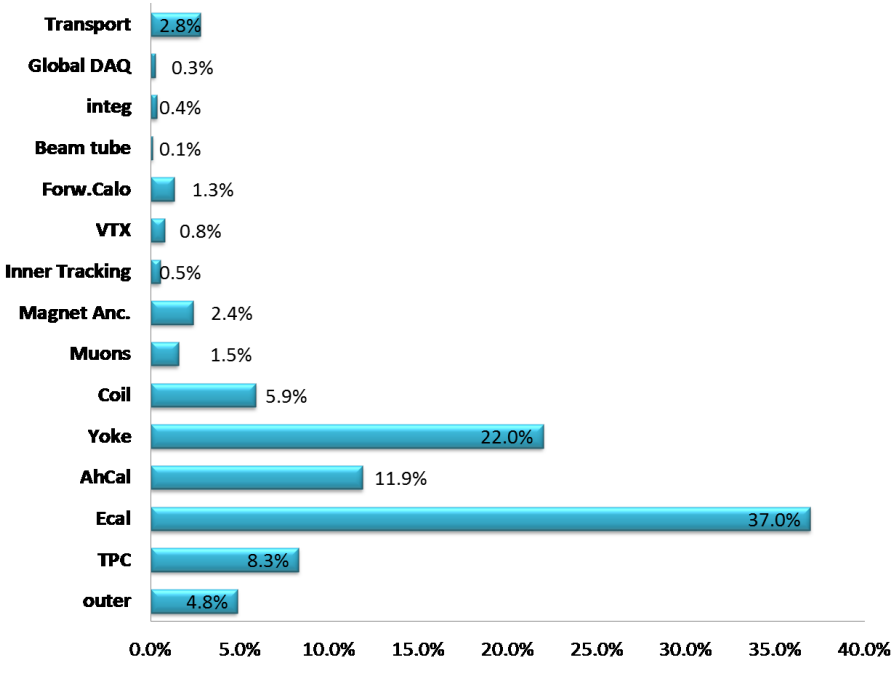
Excellent overall performance

Large detector: relatively large costs.

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

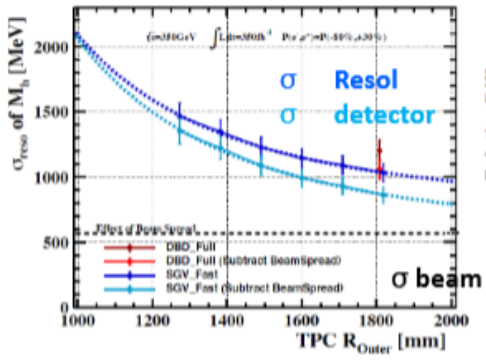
Total cost about 400 Mio ILCU (2012 costs)

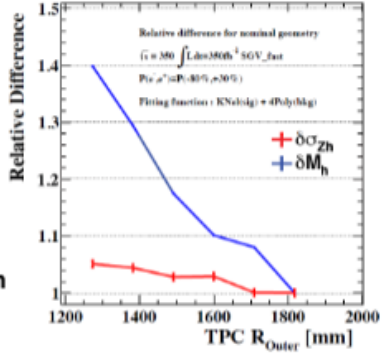
ILD Optimization



Total cost about 400 Mio ILCU (2012 costs)

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

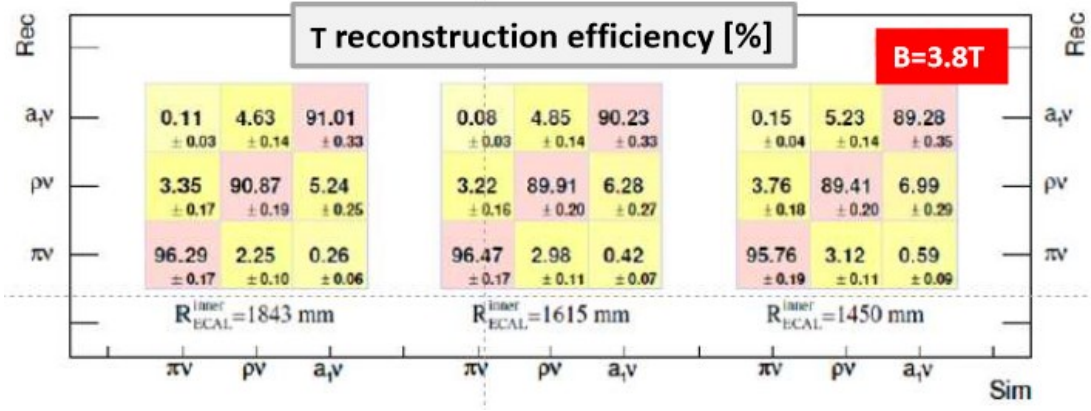
Degradation **(R:1.8 m ➔ 1.6m)** Mh precission **~10%**

ILD Optimization

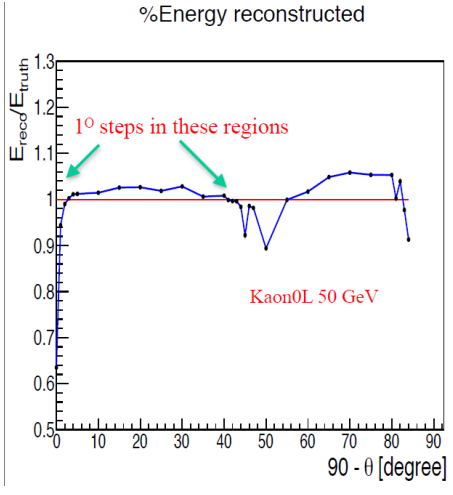
Lots of detailed progress over the last year on optimization issues.

- 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.)

Tau reconstruction in ILD

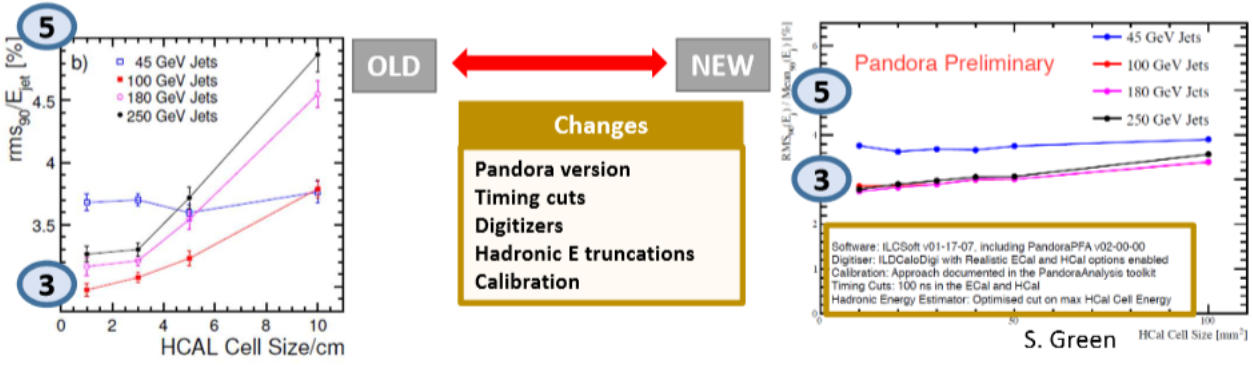


Effects of cracks in the HCAL



Technical issues

Strong dependence on our reconstruction tools:



Dependence of
Jet Energy Resolution
on AHCAL cell size.

Implementation of
proper software compensation
might change the picture
yet again.

ILD invests heavily into tools and their development
We depend critically on the tools and the understanding of these tools
We are seeking closer collaboration with SiD and CLICdp and R&D groups to optimize the resources
Remarkable progress over the past few months: problems mostly understood.

Technical issues

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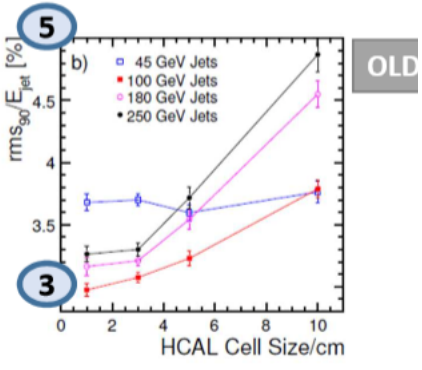

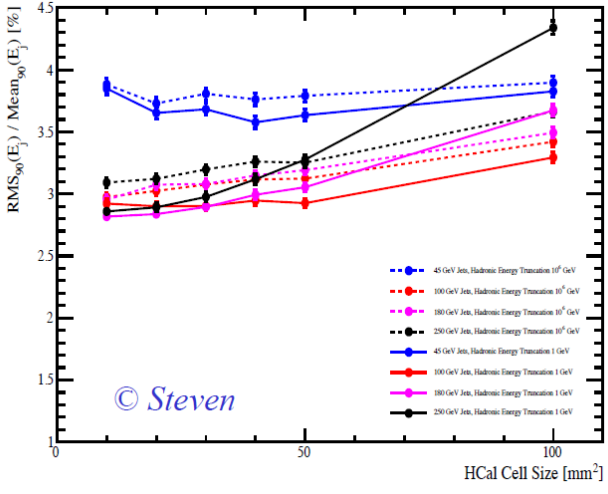

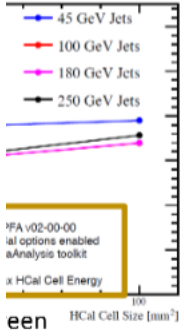

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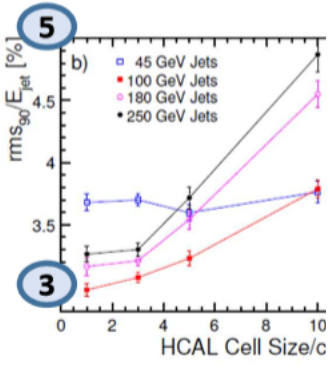
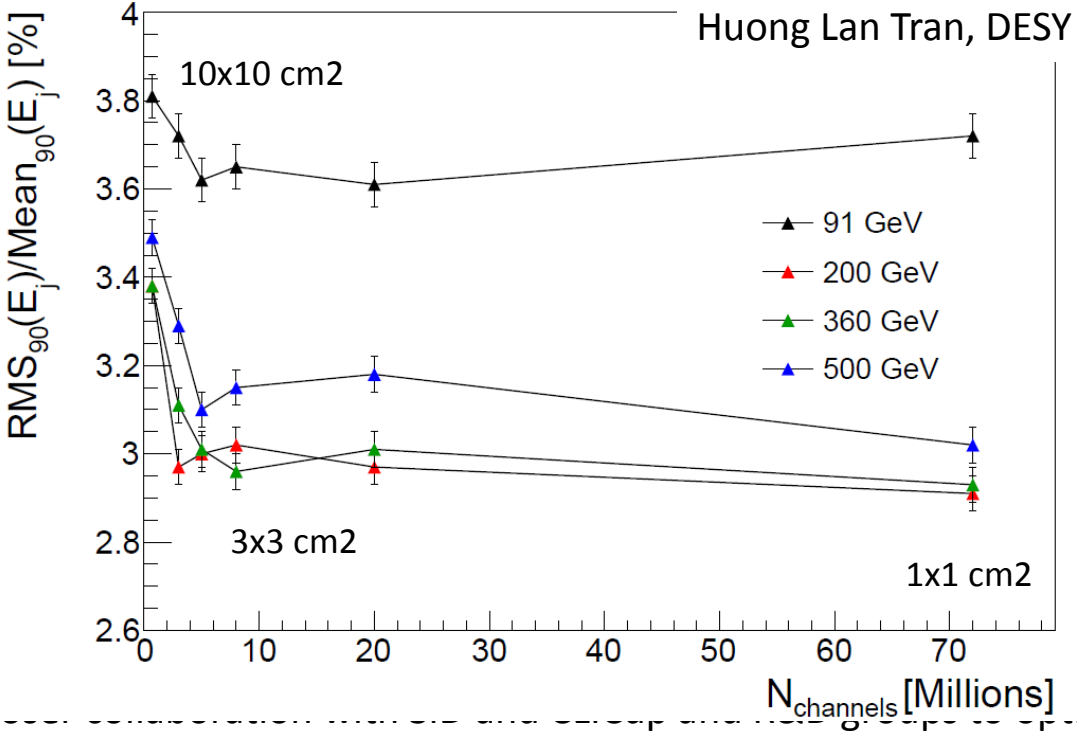


Work in progress
Huong Lan Tran, DESY



endence of
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HCAL cell size.

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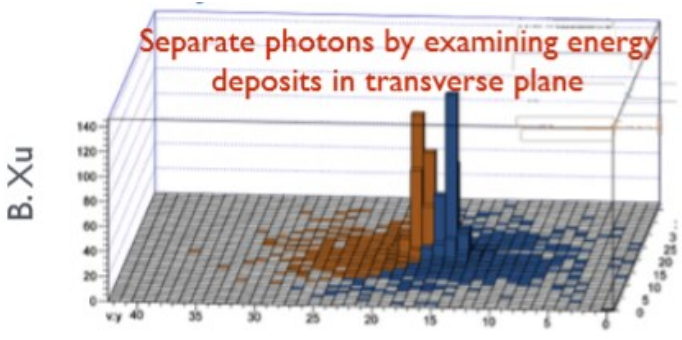
Software

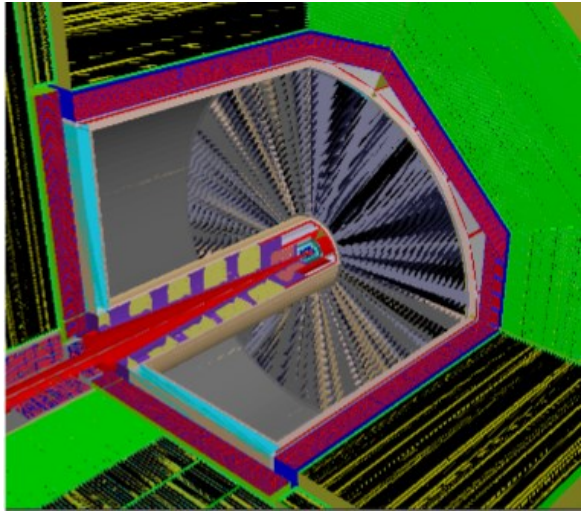
New “DD” type ILD software is getting there

- 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

Very nice to see
broad “non-ILD”
applications





ILD Options

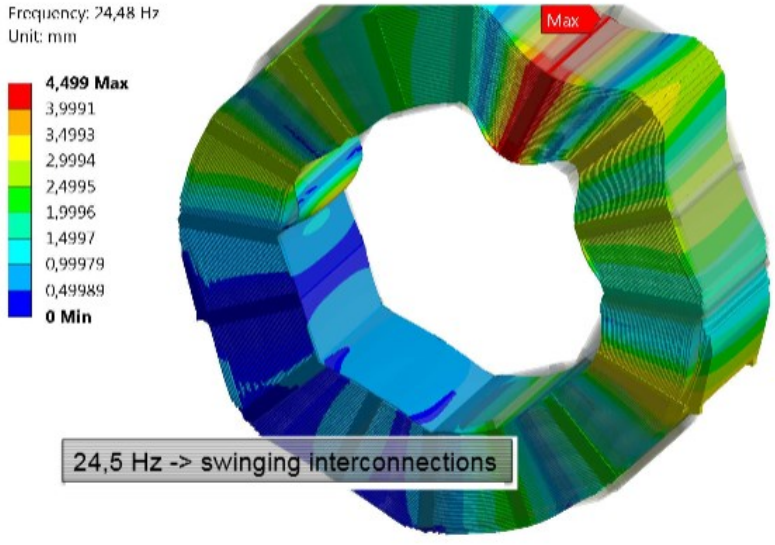
ILD maintains a number of different options for subdetectors.

Strategy for moving towards a technology choice:

- 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

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

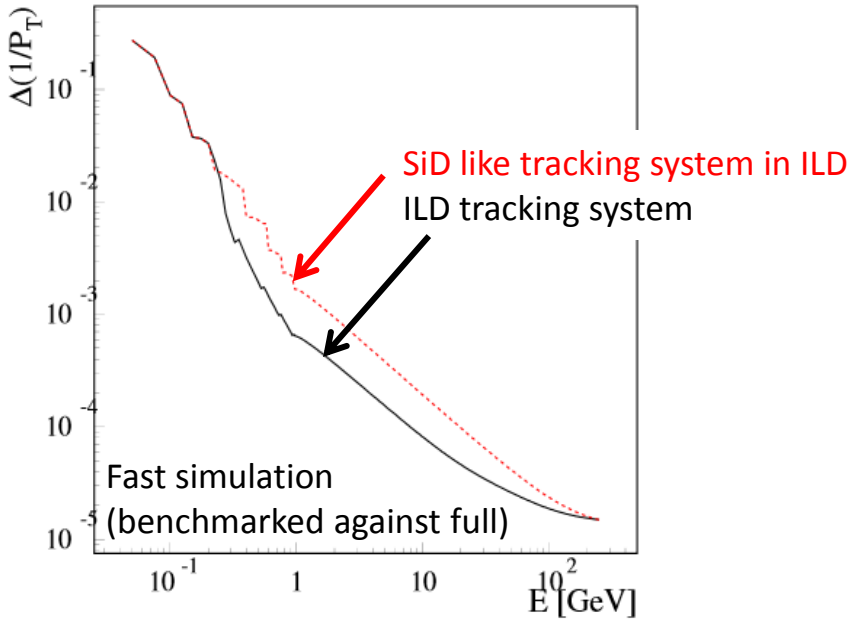
For most systems we are here

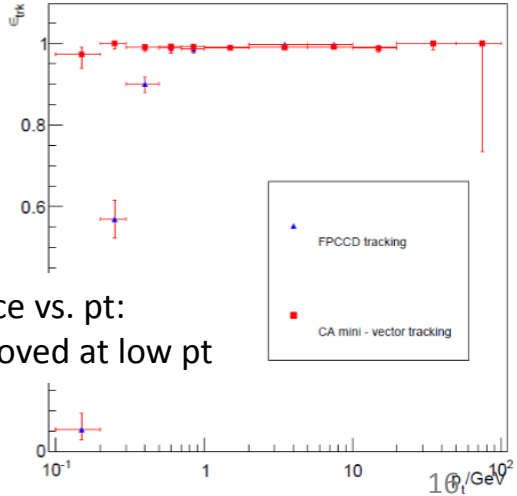
For large-scale serious engineering we lack resources!

Changing ILD?

We start to understand in some detail the performance issues connected with the ILD design.

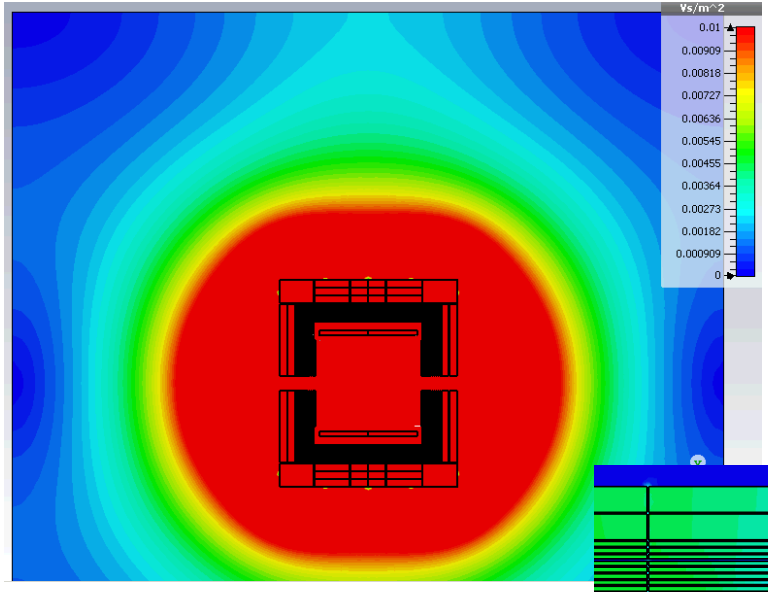
Does a fundamental change of the ILD tracker make sense?





Performance vs. pt:
Much improved at low pt

Changing ILD: Big Issues



Alternative designs in the corner?

Moving the ILD design “to Japan” requires adapdations

- Granularity of the mechanics
- Assembly procedures
- Legal considerations

- Cost of yoke is considerable
- Stray field requirements are one main driver of the Yoke size
- Muon performance?

Goals/ Plans

Assumption: ILC is receiving encouraging signals from Japan (whatever this means)

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

Tokyo ILD meeting April 2015

How do we proceed: Proposal

Define 3 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 as documented in this meeting

I am looking forward to an intense discussion on the detailed plans during this meeting