ILD Meeting 2015

April 23-24, 2015
KEK, Tsukuba, Japan

Summary and Outlook
Ties Behnke

ILD Optimization

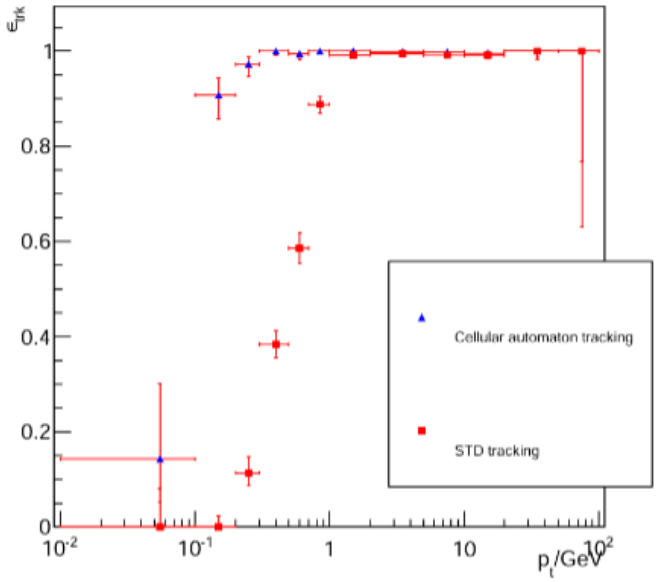
Very interesting and productive two days:

I counted ~80 participants yesterday
50+ today

Where do we go from here:

1. Re-optimize ILD
2. Sharpen the physics case
3. Demonstrate the technologies
4. Advance the detector integration

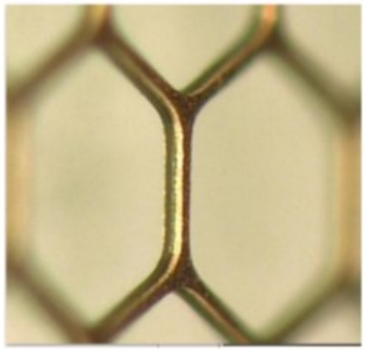
“Optimization” Issues

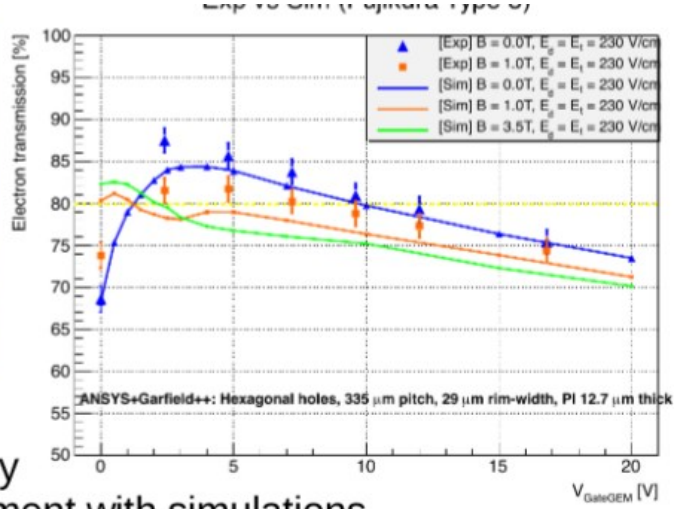


From Y.Voutsinas (Vertex-14)

VTX: First (and very convincing) demonstration that the double layer design in ILD actually makes sense and helps.

TPC: realisation of ion gate is probably the single most “critical” item for a high precision low mass TPC



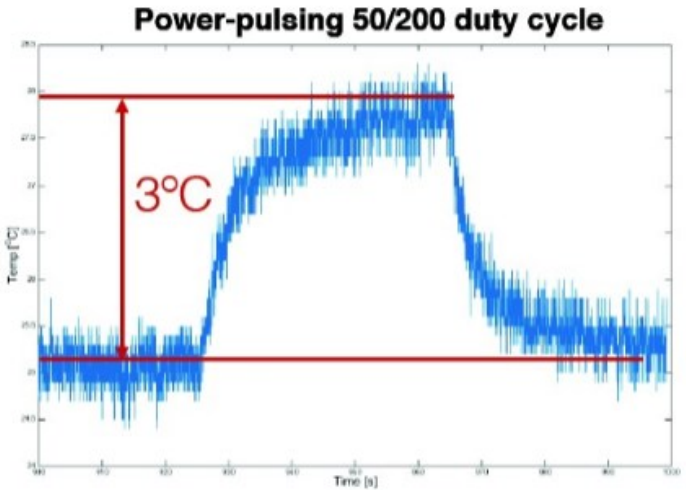


Measurements of electron transparency in reasonable agreement with simulations.
20 % electron loss corresponds to ~10 % degradation of spatial resolution.

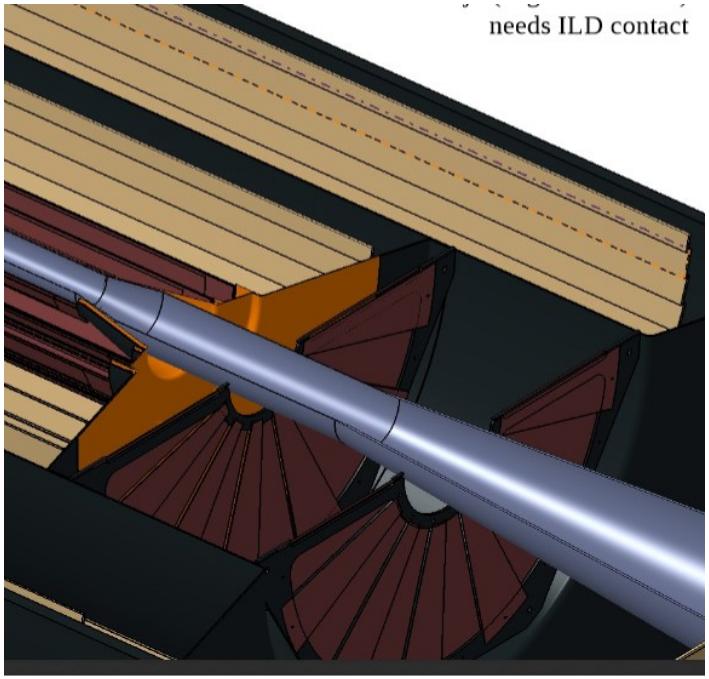
“Optimization issues”

Detector layout mostly stable, except:

Forward tracking design
External Silicon tracking in the forward region?



Power pulsing tests look promising

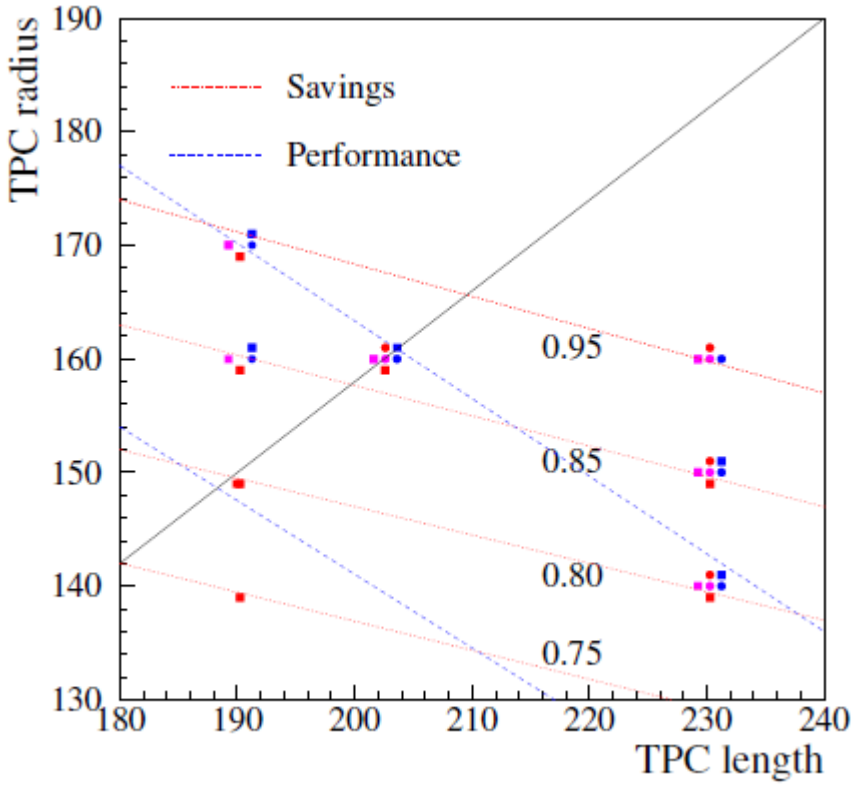


Forward design is not optimal:
Role of pixel vs strip?
Position of pixel?

FTD well covered by Spanish network
Central silicon is not covered! Major problem…

Detector Size Optimization

Several studies done, changing the tracker layout.
So far all based on generic ILD tracker (Si + TPC)



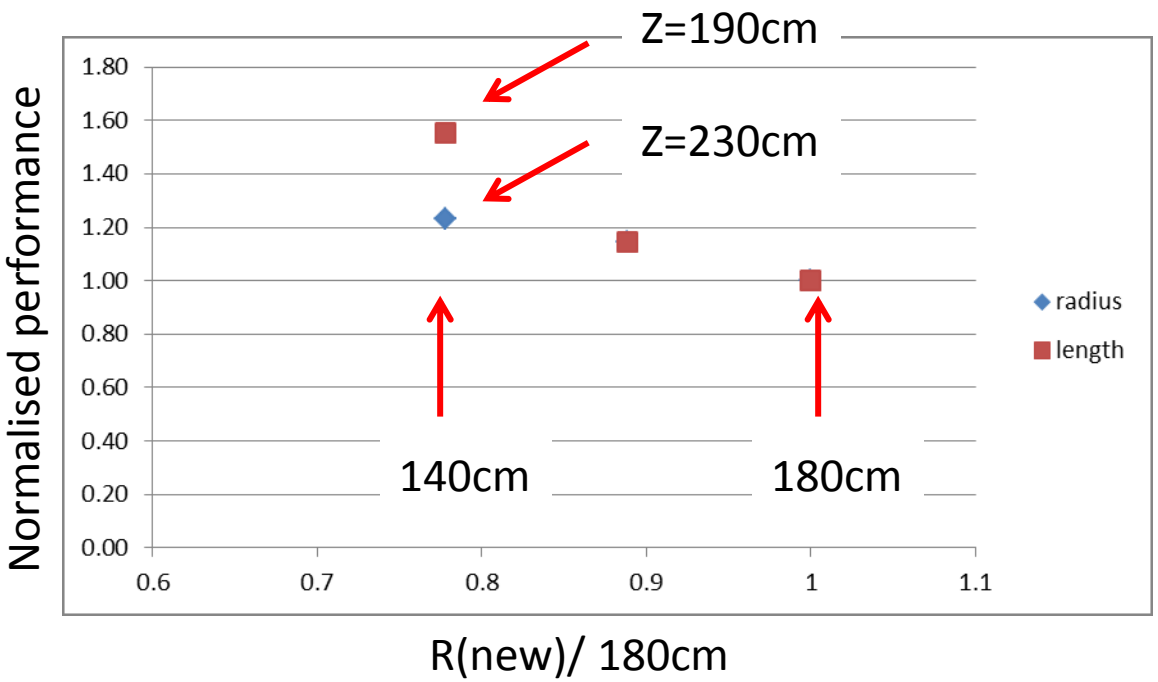
M. Berggren:

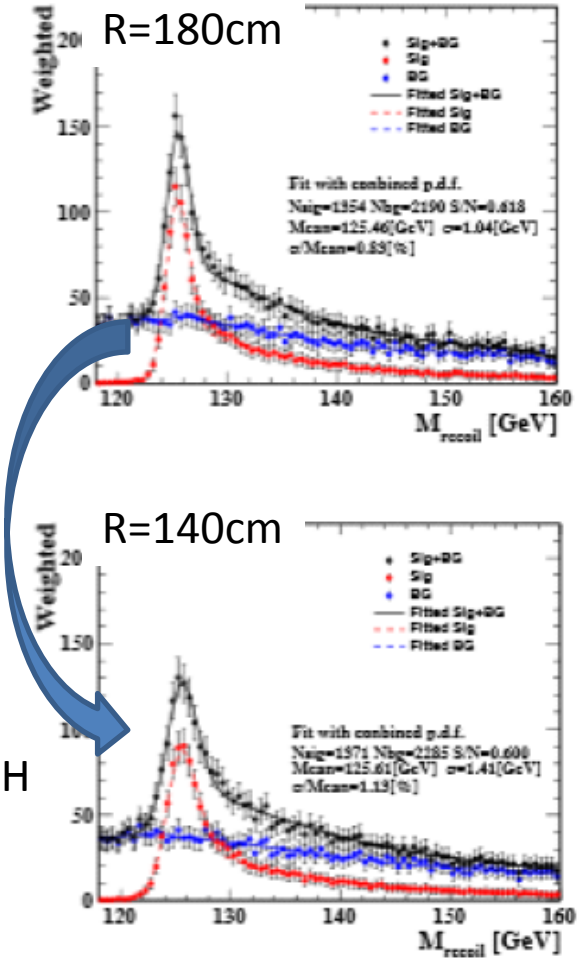
Very complete study of different tracker models

Different B-fields

Plus simple costing scaling

Tracking Performance

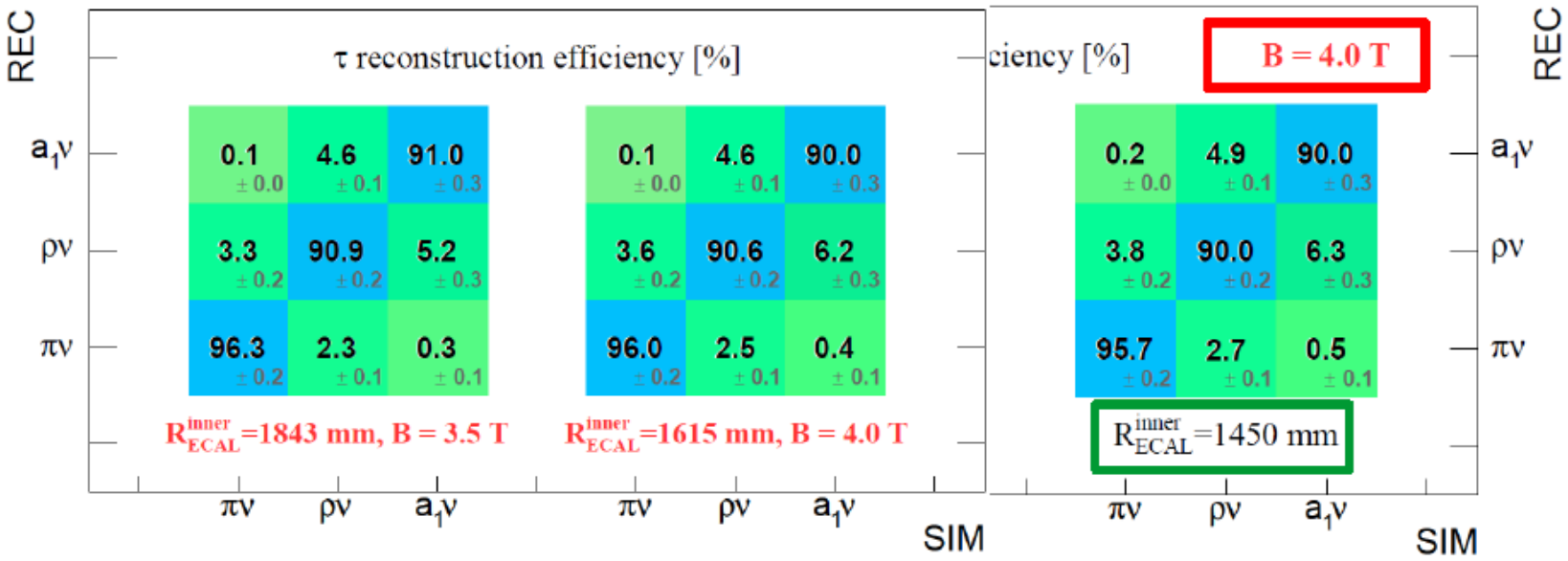




30% degradation in MH

Performance indicator a la Mikael

Calorimeter Performance

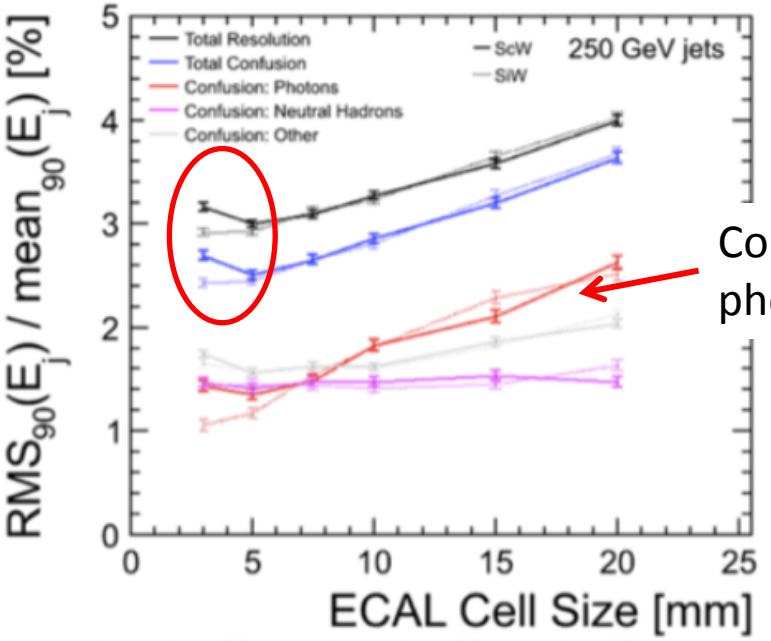


Tau reconstruction: sensitive measure for the performance of the system.

Smaller detector can perform well if magnetic field is increased.

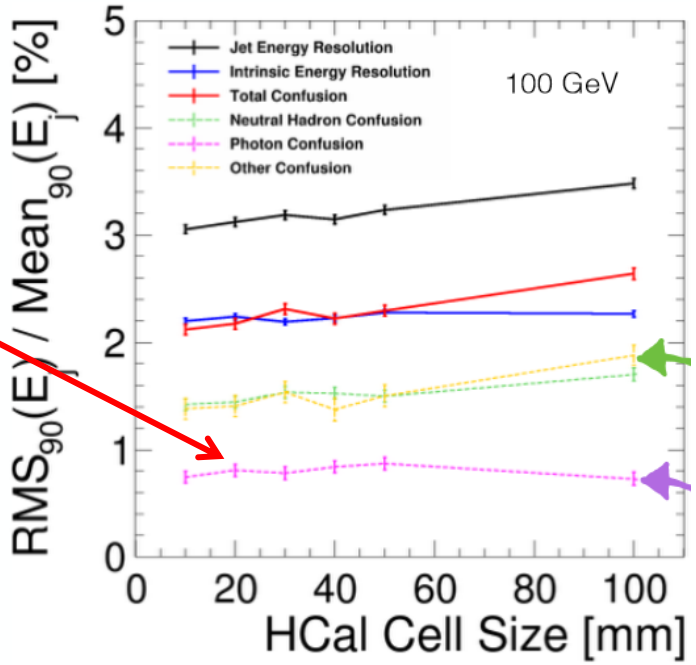
Calorimeter in view of PFLOW

ECAL



Confusion photons

HCAL



performance vs ECAL cell size

performance vs. cell size

+ Extremely nice to see the detailed studies and the high level of understanding
- We rely heavily on one piece of software for crucial studies

Linking to physics

We are seeing nice results

Background rejection efficiency:

Single lepton ID	Cut based	Old likelihood	New likelihood
Signal(%)	98.1	98.1	97.8
ttbar – all hadronic(%)	7.9	3.1	2.3

- Improvement of all hadronic event rejection: ～30%
- Note: lepton energy threshold is loosened on likelihood_new
  - From E(lep)>15GeV → E(lep)>10GeV

Linking dEdx performance to physics gain:

Has been an outstanding issues since 10 years!

Many other analyses are ongoing and are trying to link detector performance to physics gains:

Extremely nice to see
(Remember: this was the main punch line when we started the ILD re-optimzation)

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.

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 other parameters of the 2 new models

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

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

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

Fall: validation finished

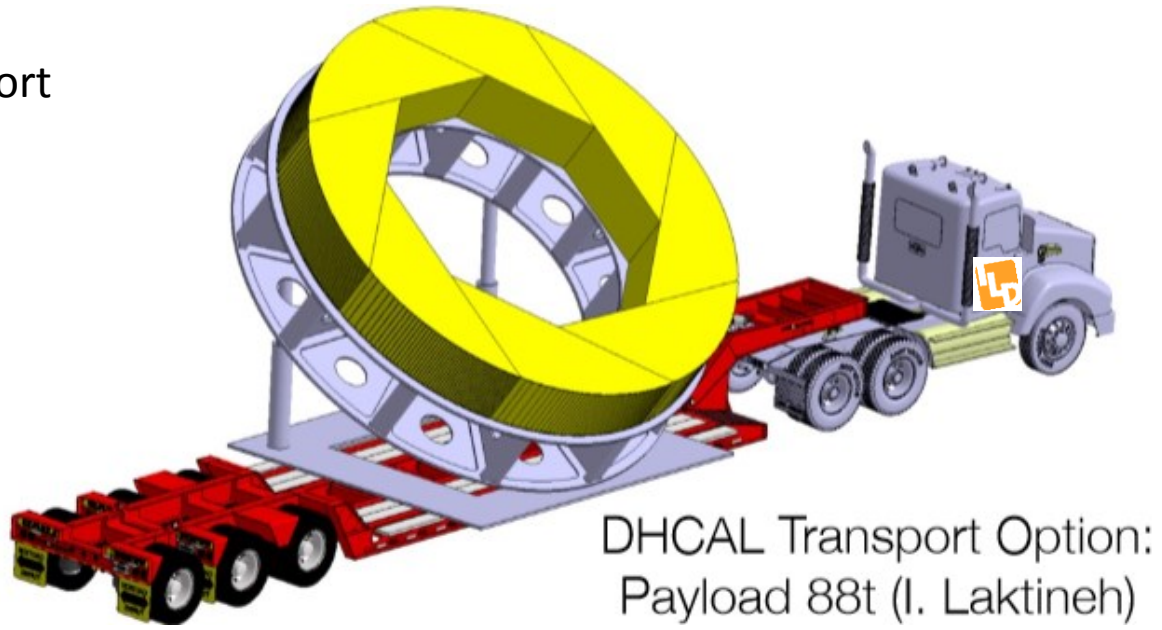
Until end of the year: finish production of relevant data files

Integration

Integration work in ILD has virtually stopped

We need to restart this effort

Engineering?
Documentation?
Overall coordination



This is important for ILD as such, but also and in particular for the site-specific studies in Japan!

The Format of the Meeting

New style of meeting:

“Omnibus” style

attach several satellite meeting around one central (shorter) meeting

Overall worked well, some details will need to be worked out.

Of course it meant less time for ILD “proper”,
so it is not the right way for every meeting.

ILD schedule

Future ILD meeting schedule:

Next ILD meeting: attached to Whistler workshop, November 2015
(length to be decided)

Question: do we want to organise a dedicated software workshop in the summer?

(needs coordination with the more global LC software workshop proposed by Frank)

Thanks

Many thanks to Yasuhiro and the KEK team for organising this meeting

- The big meeting
- The ILD meeting
- The wonderful dinner yesterday night