

# 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

# The talk...

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### "Optimization" Issues

VTG: Riel (and very convincing) demonstrated that the double layer design in ILD actually malfunctions and helps.

From Y. Voulas (Vites-14)

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

TPC realization of ion gate is probably the single most "critical" item for a high precision low mass TPC

### 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 coating scaling

### "Optimization issues"

Layout mostly stable, except:  
Tracking design  
Ion tracking in the forward region?  
Timing 50000 day cycle

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

FTD well covered by Si-strip network.  
Central silicon is not covered! Major problem...

### Tracking Performance

Performance Indicator is  $\Delta$  Miscal

30% degradation in Miscal

### Calorimeter Performance

Reconstruction efficiency (%)

Energy resolution (%)

0.5 - 1.0 T

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

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

seeing nice results

background rejection efficiency:

Selection ID	Cut based	Old threshold	New threshold
420	98.1	98.1	97.8
all hadrons (%)	7.9	5.1	2.3

Rejection of all hadronic event rejection: ~50%  
Leptron energy threshold is lowered on threshold, new on E(lep) 100GeV → E(lep) 105GeV

Other analyses are ongoing and are trying to link detector performance to physics gain.

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

Linking detector performance to physics gain:  
Has been an outstanding issue since 10 years!

# 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

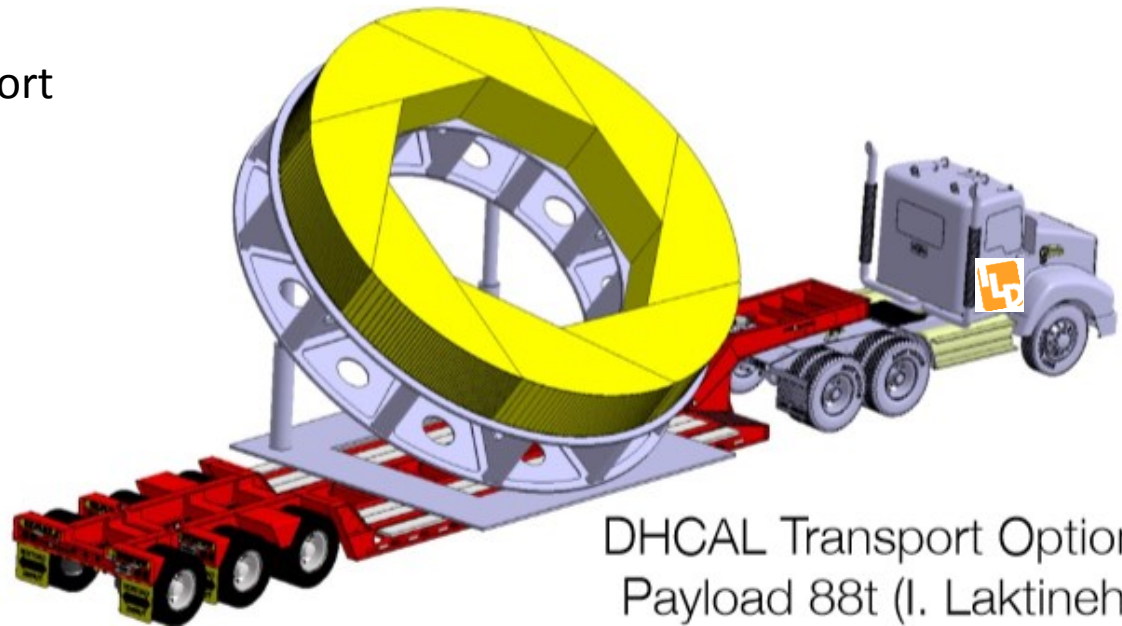
Integration work in ILD has virtually stopped

We need to restart this effort

Engineering?

Documentation?

Overall coordination



DHCAL Transport Option:  
Payload 88t (I. Laktineh)

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

# 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

