

ILD status report

Ties Behnke

30.7.2014

ILD and the LCC

LCCPD (Hitoshi Yamamoto,
deputy director for Physics and Experiment)

- regular LCCEB meetings every two weeks
- Installation of several working groups
-

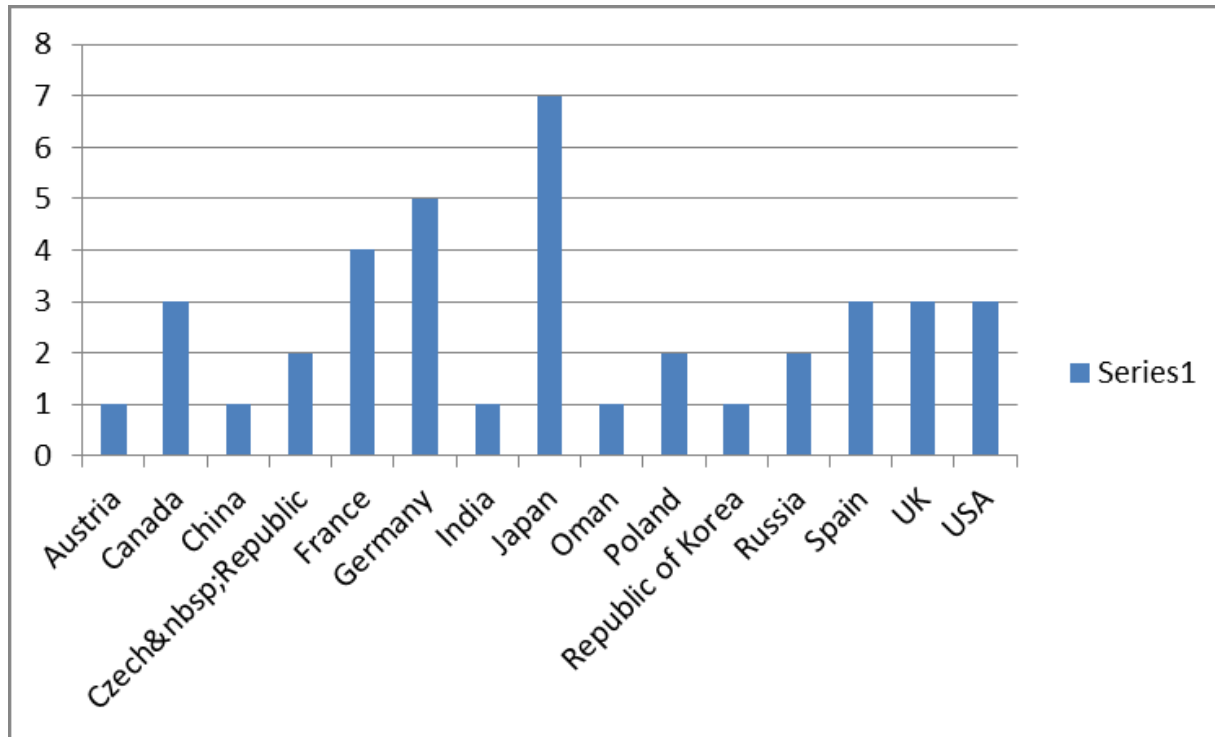


- Parameters working group (Jim Brau, Jenny List, Keisuke Fujii)
- Physics (Mike Peskin + many others)
- Detector R&D (Maxim Titov, Jan Strube)
- MDI (Karsten Buesser)
- Infrastructure (ILD person Karsten Buesser, Frank Simon, Mary Cruz (tbc.))
- Conference talks organisation (Frank Simon)
- Change controls (Jenny List, Marco Oriunno, from concepts)

ILD organisation

ILD is collecting “members”:

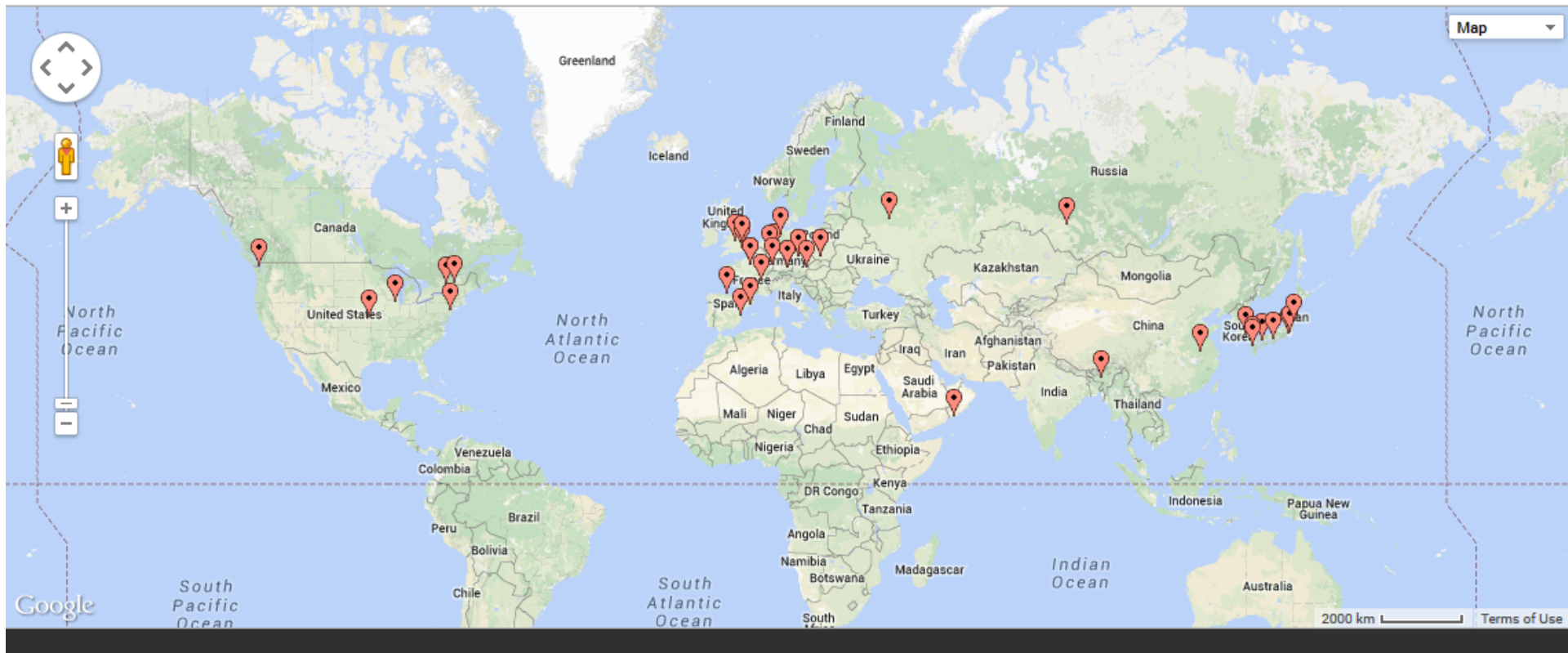
- Statement of participation
- WEB based system, the member signs the statement, ILD approves



Total of 39
signatories,

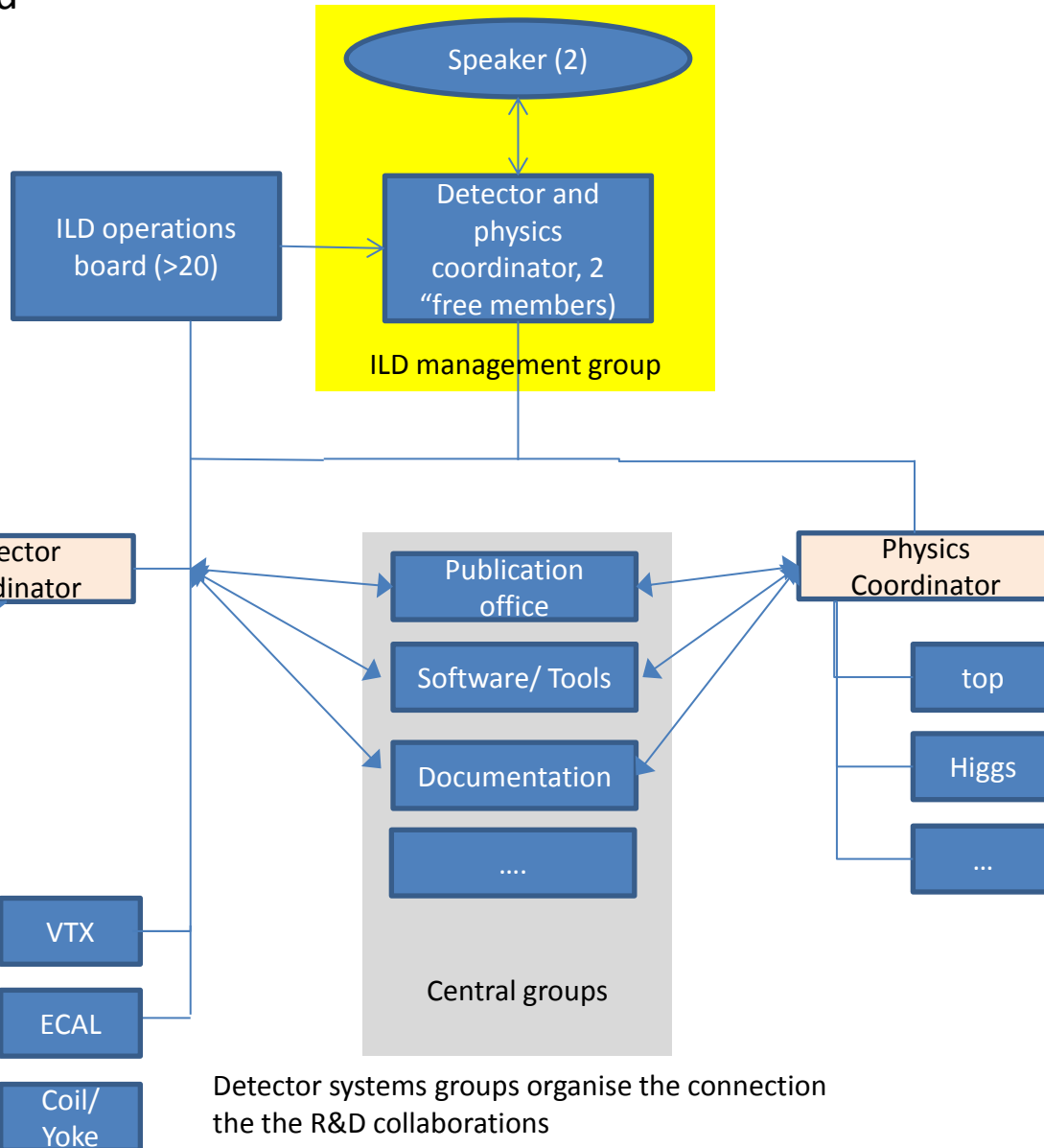
From 15 countries

The MAP according to ILD



Institute Assembly

Proposal from Cracow,
To be further developed
and discussed over the
next few months



Detector systems groups organise the connection
the the R&D collaborations

ILD meeting



6.-9.9.2014

<https://agenda.linearcollider.org/conferenceDisplay.py?ovw=True&confId=6360>

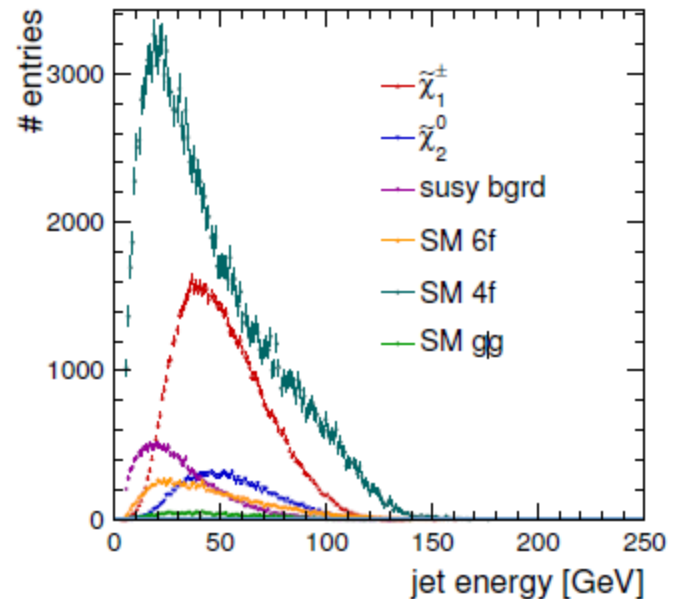
- Physics case for the ILC
- Physics with ILD
- ILD optimization
- ILD integration

Pre-meeting: MDI/ CSF meeting Sept. 4-6 in Sendai area

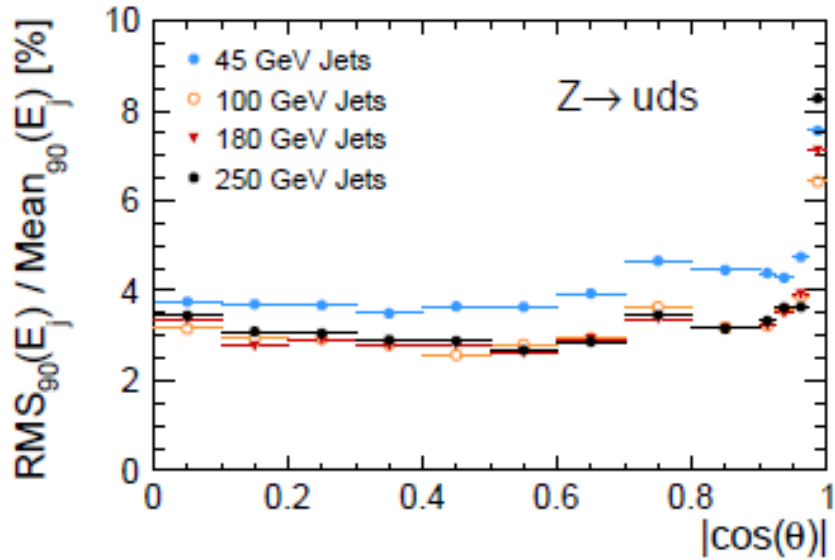
Optimization: The Goal(s)

Start from an already excellent detector

- Look hard at the physics we will do: is our detector the best for this?
- Are we cost efficient?
- Are there alternatives on the market which might help to make ILD better or cheaper?
- Make the case with a clear physics message

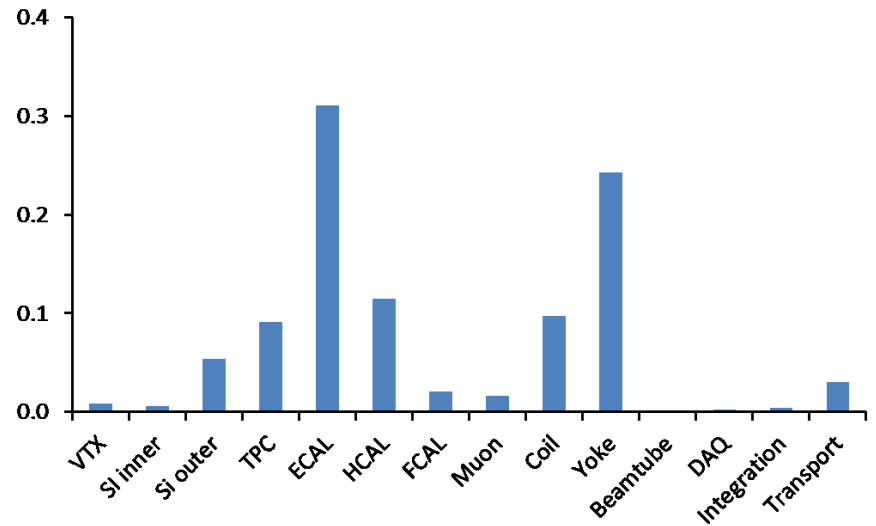


The Starting point

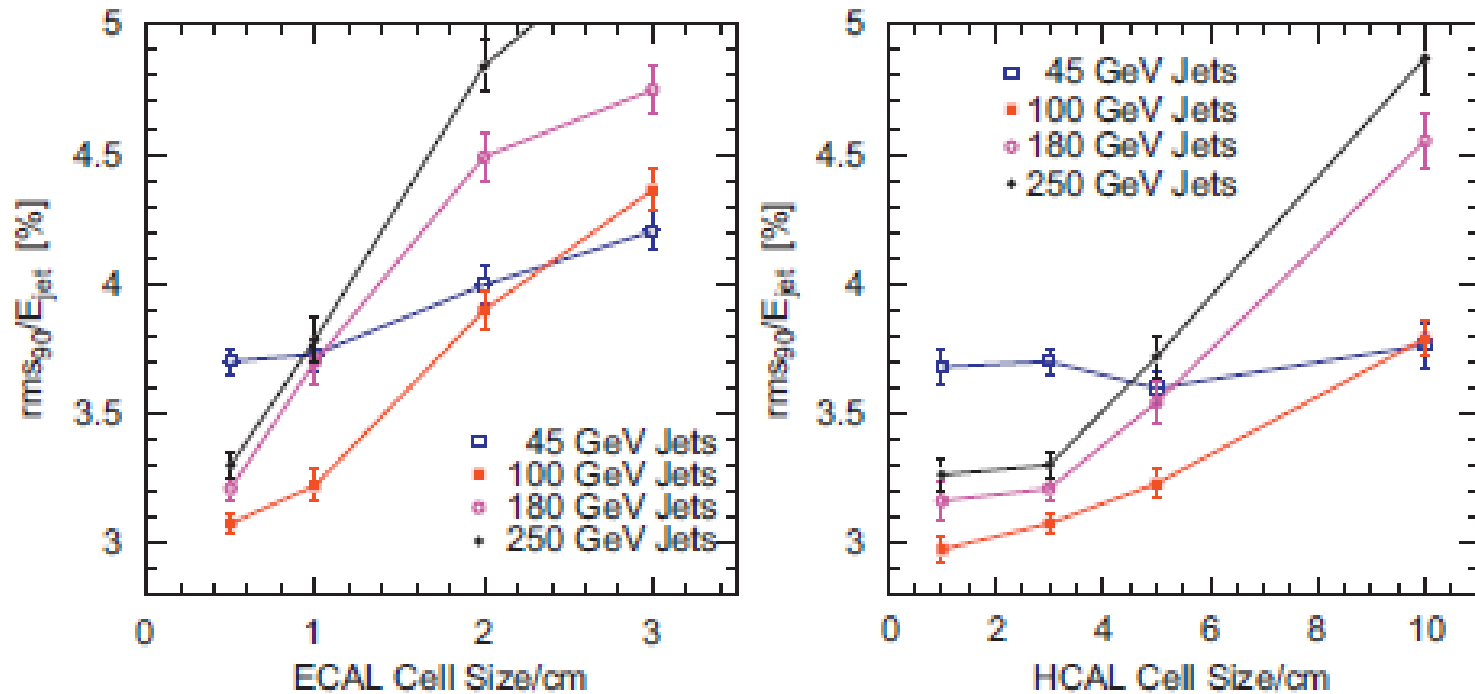


Jet energy resolution

Cost breakdown from the DBD

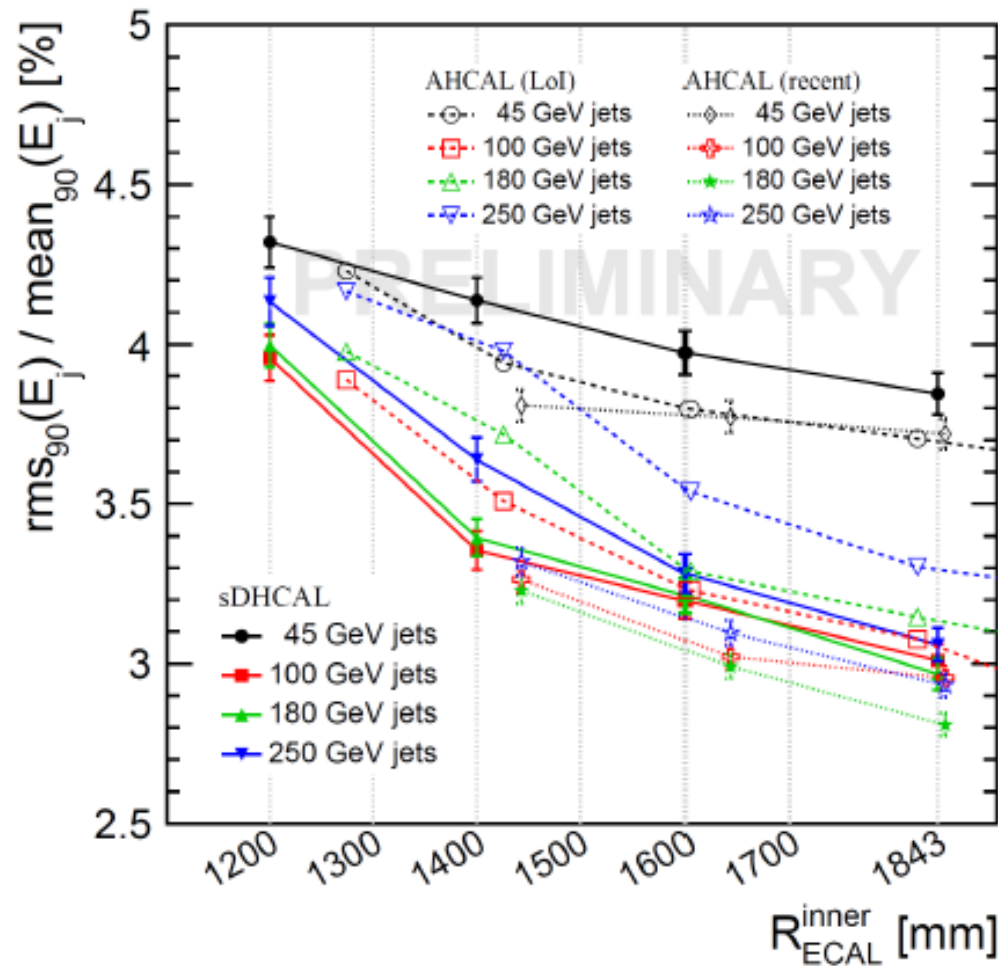


Granularity

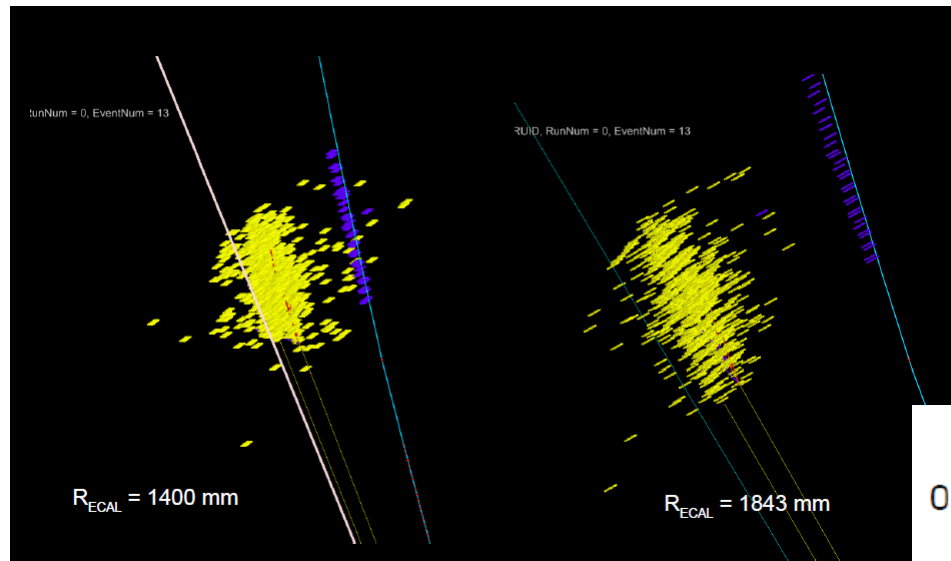


LOI studies, plus new studies: current calo cell sizes seem reasonable

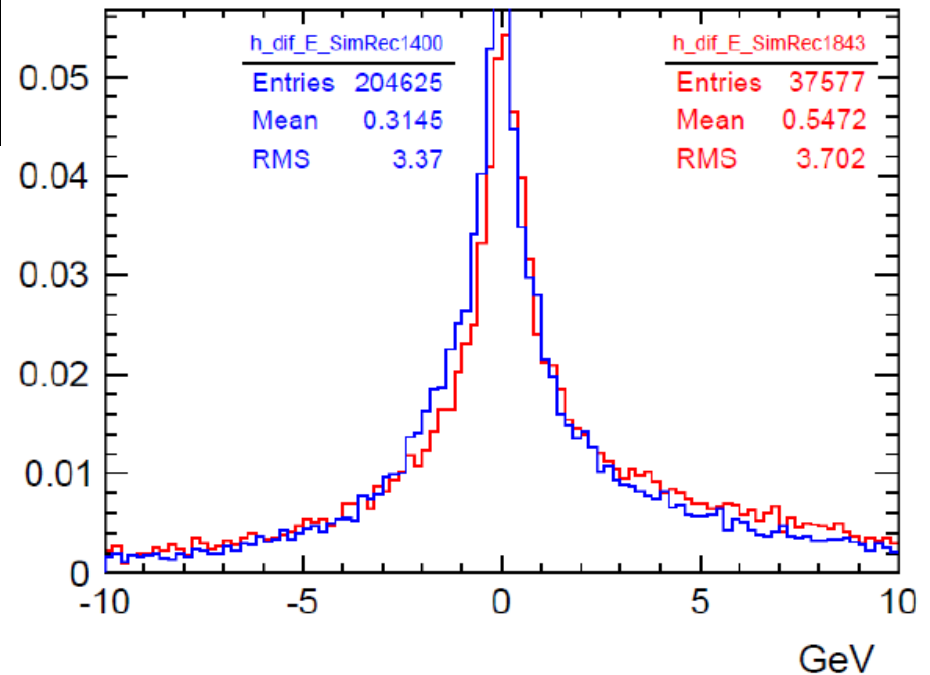
Radius



Smaller ILD



Tau performance seems similar between the two models

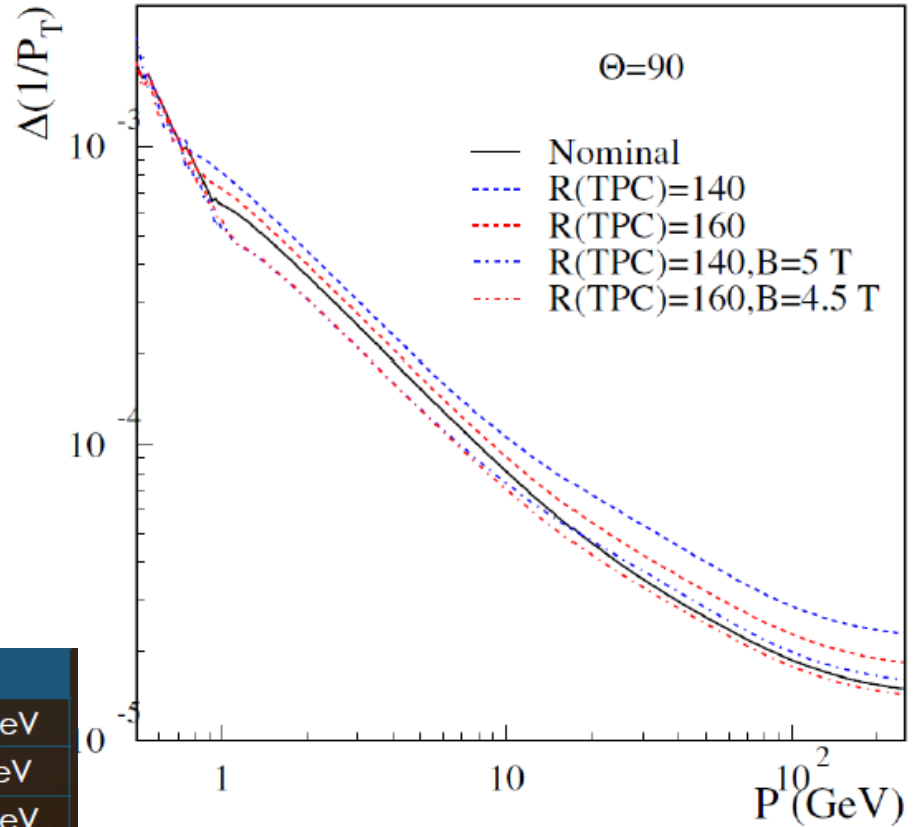


DBD ILD: $R(\text{Ecal}) = 184 \text{ cm}$
reduced size : $R(\text{ECAL}) = 140 \text{ cm}$

Tracking performance

Momentum resolution
(fast simulation)
Scaling with size.

10-20% degradation for 140cm ECAL



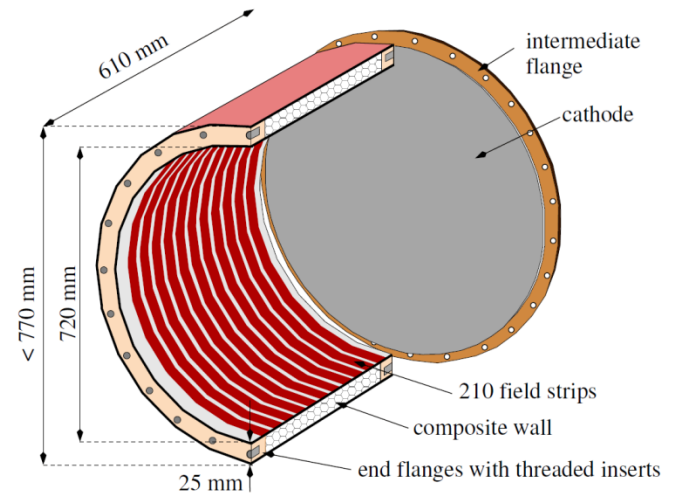
	N_{sig}	N_{BG}	δ_σ	δ_m
nominal	1596	4584	3.55%	32.5 MeV
DBD			~3.7%	~37 MeV
160, 3.5	1590	4583	3.60%	35.6 MeV
160, 4.5	1592	4662	3.66%	33.7 MeV
140, 3.5	1595	4654	3.64%	39.3 MeV
140, 5.0	1586	4640	3.66%	34.0 MeV

Physics impact: recoil resolution for different sizes: Changes are %-level

TPC issues

Things to study for the TPC within ILD

- Resolution vs. size / aspect ratio/ etc.
- Optimize in cost – performance space
- Material
 - Fieldcage and friends
 - Endplate
 - Realistic designs?



Questions to be answered by LCTPC

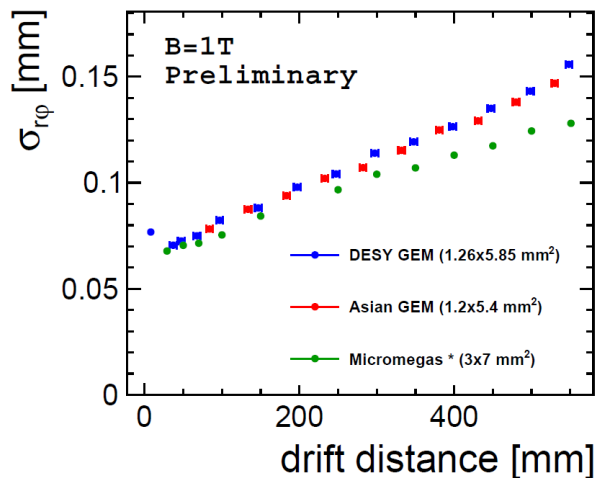
- Performance
- Reliability
- Realistic engineering design

Technological Roadmap

Assumption: we need to write a TDR in 3-4 years time.

Assumption: at this time we need to show that we are prepared to make a technology decision

- We need to prepare such a decision
 - For each technology, finalise the proof of concept, proof of system
 - Develop integrated designs, including gating grid
 - Demonstrate performance with well understood tools and methods



Example: comparison of resolution results done by Astrid et al.

Note: this is my personal view, and has not been blessed by ILD

ILD Software

- plan to use new detector geometry and simulation tool DD4hep



AIDA

Advanced European Infrastructures
for Detectors at Accelerators

- Plan to initiate the change from MOKKA to DDSim
- started to port ILD_o1_v05 sub detector models from Mokka
 - so far VXD,SIT,TPC, Ecal barrel, Hcal barrel, Beamcal
 - need testing and validation
- to get more flexible models wrt to optimization of the detector model (scaling)
more work is needed
- ideally need man power from R&D group (software experts) to port missing models and help with the validation

TPC: we need to take action!

ILD Software

ILCDirac

- switched to new Grid production tool ILCDirac
- maintained by CLICdp group

- switched to new data catalogue and software installation mechanism on the Grid w/ CVMFS

- need some time to configure and adapt job production scripts for any large central production
- smaller user productions already ongoing

- new ILD MC production coordinator Shaojun Lu (taken over from Eduard Avetisyan)

Optimization: Next steps

We start to get a picture and can start to compare different setups

On first sight a slightly smaller ILD will be ok, in particular, if we could compensate with the magnetic field

But

We are only starting to see the real physics impact.

We have not studied the energy scaling

We have no idea about the costs

Etc. etc.

Special role for the TPC group here, as this will significantly impact the TPC design and performance!

What we need to do

Move towards a better coordinated efforts (at the moment things are too scattered)

Agree on a small number of “benchmark” models

Decide, on what scale and when we like to do new productions

Identify a few relevant physics analyses which are sensitive to the optimization parameters

Get a costing group going again