

Report from the IDAG session with ILD

Session 1: interview of ILD by IDAG

- Answers to list of questions given to us by IDAG
- Open discussion (not much)

Session 2: common meeting of 3 concepts and IDAG on benchmarks



Report from the IDAG session with ILD

Session 1: interview of ILD by IDAG

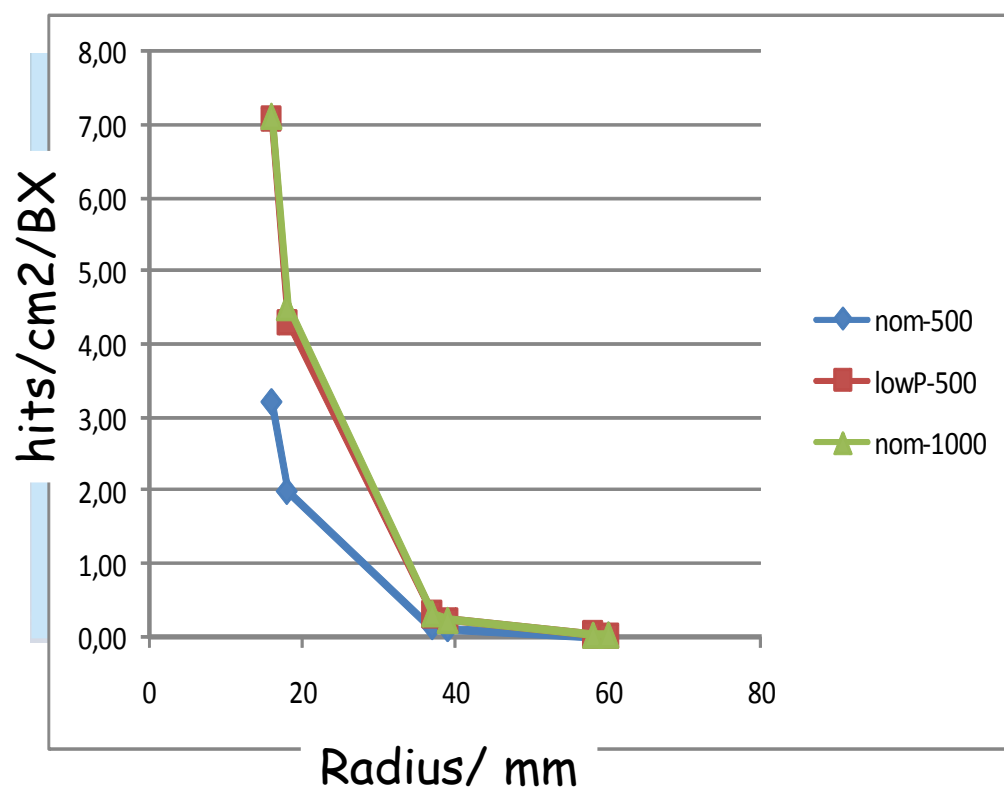
- Answers to list of questions given to us by IDAG
- Open discussion (not much)

Session 2: common meeting of 3 concepts and IDAG on benchmarks

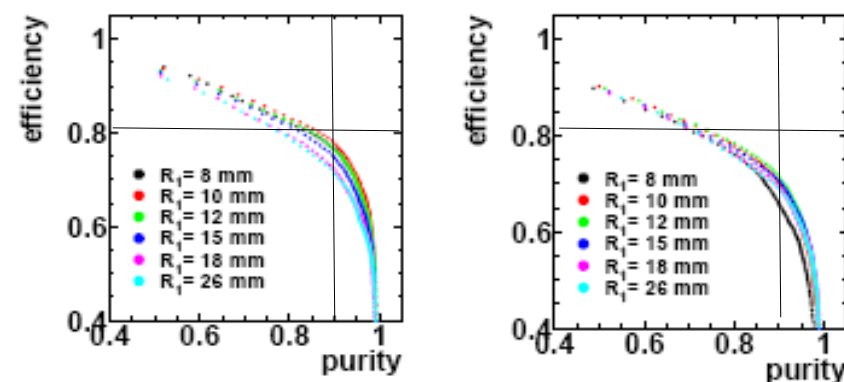


Vertex Detector Questions 1

The vertex detector is sensitive to machine backgrounds. Can you assess what “headroom” there is if backgrounds are higher than planned? For example, what is the flavor tagging behavior - purity vs. efficiency - in the presence of added background. In addition, the tagging is evaluated at the Z pole. What is the response at higher energies?

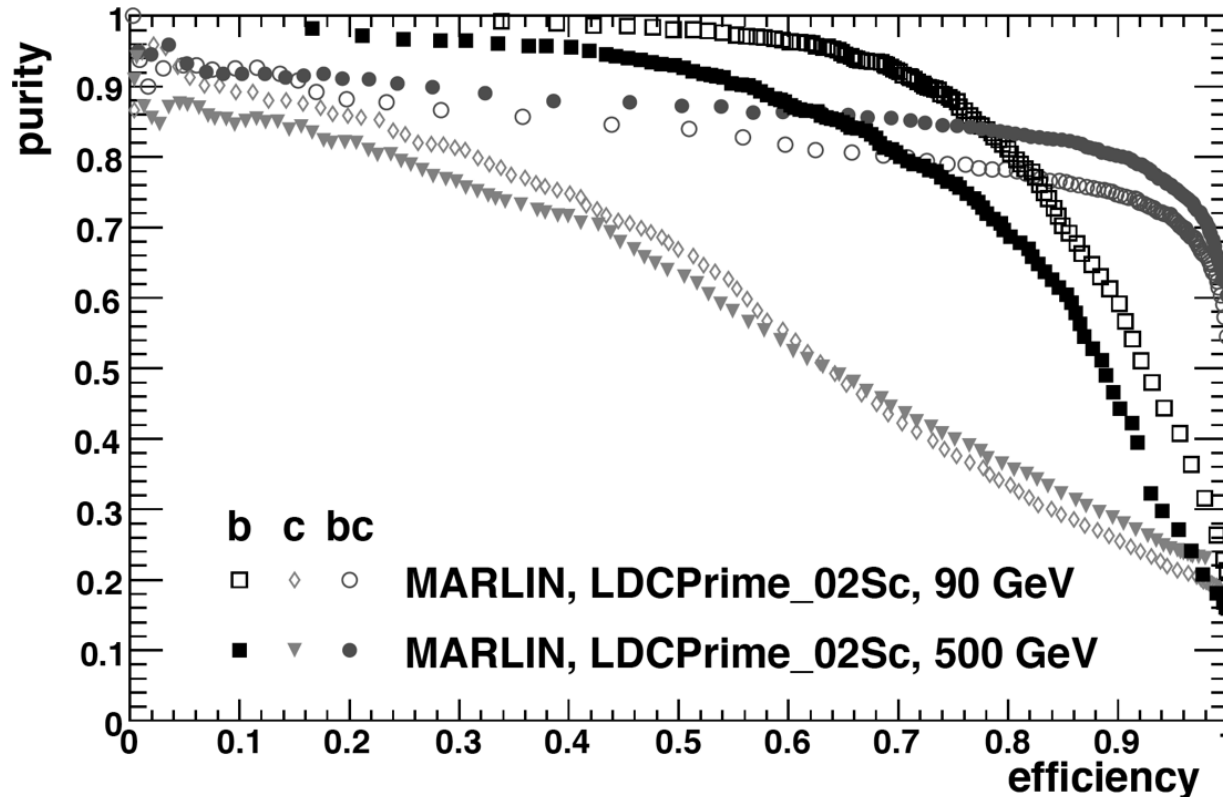


background: 0 bx background: 131bx



Study of b-tagging performance
for different backgrounds
(very preliminary)

Flavour tagging: higher energies

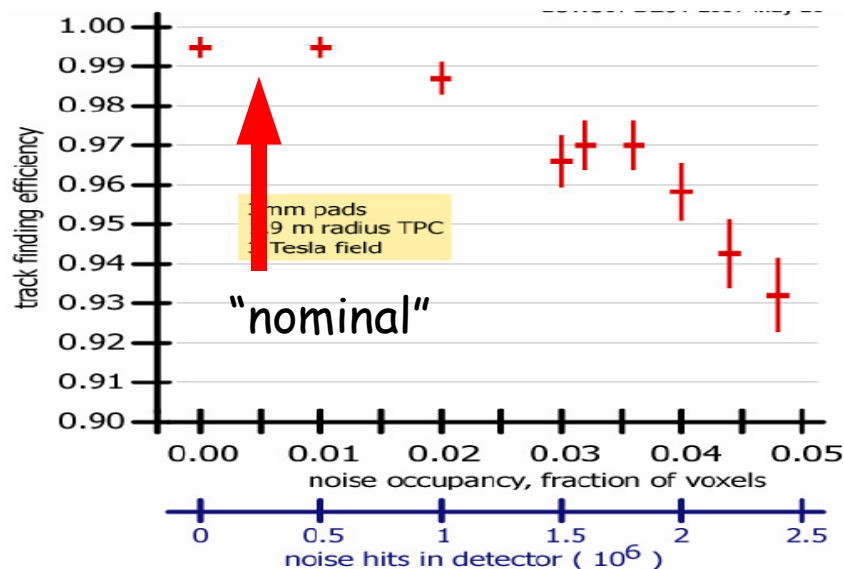


★ ANNs were not tuned for 250 GeV jets

Flavour composition	91.2 GeV	500 GeV
bb	22%	15%
cc	17%	25%
uu, dd, ss	61%	60%

Background in trackers

- tracking performance will eventually suffer:



These studies need to be re-done with the current detector understanding and design

- do we understand how to deal with the ion feedback if it varies over time?

Rita will present concrete plans on background treatment later today!

To do:

- “official” study about flavour tagging in the presence of backgrounds
- Retrain flavour tagging at higher energies

Need to speed up the inclusion of backgrounds

Discussions started among experts here at TILC particularly for the VTX detector backgrounds

This has a very high priority for ILD: should have some answers by June IDAG meeting

Question 2

Rephrased: how to you calibrate your Mega-channel detector in a finite amount of time and maintain the calibration over time?

- VTX
- TPC
- Calo
-

Experience starts to be gained by R&D collaborations but transfer to full size it not always easy.

Need to account for the different options and resulting differences (in particular calorimeter)

This is a sensitive and difficult problem: we have ideas, we have some results, but we have very little realistic studies for the final systems

Can we expect more reliable statements in time for the June meeting?

Power Pulsing

When will there be a test of power pulsing with B field? For example CDF have had difficulties with wire bonds. Is power pulsing required or is there an alternative?

Power pulsing is a major R&D topic on its own, we are just starting to investigate this.

Facilities exist / are being setup to study some effects due to power pulsing:

- 5T small bore (28 cm dia) magnet at DESY
- 1T large bore magnet for TPC test facility at DESY
- investigate other options around the world

Currently there are no final answers to the question of Power pulsing (note: development of novel power schemes is also an area of collaboration with the LHC experiments)

Power Pulsing

When will there be a test of power pulsing with B field? For example CDF have had difficulties with wire bonds. Is power pulsing required or is there an alternative?

Power pulsing is a major R&D topic on its own, we are just starting to investigate this.

Facilities exist / are being setup to study some of these

Significant danger that we might lose this facility at the end of this year due to XFEL construction

- 5T small bore (28 cm dia) magnet at DESY
- 1T large bore magnet for TPC test facility at DESY
- investigate other options around the world

Currently there are no final answers to the question of Power pulsing (note: development of novel power schemes is also an area of collaboration with the LHC experiments)

Power Pulsing

When will there be a test of power pulsing with B field? For example CDF have had difficulties with wire bonds. Is power pulsing required or is there an alternative?

Power pulsing is a major R&D topic on its own, we are just starting to investigate this.

Facilities exist / are being setup to study some effects

Facility is ensured until end of 2012 (official end of EUDET), future beyond this to be negotiated

- 5T small bore (28 cm dia) magnet at DESY
- 1T large bore magnet for TPC test facility at DESY
- investigate other options around the world

Currently there are no final answers to the question of Power pulsing (note: development of novel power schemes is also an area of collaboration with the LHC experiments)

Power Pulsing

When will there be a test of power pulsing with B field? For example CDF have had difficulties with wire bonds. Is power pulsing required or is there an alternative?

Power pulsing is a major R&D topic on its own, we are just starting to investigate this.

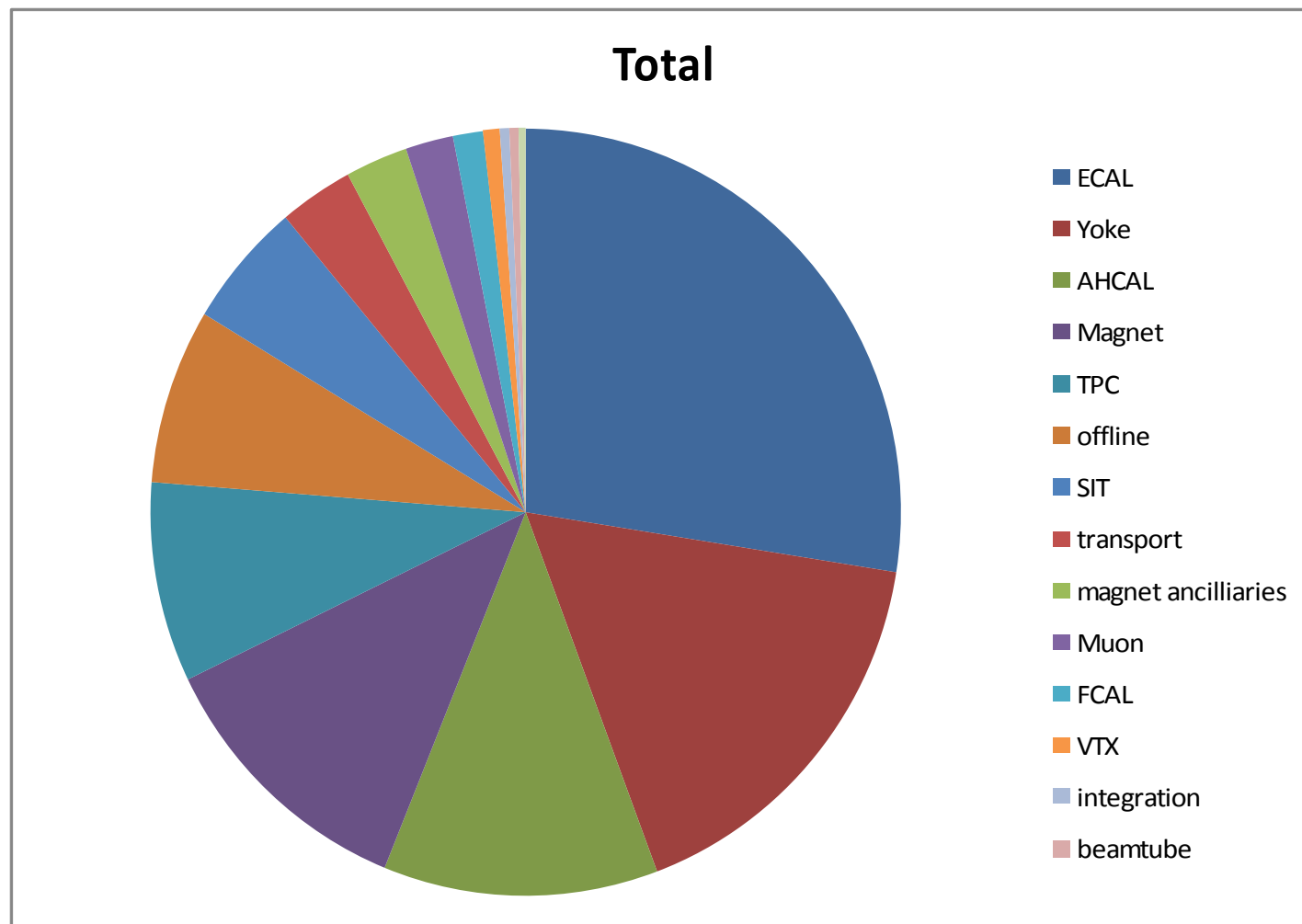
Facilities exist / are being setup to study some effects

Are there other options at other labs around the world? CERN? FNAL?

- 5T small bore (28 cm dia) magnet at DESY
- 1T large bore magnet for TPC test facility at DESY
- investigate other options around the world

Currently there are no final answers to the question of Power pulsing (note: development of novel power schemes is also an area of collaboration with the LHC experiments)

ILD Cost breakdown



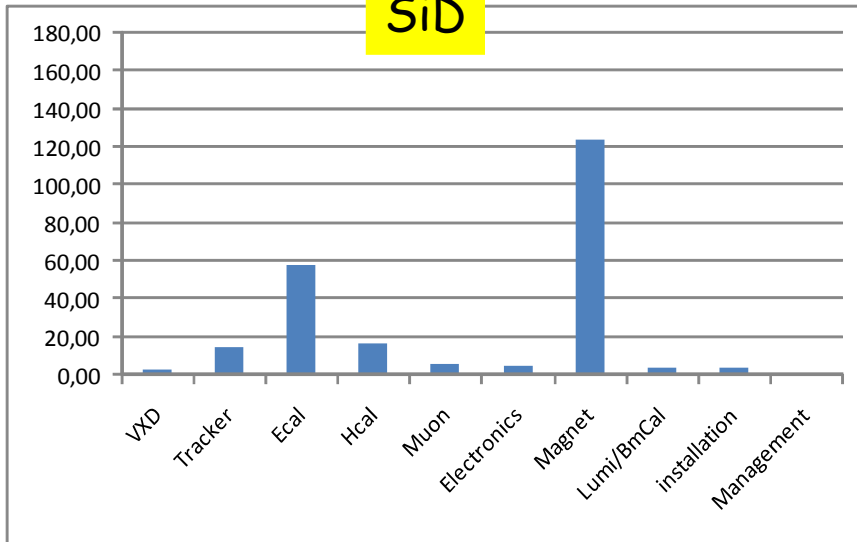
Total sum:
407 MILCU
(approx. 320 M€)

Only M&O

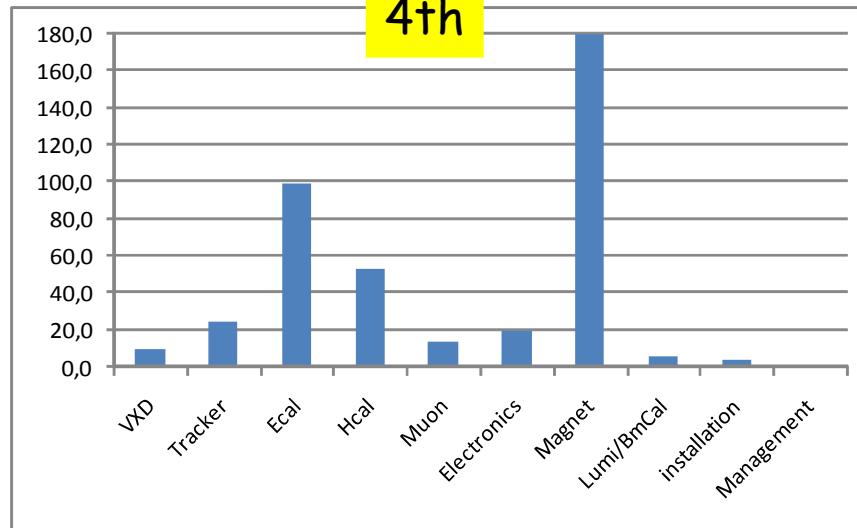
Comparison: SiD equivalent cost is 236 MILCU

A word on costs

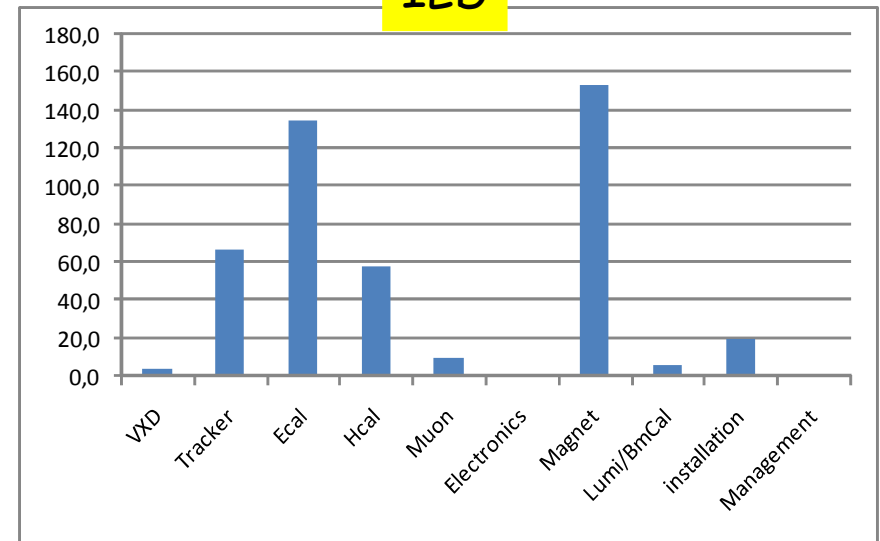
SiD



4th



ILD



Problem?

Costing remarks

Costing has not really played a role in the IDAG discussion

But we need to understand our costs a bit better:

- understand different assumptions
- with a bit more time than available for LOI, do another attempt to improve the costing to be on a more common footing between different options.
- shall we re-instate the common costing discussions with SiD and 4th?

Example: W-cost SiD= 80\$/kg, ILD = 120\$/kg

But: we need to be prepared for the June meeting:

Need to make sure that a critical review of the costs is happening between now and then

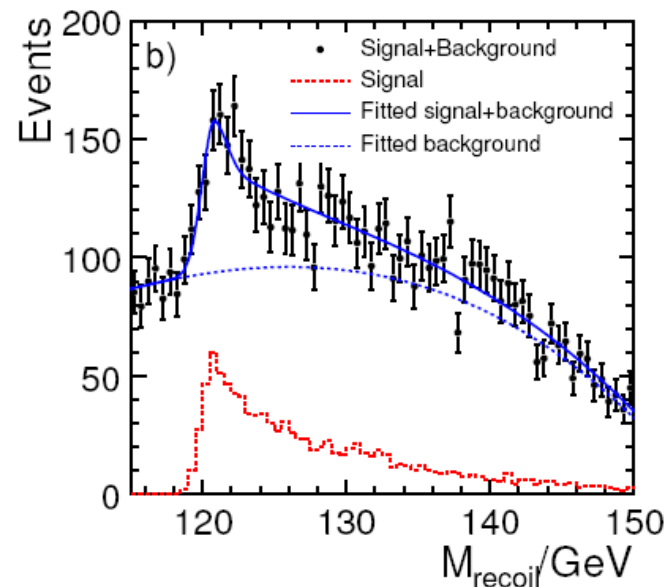
Benchmark Discussion

Common session between IDAG and three concept groups

(see Marks talks for more details)

Upshot of the session:

ILD is asked to re-do the Higgs recoil with the correct beam parameters and background properties



IDAG Questions part I:

For all three concept groups:

* Give an outline of the plan for calibrating the energy response of your calorimeter, both from test beams or monitoring signals and *in situ* running. What level of precision is required? How is it obtained? How do you monitor and maintain it? If operation at the Z pole is part of your strategy, how much data is required?

*What is your plan for aligning your tracking systems. What is the precision required?

Are there special operations needed for alignment after push-pull prior to data taking, and what time is required? How many degrees of freedom need to be considered after a move? How do the alignment needs affect the design of your detector? Is any real-time monitoring of the tracker alignment envisioned (e.g., related to power pulsing and long term stability)?

*Repeat the recoil analysis with $Z \rightarrow \mu^+\mu^-$, e^+e^- , including the corrected ISR spectrum, and simulation of beam-background hits.

IDAG Questions part II:

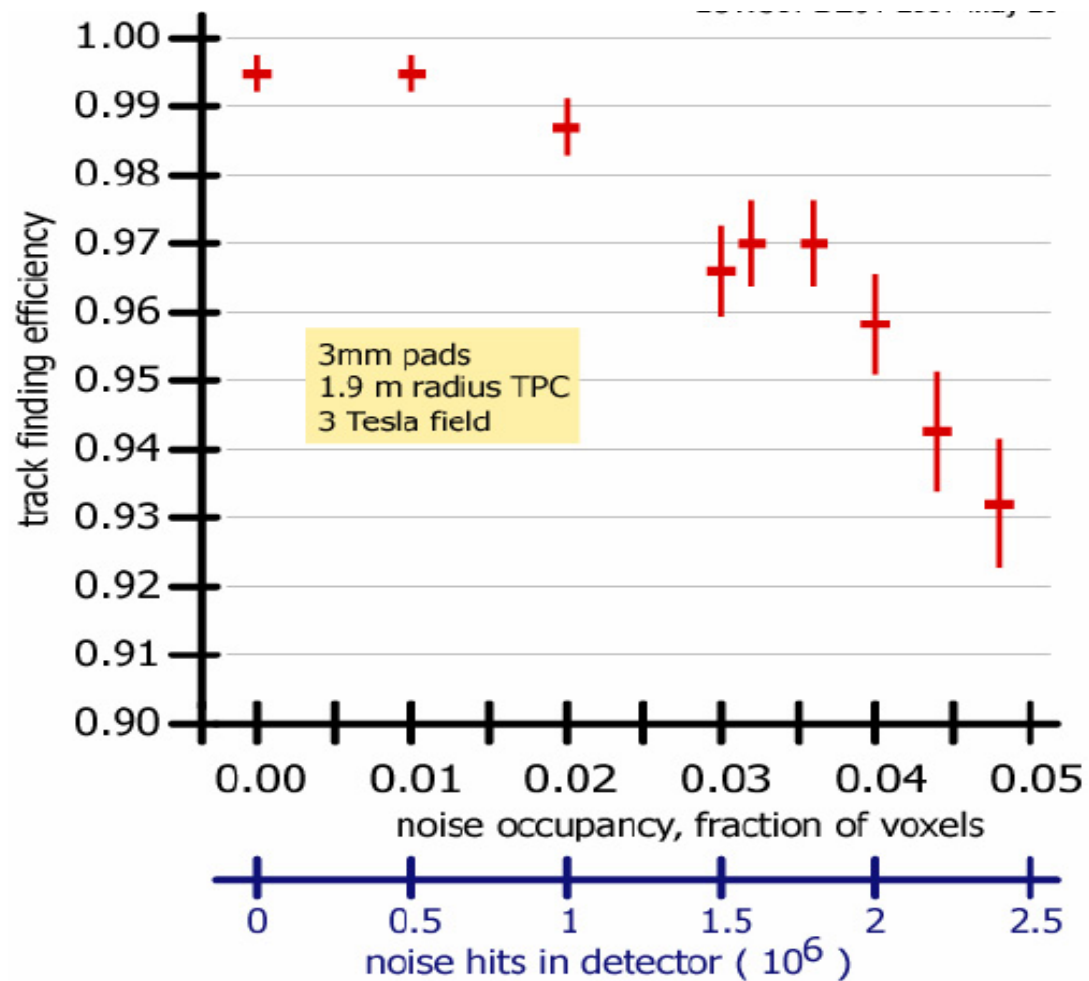
For the ILD concept:

Elaborate on the meaning of the information in Fig. 4.3-4. What are the plans to mitigate the loss of track efficiency with background level? What is the sensitivity to beam halo, and at what level does it become problematic?

Perform the A_{fb} analysis in the study of the t - t bar benchmark channel.

$Z(e^+e^-)H$ inclusive: show the result of the analysis with and without the calorimeter.

The figure



Timescale

June 12: deliver answers to IDAG

June 19/20: session with IDAG in Paris.

2-3 people per concept should attend in person
We need to understand what IDAG wants, and then
have to plan the attendance

Probably need to setup a scheme which will allow us
to contact expert on short notice during these days
in case of very specific questions.

...over to Mark

