(SiW) Ecal Ideas for Optimisation

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- Issues to be addressed until DBD

- Optimisation “Strategy”

- Conclusion and Discussion

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Calorimeter for ILC

Issues to be addressed until 2012

- Physics Prototypes of CALICE have demonstrated the feasibility of operating high granular calorimeters in test beams

  - Main results of data analysis:
    1) Linearity and Resolution in test beam confirms values simulated in LOI studies
    2) Calibration of SiW Ecal stable over several test beams campaigns (SiW Ecal)
    3) Low noise calorimeters (SiW Ecal)

=> Digitisation for DBD study?
Minor importance for SiW Ecal
Important for Scint Ecal

The cost issue

The cost estimate of a financially viable ECAL for ILD assumes this input :

A cost at the level 2 € / cm²

Now we are at the level of 10 to 20 €/cm² Might save a bit if a big amount is ordered

About 2500 m² of sensors needed for SiW ECAL of ILD = 300 000 sensors (actual design)

What could we do / rely on?

Savings due to the change on scale ?

Create a competition between manufacturers ?

- specific production...
- financial weight of our orders

Do things ourselves ?

- manpower, equipment

Optimize financial impact being opportunistic ?

- order when markets are low
- share production among various small batches

Optimize the yield ?

Deal with consumer devices manufacturers ?

- eg. OnSemi

It's time to act!!!!
Top Priority in R&D in coming years!!!

Alternative: Cost Lowering by Reduction of Sensitive Planes Viable?

CALICE Collaboration Meeting Sep. 2009

Detector Optimisation – Number of Layers/Sensitive Material

Always with the same depth: 24 X_0

Four Models to study:

1) A pure SiW Ecal Calorimeter with 30 Layers

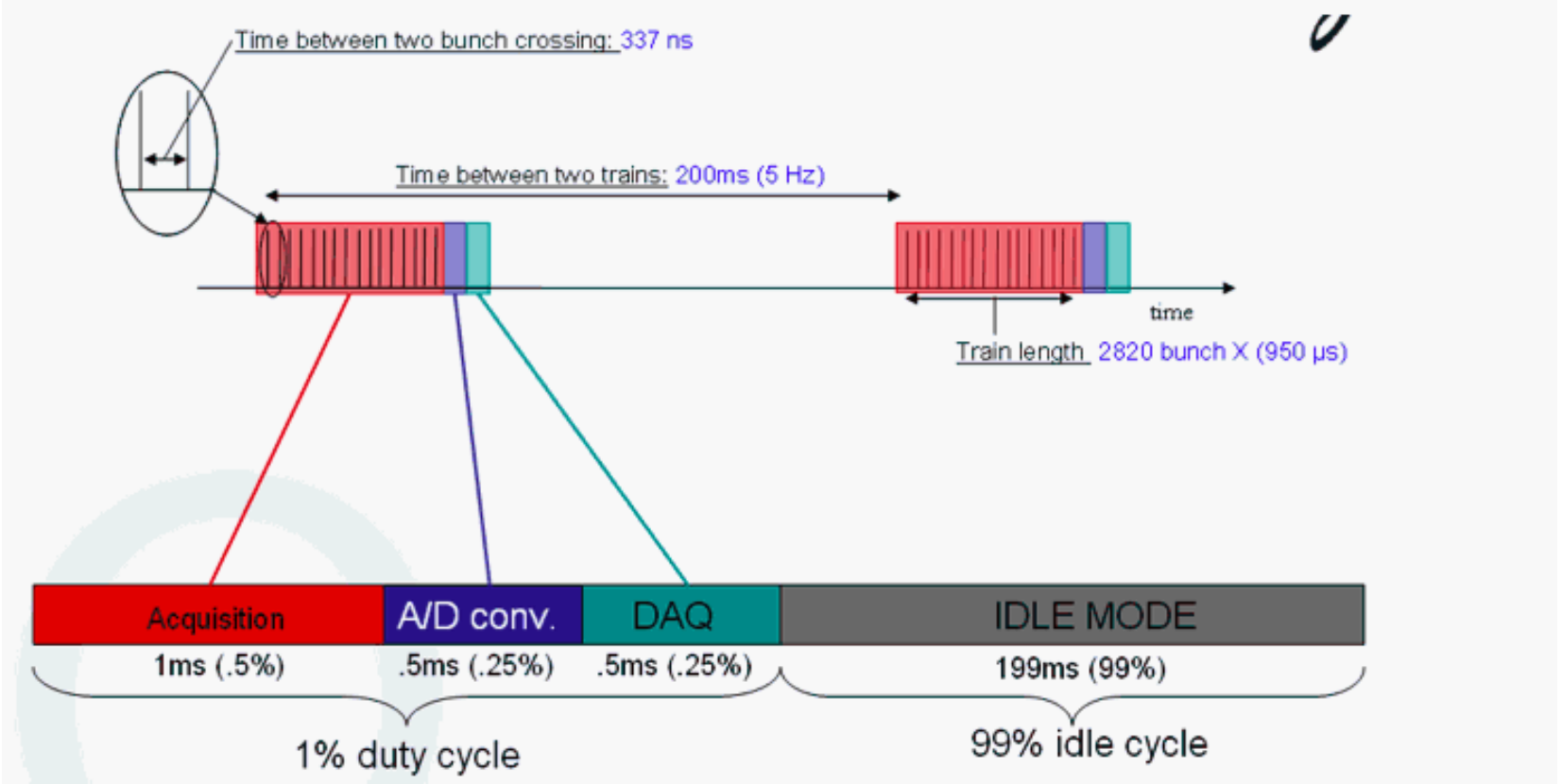
2) A pure SiW Ecal Calorimeter with 20 Layers

3) A pure Scintillator Ecal

4) NEW: A hybrid solution
e.g. first 20 layers Si with rear part of calorimeter equipped with Scintillator

A lot to simulate, need to find strategy how to select baseline

“Power Pulsing”



- The mastering of this technology is of interest for all calorimeters for the ILC

- It's studying should have very high priority in the R&D in the next two years

- Will there be sizable influence on the detector performance?
  First tests indicate that not.

Influence of Magnetic Field?

- Effects of B-Field seen by studies of Marcel and Kotera

Increment of ECAL response by 3.5 T magnetic field

ECAL	part	increment(%)
ScECAL	barrel	8.9
	end caps	~ 0
SiECAL	barrel	3.5
	end caps	~ 0

Would be desirable to confirm the magnitude of effect with data

Future Testbeams?

- For the latter two items support from test beam would be desirable!

- Testbeams with Ecal Technological Prototypes unlikely
  before middle of 2011 (and this is the very optimistic scenario)

=> Unlikely to have Input to DBD from new test beams

Financial situation and man power situation not in favour of quick progress

Need continued support for projects which have a chance to lead to a well founded baseline for the detector

Power Pulsing can maybe sufficiently studied on a test bench

We may know eletrodynamics well enough to be confident that the B-Field effects are well simulated

However ... best test is always real beam data!!!!

Conclusion

- Need to define strategy on simulation of various detector models

  Central question: Can we afford (from the physics point of view)
  to reduce the number of Silicon Layers?

- Input to DBD from next generation testbeams is on critical path!!!