

call for a ZHH task force

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ZHH task force

- it has been suggested at IWLC 2010 that we should form a dedicated task force for the ZHH analysis

In the Higgs topic, *ZHH* is **not** on the list (on Tuesday, maybe it is now ...)

What should we do about it ?

Many issues:

- Jet finding
- Flavour tagging
- Kinematic fits
- Backgrounds
- ...

M. Berggren @ IWLC 2010

If we will do this, we will need to form a **task-force** of experts on these topics, to have a **coherent** approach.

- this talk is a call for a ZHH task force
 - review the status of ongoing ZHH analysis
 - identify task list
 - discuss schedule

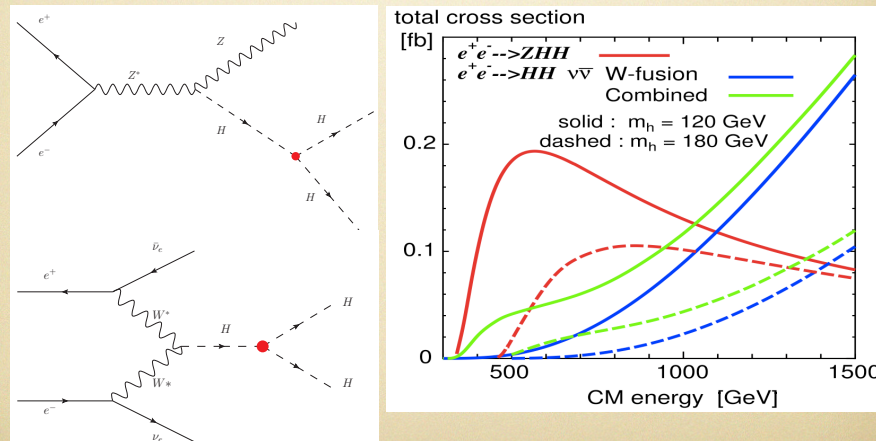
current status of ZHH analysis

- ZHH full simulation analysis ($H \rightarrow bb$, $Z \rightarrow qq, ll, \nu\nu$) using conventional analysis techniques
- It is critical to show the feasibility of the Higgs self coupling measurement during the initial stages of ILC (500 GeV) and to establish what can be realistically achieved

Measurement of the trilinear Higgs self-coupling @ ILC

J. Tian

- double Higgs-strahlung (dominate at lower energy)
- WW fusion (dominate at higher energy)



status of the simulation (preliminary)

$$e^+ + e^- \rightarrow ZHH \quad e^+ + e^- \rightarrow \nu\nu HH \quad M(H) = 120\text{GeV}$$

$$\int L dt = 2\text{ab}^{-1}$$

Energy (GeV)	Modes	Fast Simulation	Full Simulation
500	$ZHH \rightarrow (l\bar{l})(b\bar{b})(b\bar{b})$	2.5σ	3.6σ
500	$ZHH \rightarrow (\nu\bar{\nu})(b\bar{b})(b\bar{b})$	0.8σ	1.3σ
500	$ZHH \rightarrow (q\bar{q})(b\bar{b})(b\bar{b})$	2.0σ	2.0σ
500	$ZHH \rightarrow (q\bar{q})(b\bar{b})(WW^*)$	0.05σ	
1,000	$\nu\bar{\nu}HH \rightarrow (\nu\bar{\nu})(b\bar{b})(b\bar{b})$	2.5σ	

ZZH background yet to be included

- from LCWS2010, full simulations of llHH and $\nu\nu$ HH were investigated (today's topic).
- qqHH analysis was presented at ALCPG09 by Takubo-san.
- improvement in full simulation comes from b tagging and background specification.

dire need of improvement in reconstruction tools

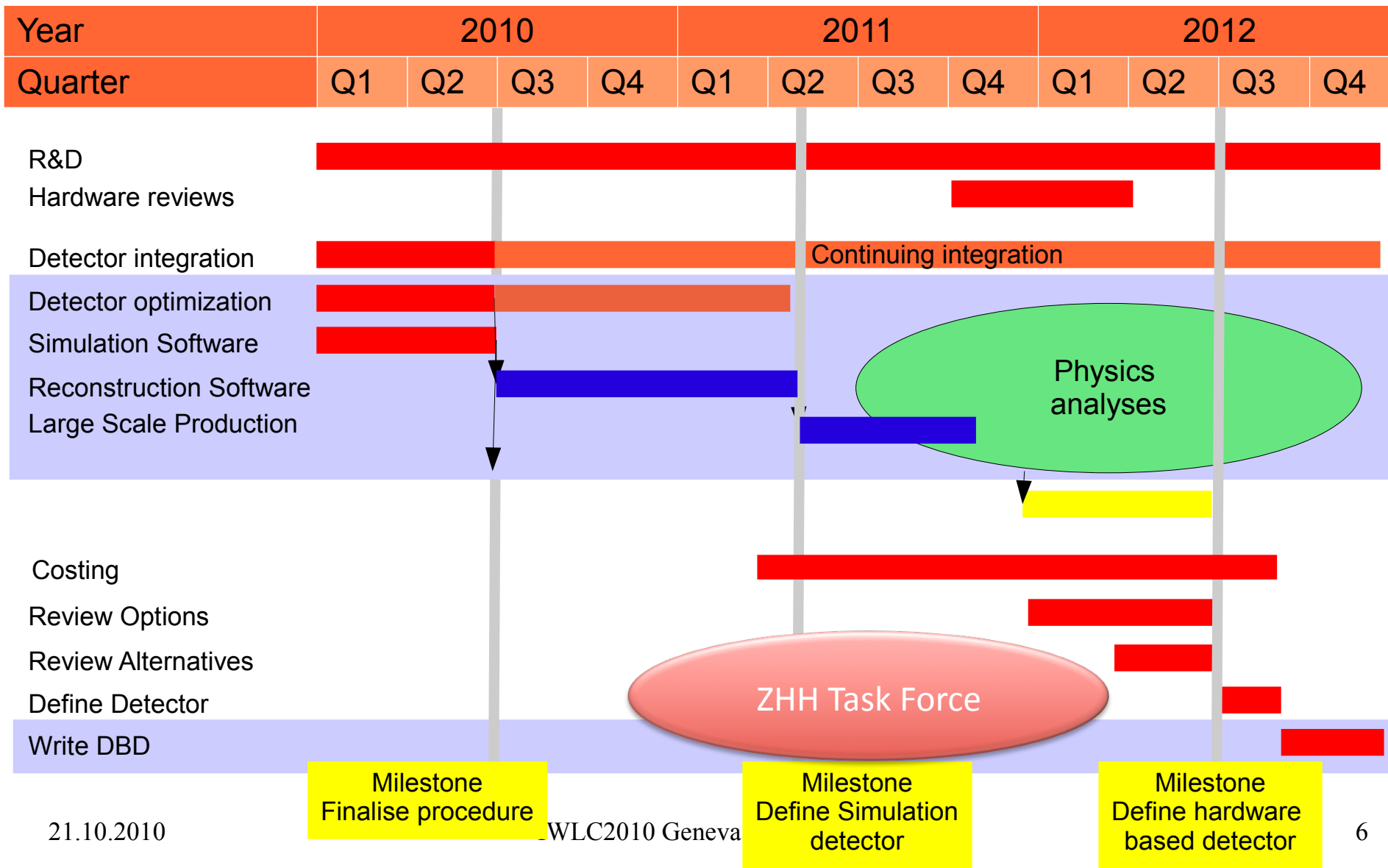
task list (software)

- vertex finding, jet finding, flavor tagging, vertex charge
 - LCFIVertex
- particle ID (lepton tagging)
 - PFOID is optimized using single particle events
 - need particle ID at the particle flow level
 - it would be nice to see realistic particle ID performance optimized for different calorimeter options (need at least one such algorithm!)
- kinematic fits
 - can we use MarlinKinFit?
- tracking
 - need realistic track impact parameter resolution
- background
 - effect of VXD background

task list (physics)

- study of systematic effects
 - effect of hadronization algorithms
- study different Higgs mass?
 - currently $m_H = 120 \text{ GeV}$
- add Higgs decay modes?
 - currently $H \rightarrow b\bar{b}$
 - add $H \rightarrow WW$?
- any other issues ... ?

ILD planning for the DBD



ZHH task force

- anyone interested is invited to join this effort!!