DCR: Feedback from Higgs

Higgs Working Group

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$\rightarrow$ just a reflexion of the DCR discussion in the Higgs session

The case for the ILC was made! Many times!

- Present in condensed form the arguments
  $\rightarrow$ automatically physics driven

  – SM Higgs: (self) coupling measurements
    CP quantum numbers, Spin

  – MSSM Higgs: detailed studies possible

  – NMSSM Higgs: "exotic" Higgses can be measured
    no problem with e.g. light A

  $\rightarrow$ all this (more or less) model independent

- more tricky scenario (also studied already in detail)

  – invisible Higgs (physics driven! : $h \rightarrow \tilde{\chi}_1^0 \tilde{\chi}_1^0$)

- Examples of more problematic scenarios . . .

  – LHC sees intermediate mass Higgs boson ($M_H \approx 200$ GeV) and
    nothing else. What can the ILC do?
    – Γ_{tot} possible
    – $hb\bar{b}$ coupling
    – model independent precise measurement of hWW
      and hZZ coupling
    ⇒ all of this the LHC cannot do

  – More (physics driven) examples for LHC/ILC?

- Scenarios not much covered yet:
  – Little Higgs
  – . . .

⇒ all this can be done with the 500 GeV ILC

Arguments for the ILC(1000):

- top Yukawa coupling better

- improve on many other coupling measurements
  (also e.g. for $h\gamma\gamma$ with $\gamma\gamma$ option)

- Extend the reach for MSSM heavy Higgs bosons
  (also e.g. with $\gamma\gamma$ option)

- Better reach for strongly interacting Higgs sector

But all these points are known and have been made

Connection to Detector CR

We have to prove that we can measure all this with the precision we claim, backed up by full simulations

$\Rightarrow$ much work is to do here

Given the time scale (of this document) and because reconstruction tools are still being devoloped, possibly a hybrid approach has to be used. Example: Higgs hadronic branching ratios ($h \rightarrow b\bar{b}$, $h \rightarrow c\bar{c}$, $h \rightarrow gg$)

Tools we have now:
— realistic pattern recognition in the vertex detector
— high level heavy flavor tagging tools

Having those tools we can evaluate the performance of e.g. heavy flavor tagging and parametrize it in the fast simulation and then revise the existing analyses

$\rightarrow$ can be done relatively fast
$\Rightarrow$ hybrid approach