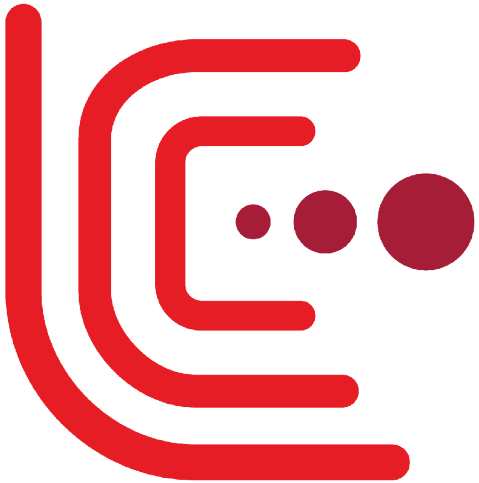
Update from the Parameters Group



ILD Analysis Meeting

April 16, 2014

J.List (DESY)

on behalf of the parameters group

Extended Parameters Group

- Inital members:
  Jim Brau (chair), Keisuke Fujii, Tim Barklow, JL
- After LCC/LCB in February:
  Nick Walker (co-chair), Kaoru Yokoya and Jie Gao joined
- Key questions:
  - How much initial fb^{-1} required at 250 GeV?
  - How much fb^{-1} ultimatively required at 250 GeV?
  - How much data required at ttbar threshold (350 GeV) and how does this contribute to Higgs physics?
  - Empty tunnel should be built for which top-level energy (before 1 TeV upgrade) – 500 GeV? 550 GeV?

Goal: physics reach for various scenarios

- We're not doing the politics, just provide physics & technical input
- Way forward:
  - define example running scenarios
  - Evaluate physics performance
  - Evaluate running time, production/installation schemes
- Experimental perspective:
  - Need to have simulation results for key physics analyses at the various energy steps
  - Can then scale to any lumi & polarisation!

Example Running Scenarios

a) 250 fb^{-1} @ 250 GeV, 500 fb^{-1} @ 500 GeV

b) 250 fb^{-1} @ 250 GeV, 500 fb^{-1} @ 550 GeV

c) 250 fb^{-1} @ 250 GeV, 1000 fb^{-1} @ 500 GeV
(for comparison with scenario b)

d) 100 fb^{-1} @ 250 GeV, 200 fb^{-1} @ 350 GeV,
500 fb^{-1} @ 500 GeV

e) 100 fb^{-1} @ 250 GeV, 200 fb^{-1} @ 350 GeV,
500 fb^{-1} @ 550 GeV

f) 25 fb^{-1} @ 250 GeV, 350 fb^{-1} @ 350 GeV,
500 fb^{-1} @ 500 GeV

g) 500 fb^{-1} @ 250 GeV, 500 fb^{-1} @ 500 GeV

Analysis status – ILD full sim

- Recoil mass and ZH cross section:
  - 250 GeV: Shun Watanuki
  - 350 GeV: Jacqueline & Shun Watanuki
    Studies by H. Li: ttbar background neglected – impact=?
- Higgs sigma x BR (and fusion cross-section):
  - 250 GeV: Hiroaki Ono
  - 350 GeV: Hiroaki Ono & Felix Müller
- Wanted: update of sigma x BR at 500 GeV !
  Any volunteers?

Analysis status – ILD full sim con't

- BR(H → tau tau), 500 GeV: Shin-ichi Kawada

  anybody looking in to CP properties here?
  High interest from theory community....

- ttH:
  - 500 GeV: Yuji Sudo
  - 550 GeV: assume x-section scaling (S+B)

    => do we want an analysis here?
    possibly in SGV...?

Ultimate luminosity at 250 GeV

- Unbeatable near threshold: Recoil mass!
- When do we get systematically limited?

  => very first look: muon momentum scale and recoil mass (ie beam energy) scale from ZZ:

  - scales with sqrt(lumi)
  - Previous estimates (H.Li): ~200fb => ~30 MeV sys.
- Higgs mass enters coupling extraction from sigma x BR: eg +-100 MeV => 0.5% on κ_b/κ_W

  => will need significantly better for 1 TeV (and lumi-up)

  Target number needs to be worked out, but could require $1ab^{-1}$ or more...

Summary & Outlook

- How much (initial/final) lumi at 250 GeV?
- Top baseline energy 500 GeV or 550 GeV?
  (in staged scenario: empty tunnel length...)

Not covered today, but still on the agenda:

- Low energy running (Z pole, WW threshold) with polarised beams
- Safety margins in energy reach at each threshold

Next:

- AWLC:
  1:30 to 2:00 hour plenary session on these issues!