Reference reaction discussion in the Roadmap Panel

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Guideline for LOI

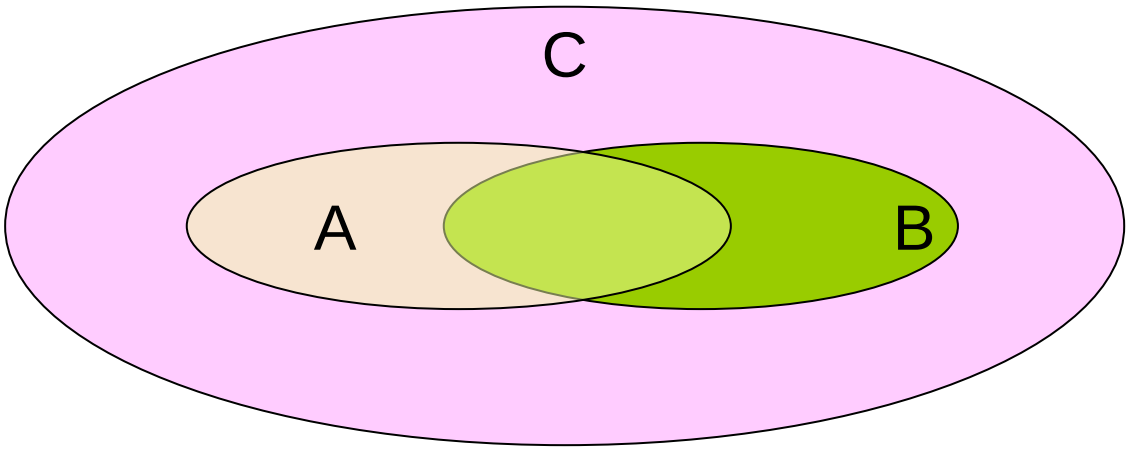
- ……
- ……
- The evaluation of the detector performance should be based on physics benchmarks, some of which will be the same for all LOIs based upon an agreed upon list and some which may be chosen to emphasize the particular strengths of the proposed detector.
- ……..
- ……..

Benchmark processes

A) Benchmark processes for ILD optimization

B) Reference processes which will be given by RD/IDAG

C) Benchmark processes for demonstration of ILD performance



Discussion at RM panel

- Attendance
  - S.Yamada :RD
  - F.Richard (Chair), J.Brau :WWS co-chair
  - T.Behnke, A.Miyamoto :Software panel
  - M.Thomson, Y.Sugimoto :ILD
  - T.Barklow, J.Jaros :SiD
  - G.P.Yeh, J.Hauptman :4 th
  - C.Damerelle :R&D panel

Software panel report

- Six benchmark processes
  1. e+e- → ZH → e+e-X (M_H=120GeV, E_{CM}=250GeV)
  2. e+e- → ZH, H → cc, Z → $\nu\nu$ (M_H=120GeV, E_{CM}=250GeV)
  3. e+e- → Z → $\tau\tau$ (E_{CM}=500GeV)
  4. e+e- → tt, t → bW, W → qq' (M_{top}=175GeV, E_{CM}=500GeV)
  5. e+e- → $\chi^+\chi^-/\chi_2^0\chi_2^0$ (E_{CM}=500GeV)
  6. e+e- → Scalar muon pair (E_{CM}=500GeV)
- Background samples
  - e+e- → 2f (f=μ,τ,u,d,s,c,b) (50 fb^{-1}), 4f (20 fb^{-1}), 6f (20 fb^{-1})
  - γ → X (X=pairs of μ,τ,u,d,s,c,b) (1 fb^{-1})
  - e+e- → $\gamma\gamma$ (nγ) (10 fb^{-1}), $\nu\nu$(nγ) (20 fb^{-1}), e+e- (0.1 fb^{-1}), eγ (0.1 fb^{-1})
  - Calibration samples
  - Single particle samples

Comments from LOI groups

- ILD: Happy with SWP report
- 4 th: Suggested reactions at 1TeV
- SiD: Presented their list
  1. e+e- → ff, f=μ,c,b (E_{CM}=250GeV)
  2. e+e- → Zh → l^+l^-X, l=e,μ (M_h=120GeV E_{CM}=250GeV)
  3. e+e- → Zh, h → cc, gg, ττ, μμ (M_h=120GeV E_{CM}=250GeV)
  4. e+e- → Zhh (M_h=120GeV E_{CM}=250GeV)
  5. e+e- → Scalar tau pair at Point 3 (E_{CM}=500GeV)
  6. e+e- → $\chi^+\chi^-/\chi_2^0\chi_2^0$ at Point 5 (E_{CM}=500GeV)

Agreement

- Benchmark processes
  1. e+e- → ZH → l^+l^-X (l=e,μ) (M_H=120GeV, E_{CM}=250GeV)
  2. e+e- → ZH, H → cc, Z → νν, qq (M_H=120GeV, E_{CM}=250GeV)
  3. e+e- → Z → ττ (E_{CM}=500GeV)
  4. e+e- → tt, t → bW, W → qq' (M_{top}=175GeV, E_{CM}=500GeV)
  5. e+e- → $\chi^+\chi^-/\chi_2^0\chi_2^0$ (E_{CM}=500GeV)
  6. e+e- → ZH, H → μμ (E_{CM}=500GeV)
- Observables of each processes should be clarified

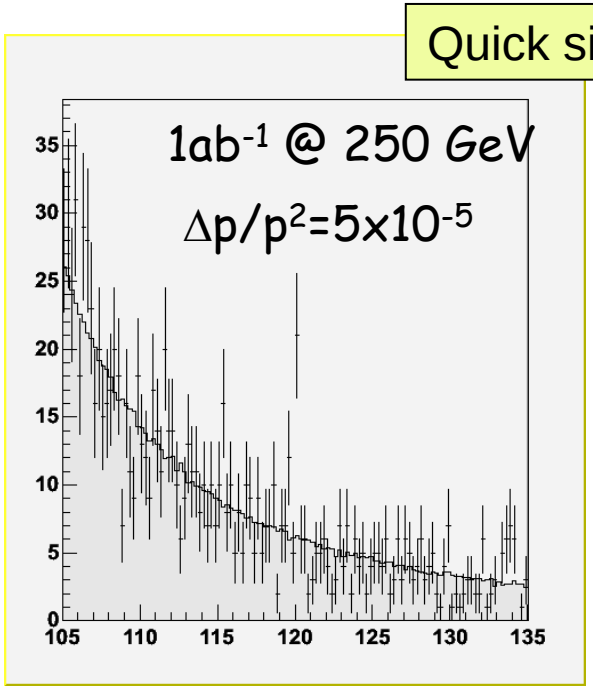
Next step

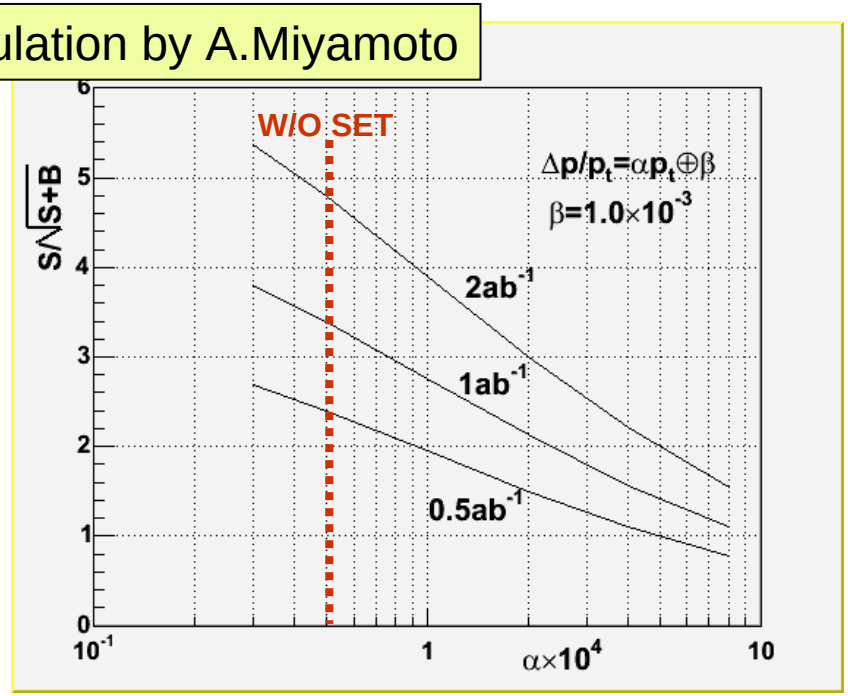
- Action 1: LoI representatives should send suggestions to the Software Panel about the observables for the 6 reactions
- Action 2: The Software Panel , in consultation with the LoI groups, will produce a second draft before Xmass
- RD pointed out that the IDAG could impose an extra effort (additional benchmark processes)

Y.S.'s personal view

- H → μμ
  - We can get only ~30 events with 500 fb^{-1} and 100% detection efficiency
  - To study this process, External Silicon Tracker between TPC and ECAL would be mandatory
  - Somebody should seriously think about design and alignment of this device

Quick simulation by A.Miyamoto





M.Battaglia's comment

- H → μ μ
  - Interesting process, but hardly stands as a main driver for the tracker optimization at 0.5TeV
  - The mass window of sensitivity is small, and running at higher energy will provide the definitive answer
- ee → τ τ
  - What are the observables?
    - Cross section measurement is easy
    - A_{FB} can use single prong decays
    - τ-tagging and polarization measurements are a challenge in more complex environments, not in two-fermion processes
- ee → t t
  - What do we learn from this reaction? Are there well defined requirements on the measurement accuracy?
- No processes testing the forward region