Summary and Discussions of 51th General Meeting of ILC Physics Subgroup

April 15, 2017, KEK

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On behalf of the ILC physics WG

Goal of ILC Physics WG

Provide a clear vision on the potential of ILC physics

Higgs/EW Top BSM

Most of these point to BSM search in one way or another

- **Direct search for new particles**
  complementary to the LHC

- **indirect search through precision measurements of SM physics (Higgs boson and top quark couplings, 2-fermion processes)**
  a powerful approach guaranteed at the ILC

Thank you for many contributions today

Brief Outline of today's talks

Pls see minutes for details

K. Fujii: Opening : Group activities and workshop schedules

T. Ogawa: Anomalous HVV coupling

- Anomalous ZZH almost finished. Aim to finish paper before June
- Also finalizing HWW results, using current strategy (chi-2 test , take into account migration effects)
- For further improvements, matrix element will be restarted to get improved results.

Y. Aoki: Plan of ZHgamma process

Measure xsec of ee→gamma h for two polarizations→ determine cγ and cγZ separately
Use recoil method to measure xsec of ee→γh
Now studying simulation/generator
Plan to finish analysis by M thesis deadline 2018 Jan

J.Yan: Characterizing Light Higgsinos from Natural SUSY at ILC √s=500GeV

evaluated measurement precision of mass and xsec of light Higgsinos with small ΔM (from ～20 GeV down to ～ 5 GeV) at ILC √s = 500 GeV, full ILD simulation

H20 : Mass: 1% (ILC1, ILC2) , 2−3%(nGMM1), xse: better than few %
Next: finalizing results and preparing publication, and extrapolate for staging

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Liao Libo: study of BR(H—>WW*) at CEPC

for 3 major channels, evaluated precision to be ～1.4% for 5 ab-1 at 250 GeV

plan to optimize cut, analyze other channels , and perform fit

H. Yamashiro: Plan for two fermion process study

April: construct processor for Z→mumu analysis

May: if possible study other channels

June: Summarize research results, Report the results at AWLC@SLAC

C.Drews: Heavy Higgs Search

Jet Pairing optimization in process, finding best R value for kt clustering

Data samples generated successfully

Analyses environment is set and partially tested on tth samples

Plan: Chi^2 Pairing with 3D display, extra conditions for pairing, bkg study w/ cuts

Goal: evaluate mass resolution and cross section times branching ratio

Bonus: distinguish between H+ and H-, Study of CP-violation measurement

Brief Outline of today's talks

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Y. Sato: Top electroweak couplings study using di-muonic state at $\sqrt{s}$ = 500 GeV

For kinematic reconstruction: currently using random values are used for seeds instead of MC truth values : works well for sample including detector effects, but not for that including gluon emission

Analysis : found that better precision can be obtained when more angles are used

Plan to check sensitivity for other parameters.

M. Kurata; Jet Clustering Using Deep Learning

- Reached stable network training, but overfit problem need s to be conquered, maybe by additional number of events → CPU problem.
- Show efficiency increase when tested using ZHH→(qq)(bb)(bb) events
- CNN seems like new idea to include color training + other new ideas are needed

Additional Material

List of Possible New Studies

Most topics are at √250 GeV

- **single W, Z process (following Tsuchimoto-san of Shinshu Univ)**

- **multi-gauge boson process**

- **2-fermion process**

- Hadronic recoil (model independence)

- **Light Higgsino at √s = 250 GeV**

- **top Yukawa（following Sudo-san's studies）**

- **Exotic Higgs decay, light Higgs, etc….**

And others…..