

Report from Physics WG

Keisuke Fujii
on behalf of the Physics WG
Mar. 22, 2017

WG Activities

ILD Physics Coordination Meeting

on March 21 (Tue.) 7:00-8:00 JST

Agenda

1. EPS (July 5-12) talks (abstract deadline: April 15)
 - Precision Higgs with staging discussion
 - New particle searches: ICFA support document
 - Top: ILC/CLIC combined
 - Precision EW (incl. TGC, etc.) if we have enough manpower to put into this
 - “Semi-private” talks
 - Higgs: HVV
 - Higgsinos
 - $e^+e^- \rightarrow bb$
 - ...
 - APS DPF (1st week of Aug.) (abstract deadline: May 12)
 - to be handled by Kiyotomo and Jim?

ILD Physics Coordination Meeting

continued

2. Papers in preparation

- CP mixture in $H \rightarrow \tau^+ \tau^-$: Daniel
- $e^+e^- \rightarrow bb$: Roman / Francois
- CPV in Top : Marcel
- Higgsinos : Jackie / Suvi
- Higgs self-coupling : Claude / Jumping / Masakazu
- Anomalous HVV couplings : Tomohisa / Junping
- ...

ILD Physics Coordination Meeting

continued

3. Subgroup meetings

- 1st BSM WG meeting on March 1
- regular subgroup meetings are probably overkill → have one as needed
- effective use of confluence

4. MC production → Hiroaki

5. Staging

6. Physics/optimization session of the Lyon meeting

- status reports from individual benchmark studies
- complementary to SLAC WS
- high level rec. session to be co-organized with the software WG

Staging

ILC parameters working group and LCC physics working group are working together on the staging with emphasis on the initial stage.

The staging option resurfaced again during LCWS 2016!

Following this ILC Parameters Joint WG met on Jan. 4

- Our goal is to consider the physics potential for an ILC that starts operations at low energy, either 250 GeV, or 350 GeV.
- We need to make the 1st stage as attractive as possible.
→ as high Luminosity as possible for the 1st stage.
- We could consider a different choice for the machine parameters.
- **Official request sent to Shin Michizono for some machine manpower to investigate the possibility.**
→ Kaoru Yokoya, Takashi Okugi, Toshiaki Tauchi, Daniel Jeans started a study. Needs modification of DR design to reduce horizontal emittance.
- Lyn has asked us to provide a first update on the physics impact of the staging possibilities by mid February.

Jim Brau, as the LCC associate director for physics and detector, requested the LCC ILC Physics WG to define the physics goals of the initial stage.

- A short (2-page) report (*a straw man staging scenario*) handed to Jim Brau, **shown on Feb.16 at the ICFA annual meeting in Valencia:**
<https://indico.fnal.gov/conferenceTimeTable.py?confId=13386#20170216.detailed>
- **Feed back from Jim to LCC Physics WG.**

ILC Parameters Joint WG met on Mar. 8 → action plan formulated.

- ***Luminosity optimization at 250 GeV → >50% luminosity increase by halving the horizontal emittance.***
- ***Realistic run scenarios being prepared: starting from 250 GeV then after lumi-up either to 350 or directly to >500 GeV***
- ***Final report expected in late May to early June → ALCW2017@SLAC?***

Further Requests

What does a particular performance figure tell us about new physics?

- Plots to show specifically how the expected precision for 500 fb⁻¹ at 250 GeV can distinguish different BSM scenarios?

- Plots like

arXiv: 1506.05992

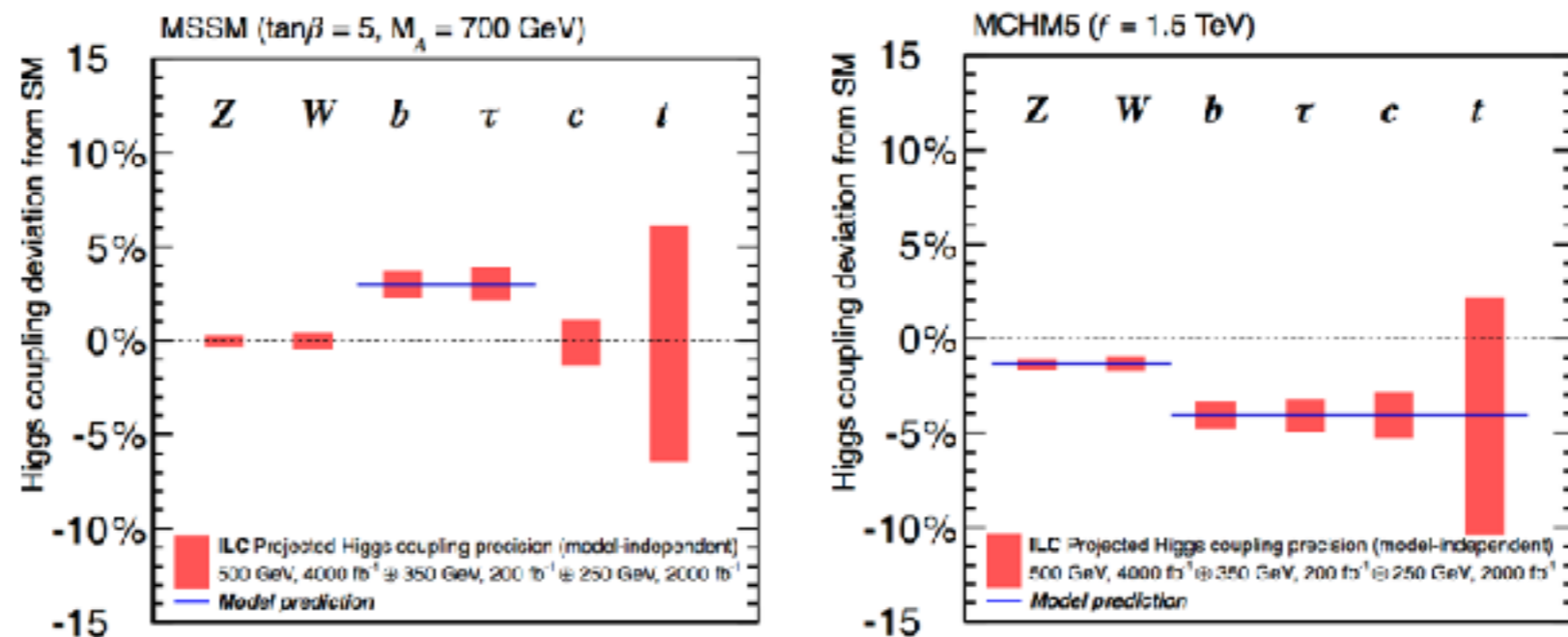


Figure 6: Two examples of models of new physics and their predicted effects on the pattern of Higgs boson couplings. Left: a supersymmetric model. Right: a model with Higgs boson compositeness. The error bars indicate the 1σ uncertainties expected from the model-independent fit to the full ILC data set.

- Model discrimination power: χ^2 vs Λ_{BSM} for a few BSM models.

P-values (as $f(\Lambda_{\text{BSM}})$?)

	Scenario A SM	Scenario B SUSY	Scenario C MCHM	Scenario D ...
Scenario A SM				
Scenario B SUSY				
Scenario C MCHM				
Scenario D ...				

MEXT ILC Advisory Panel

More Studies for Staging

Higgs/EW at 250GeV

- $\text{BR}(h \rightarrow WW^*)$
- Exotic Higgs decays
- 2-fermion processes
- m_W measurements
- TGC

Top/QCD

- $\sigma(bb)$, $A_{\text{FB}}(bb)$

BSM: Direct searches at 250/350GeV

- Higgsinos?
- Dark matter particles
- Extra light states (spin-less bosons)

Physics interpretations/implications with inputs from theorists

Synergies with LHC (assuming that ILC will be concurrently running with HL-LHC)

MEXT ILC Advisory Panel

Organization & Management WG

1st meeting
on March 9 (Thu.) 10:00-12:00 JST

Agenda

1. WG mandate, etc.
2. Plan → report expected in July 2017
3. Past studies by the HEP community
 - Masa Yamauchi on organization and management in the preparation phase and KEK's action plan
 - Sachio Komamiya on ILC PIP
4. AOB: 2nd meeting on April 7, 3rd on April 24, ...

Physics focus schedule

Mar 22:	Top/QCD	(KF)
Apr 5:	Higgs/EW	(Jenny)
Apr 19:	BSM	(KF)
May 3:	Top/QCD	(Frank)
May 17:	Higgs/EW	(Akiya)

Conveners' ML:

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Use this mailing list to send your talk request.