

Report from Physics WG

Keisuke Fujii
on behalf of the Physics WG
Feb. 7, 2017

Subgroup Activities

1. News from Higgs/EW WG since LCWS16 (Junping, Graham)

- study of ILC staging focusing on Higgs/EW physics at $E_{cm} \leq 350$ GeV (with input from many analyses)
- development of global fit with alternative parameterizations, using coupling ratio or branching ratios (Jenny & Junping)
- calibration with asymmetric Z running (Graham)
- updates on $H \rightarrow \mu\mu$ (Shin-ichi, talk on ILD S&A meeting, Jan.11, 2017)
- updates on anomalous HVV coupling (Tomohisa, talk on 50th general physics meeting, Feb.4, 2017)
- paper in preparation for Higgs self-coupling analyses (Claude, Masakazu, Junping, etc.)
- new study: $e^+e^- \rightarrow \gamma h$, to measure effective $h\gamma Z$ and $h\gamma\gamma$ couplings (Yumi Aoki, KEK & Sokendai)

Subgroup Activities (continued)

2. News from BSM WG since LCWS16 (Mikael, Jackie)

(1) Light Higgsinos (J. Yan, et al)

- Finishing up analysis for ILC1 ($\Delta M=21, 15$ GeV) and ILC2 ($\Delta M \sim 10$ GeV)
- Making progress in analysis of Mirage Mediation (with smaller $\Delta M \leq 4.5, 7$ GeV)
- Increased SGV statistics of pre-selected $\gamma\gamma$ and $e\gamma$ in the making (by M.Beggren)

(2) SUSY parameter extraction from results of (1) (S-L Lehtinen, et al.)

- Talked at last ILD meeting (1/25), thesis in preparation

Paper for (1) and (2) in preparation

(3) STC4 (M.Berggren., S. Caizza)

- Published in ILC-LHC combined STC paper, further developments presented at ICHEP & LCWS. S. Caizza: Thesis almost ready

(4) WIMP (M. Habermehl, T. Tanabe et al.)

- talked at last ILD meeting (1/25) thesis in preparation

(5) SUSY “Point 5” (M. Chera) : thesis nearly completed, talk at next BSM-focus meeting

(6) FCNC in top (F. Zarnechi) : beginning, talk at next next BSM-focus meeting

Subgroup Activities (continued)

3. Report from Top/QCD WG (Roman, Hitoshi)



Top/QCD - Overview



Topic	Group	Comment
ee->tt Full leptonic, Matrix element	LAL/Tohoku	Ongoing analysis
ee->bb	LAL	Ongoing analysis, paper and thesis in 2017
Top mass, ee->tty	IFIC	Ongoing analysis
Top mass Threshold, interpretation	MPP-MPG	Ongoing analysis
Top width Threshold	Tohoku	Ongoing analysis
ee->tt Anomalous couplings using EFT	IFIC	Ongoing analysis
Top CPV couplings	IFIC/LAL/RWTH	Paper in preparation
ee->tt, continuum Fully hadronic	???	Open topic, LAL has software available
Jet algorithms	IFIC	"Standing" item with several applications
QCD e.g. alpha_s	???	Open topic
t->ch	Warsaw, MPP	Ongoing analyses

- | "Lightweight" organisation
- | Mail and personal Communication
- | "Actors know each other"

- | Regular reports at s/w and Analysis meetings
- | Three analyses at tomorrow's meeting

- | Good communication with theory
and instrumentation groups

- | Members of ILD Top/QCD play visible
roles in promoting Top/QCD topics in
several instances

- | Top/QCD studies in ILD are backbone
when demonstrating LC physics potential
(w.r.t. Top/QCD)

Next major event:

[Top@LC17](#), 7-9 June 2017 at CERN
Chair of organisation Philipp Roloff (CERN)
Keisuke, Frank, Marcel and R.P. members
of programme committee

Remark: Table created for this meeting
May need scrutinising

Support Document that follows up the ICFA letter

First authors' meeting held on Sep. 9

Discussed the structure and basic ideas about contents together with how to share the writing.

2nd authors' meeting held on Oct. 13

Reviewed the status of the draft and discussed the request from JHEPC and possible readjustment of the contents of the document.

3rd authors' meeting held on Nov. 1

Reviewed the status of the draft (significant progress, but there are still missing parts, expected to be filled in shortly) and discussed the timeline until LCWS 2016.

4th authors' meeting held on Nov. 16

Reviewed the status of the draft (significant progress, most part filled). All the part to be filled and frozen by next Monday for final editing by Jenny and KF until Nov. 28.

5th authors' meeting held on Dec. 13

Reviewed the status of the draft. Loose ends identified. The current draft is 47 pages long but we decided not to shorten it but to provide an executive summary consisting of 10 or so bullet points. Disclaimer concerning staging options will be added in the introduction. Michael will expand and generalize the DM treatment.

6th authors' meeting held on Jan. 25

Jenny, as the chief editor, made the draft into an at least formally complete form, eliminating loose ends. The draft has 2-page executive summary.

The draft has been sent to Joachim, and LCC directors. We will submit this to arXive within a couple of days after final bush-up.

Preview

The Potential of the ILC for Discovering New Particles

Document Supporting the ICFA Response Letter to the ILC Advisory Panel

LCC PHYSICS WORKING GROUP

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Abstract

This paper addresses the question of whether the International Linear Collider has the capability of discovering new particles that have not already been discovered at the CERN Large Hadron Collider. We summarize the various paths to discovery offered by the ILC, and discuss them in the context of three different scenarios: 1. LHC does not discover any new particles, 2. LHC discovers some new low mass states and 3. LHC discovers new heavy particles. We will show that in each case, ILC plays a critical role in discovery of new phenomena and in pushing forward the frontiers of high-energy physics as well as our understanding of the universe in a manner which is highly complementary to that of LHC.

For the busy reader, a two-page executive summary is provided at the beginning of the document.

New request from JHEP via Hitoshi Yamamoto

Yet Another Document Planned by JHEPC

To be completed in March 2017
Japanese HEP committee is planning to issue
*a statement on the ILC physics case
based on the LHC Run2 results (so far).*

*Hitoshi hopes that the support document will
be an input to this JHEPC statement*

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 is being prepared now.

JHEPC is setting up a sub-committee to investigate the staging.

- A report expected probably before the summer?

Modified schedule

Report by the subcommittee setup under JHEPC

To be completed **before summer**

Japanese HEP committee is planning to issue
***a statement on the ILC physics case
based on the LHC Run2 results (so far)
and on the staging***

after receiving the report from the subcommittee.

MEXT ILC Advisory Pannel

6th meeting

happened on Feb. 1 (Wed.) 15:00-17:00 JST

Agenda

1. Recent status regarding the ILC project (Report)
 - US-J cost reduction program (M. Yamauchi)
 - Report on Morioka LCWS16 (S. Komamiya)
2. Plan for further review and a new WG
 - A new WG to study ILC management & governance (Chair: Mr. Miyama)
 - This new WG will have its 1st meeting in March.

Physics focus schedule

- Feb 7:** ***General ILD meeting: today***
- Feb 8: Top/QCD (KF) : no coordinators' reports
- Feb 22: Higgs/EW (Jenny)
- Mar 7: ***General ILD meeting***
- Mar 8: BSM (Frank) : no coordinators' reports
- Mar 22: Top/QCD (Akiya)

Conveners' ML:

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Use this mailing list to send your talk request.