ILC Physics Panel

2009/04/18

Keisuke Fujii on behalf of Michael Peskin

I would like to dedicate this talk to Prof. Takayuki Matsui

Late Prof. Takayuki Matsui at home

Prof. Takayuki Matsui died of cancer a week ago.

As many of you know he made invaluable contributions to the community since the dawn of the linear collider projects in the late 1980's.

He was the organizer of the APPI series of winter institutes and was also a good skier.

He was a great leader and it is really a great loss for all of us.

The Panel Members

- Convener: Michael Peskin, Deputy Conveners: Georg Weiglein, KF
  - Keisuke Fujii (KEK)
  - Klaus Desch (Bonn)
  - Andrei Nomerotski (Oxford)
  - Tim Barklow (SLAC)
  - Franco Bedeschi (Pisa)
  - Aurore Savoy-Navarro (Paris)
  - Stewart Boogert (Rutherford)
  - Seong Youl Choi (Chonbuk)
  - Youanning Gao (Tinghua)
  - Michael Peskin (SLAC)
  - Georg Weiglein (Durham)
  - Jae Yu (Texas-Arlington)

The Panel Activities

The charge from RD is to think about possible physics scenarios for ILC

1st Meeting on Nov. 8, 2008

Discussed the goals of the panel

Agreed to

Start with the following scenarios with early LHC discovery and a name assigned to each:

1. a standard SUSY scenario with squarks of 600 GeV
2. a SUSY scenario with a 200 GeV quasi-stable stau NLSP
3. an SO(10) Z-prime at 2 TeV
4. a resonance at 1 TeV decaying to t tbar
5. a 200 GeV Higgs discovered in h -> Z Z
6. black hole production with a cross section of 100 pb

More topics should be added as time goes on to cover a wider range of possible scenarios.

Request from ILCSC

Study the physics case for a Higgs resonance gamma-gamma collider and prepare a briefing paper to ILCSC in Feb. 2009.

-> Michael, the convener, with some gamma-gamma experts prepared a report.

-> Unfortunately the schedule was too tight and there was no time to have a panel meeting to discuss the contents of the report until the last moment.

-> Tim will tell us more on the contents of the report in the next talk.

2nd Meeting on Feb. 12, 2009

Discussed the PLC report

Agreed to

1. The importance of considering staging plan.
2. Prepare a more balanced report discussing all of the possible staging options and clarify the physics case for each by the end of the summer.
3. Study further on the possibility of PLC cost reduction.

Discussed general policy for controversial subjects

Agreed to

4. Every document from the group, whether authored by the whole group or by a few members, be discussed by the Panel in a phone meeting before it is sent out. The panel should make a collective decision on how this document should be released.
5. The importance of coming to a consensus if possible on basic numbers to be presented, which should be the default mode of operation. The interpretation of these numbers -- in particular, the question of what physics results justify what cost -- is subjective and beyond the scope of the panel.

Discussed the action plan for the 6 projects listed in the 1st meeting

Agreed to

6. Prepare a first draft for each of the 6 reports by June 5.
7. Discuss these over the summer to put them together to make a paper on "early physics discoveries at the LHC and implications for ILC". The paper should give specific questions about the ILC capabilities that would then be studied in detail and discussed by the larger ILC community.
8. Distribute the paper in mid-August to the regional physics groups.
9. A first opportunity for airing of these issues would be the ALCPG meeting at the end of September.

My Very Personal View

which has not been discussed at the panel at all and talking about it here might be a violation of rule 5 on slide 6, but RD allowed me to do so as a bargaining point.

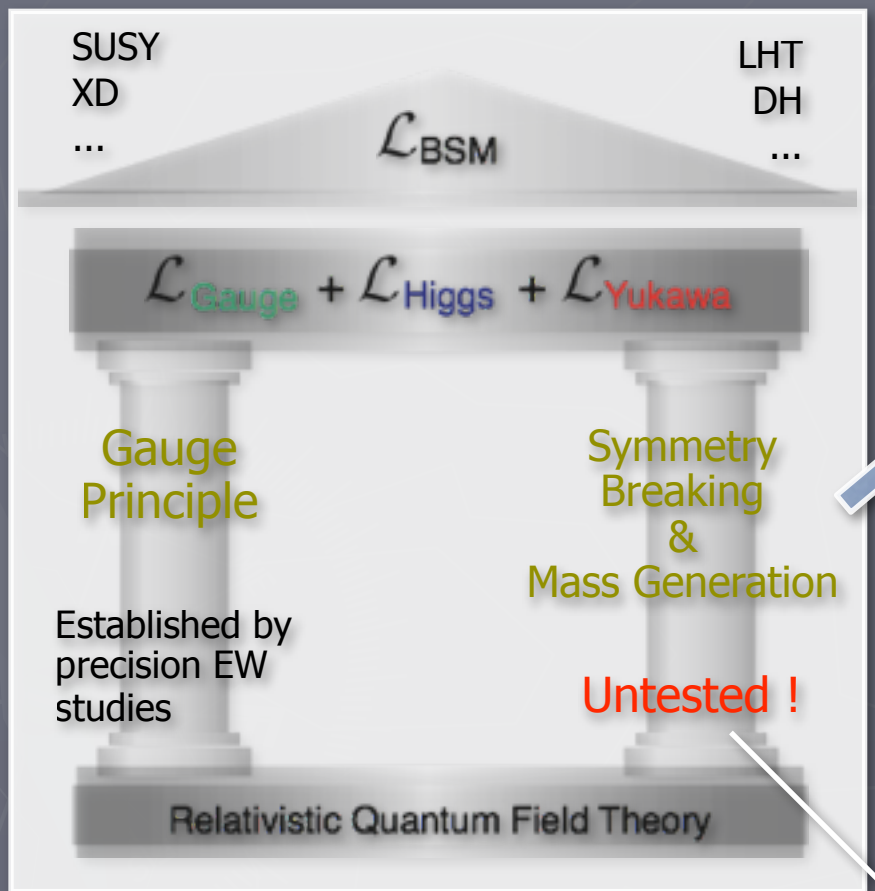
It is widely accepted that the ILC can be approved only in the context of a discovery at the LHC. To certain extent I share this opinion, but I think there is no general consensus on what discovery is enough.

Is the Higgs boson enough or do we need something clearly beyond the standard model?

Primary Goal

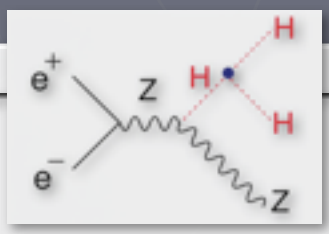
Discovery of New Fundamental Forces

Two Main Pillars of the Standard Model

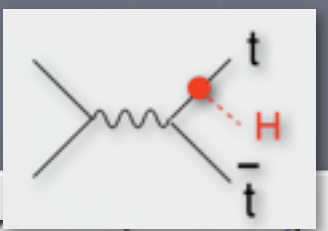


New Fundamental Forces

Higgs Force



Yukawa Force



We don't know how firm it is!

First verify the 2nd pillar, then put the BSM roof!

My Very Personal View

I believe that the discovery of two kinds of new fundamental forces should be more than enough and the coupling plot will remain in the text books forever as one of the most important measurements made in the history of HEP.

So I would say the Higgs is enough if we could really prove that it is the thing that gives mass to all the particles in the standard model.

And I am sure that deceased Prof. Takayuki Matsui would agree to this statement.