

# Energy Frontier for Snowmass 2013

M. E. Peskin  
SiD Workshop  
January 2013

The purpose of this talk is to review the Snowmass 2013 process, in particular, in the discussion of the Energy Frontier, and explain to you how ILC can be represented effectively.

I am an organizer of the Energy Frontier study, so I am in the odd position of explaining to you how to lobby me.

Fortunately for the credibility of the Snowmass process, it is not that simple. I can tell you who it is that you should persuade, but then it is your job to get them the persuasive information.

The same advice applies to any interested party.

The organization of the Energy Frontier study is described in a talk that I gave at the August SiD meeting. This talk was written jointly with my co-convener Chip Brock. Chip showed the same slides to US ATLAS and US CMS.

Chip gave an overview of our plans at the CPM meeting at Fermilab, October 11-13, 2012. Please see his slides at:

<https://indico.fnal.gov/contributionDisplay.py?sessionId=4&contribId=9&confId=5841>

Much practical material for our study is collected on the Snowmass wiki:

<http://www.snowmass2013.org/tiki-index.php?page=Energy+Frontier>

Our study is organized into 6 working groups:

HE1: The Higgs Boson

HE2: Precision Study of Electroweak Interactions

HE3: Fully Understanding the Top Quark

HE4: The Path Beyond the Standard Model -

New Particles, Forces, and Dimensions

HE5: Quantum Chromodynamics and the Strong Force

HE6: Flavor Mixing and CP Violation at High Energy

The outcome of the study will be 6 papers of length about 30 pages that attempt to summarize the current status and future prospects for each area -- written by the subgroup conveners -- plus a 30 page summary and overview written by Chip Brock and me.

It is the subgroup conveners who have the task of stating what the conclusions of Snowmass are and what the community consensus is on the important issues for the study.

To make an impact on the study, it is necessary to discuss with these people, attend their meetings, provide the data they need in the most convenient form, and provide them strong arguments for your point of view.

The subgroup conveners for Energy Frontier are:

Higgs -- Sally Dawson, Andrei Gritsan, Heather Logan,  
Jianming Qian, Chris Tully, Rick Van Kooten

Electroweak -- Ashustosh Kotwal, Michael Schmitt,  
Doreen Wackerath

Top -- Kaustubh Agashe, Robin Erbacher, Kirill Melnikov,  
Reinhard Schwienhorst

New Particles -- Yuri Gershtein, Markus Luty, Meenakshi Narain,  
Liantao Wang, Daniel Whiteson

QCD -- John Campbell, Kenichi Hatakeyama, Joey Huston,  
Frank Petriello

Flavor at HE -- Marina Artuso, Michele Papucci, Soren Prell

I hope you will agree that these are knowledgeable and thoughtful people. Most of them are now involved in LHC, for the obvious reason that this is where the action is now in the Energy Frontier.

E-mail lists have been set up for each of the working groups. To subscribe, send email to:

- [listserv@slac.stanford.edu](mailto:listserv@slac.stanford.edu)

with no subject and, in the body of the message:

- subscribe <group>

where

- <group> is one of: snowmass-higgs, snowmass-electroweak, snowmass-top, snowmass-bsm, snowmass-qcd, snowmass-flavor-at-he

The charge to the groups includes many questions -- please see the wiki.

However, there are two major questions that are important, nontrivial, and even controversial:

1. What is the physics motivation for the proposed High-Luminosity LHC ?
2. What is the future of studies of the Higgs Boson ? Do we need a "Higgs Factory" and, if so, of what kind ?

ATLAS and CMS need a sharp answer to #1 to justify putting large amounts of money into detector upgrades. This is the primary argument that Chip and I have used with the ATLAS and CMS management that they should put collaboration resources into the Snowmass study.



The organization of the study will also include:

- \* **benchmarks** - reference new physics models similar to the point and slopes of Snowmass 2001

These benchmarks have not yet been fixed. There are discussions ongoing, mainly involving the New Particles and Dark Matter subgroups.

It is recognized that these benchmarks should include points with light charginos, anomalous top couplings, etc. that can show off the relevance of ILC.

- \* **challenges** - a limited number of questions similar to: “What if the high rate for  $gg \rightarrow h \rightarrow \gamma\gamma$  persists?”

These also have not yet been rolled out.

The actual Snowmass meeting will be short, 10 days in Minneapolis. Thus, the actual work will be organized around a series of pre-Snowmass meetings. The most important of these will be two meetings where all working groups will meet:

April 3-6 at Brookhaven

June 30 - July 3 at a West Coast location

It will be important for any interested group to have multiple presentations at these meetings !

There will also be a 3-frontiers meeting of theorists at the KITP at UC Santa Barbara on May 29-31.

All of our meetings are announced at the site:

<http://www.snowmass2013.org/tiki-index.php?page=Energy+Frontier+Study+Workshops>

Another way to communicate with the Snowmass subgroup conveners is through the writing of **White Papers**.

The Snowmass proceedings will be published electronically on **eConf** in a manner similar to Snowmass 2005. The editors will be **Norman Graf** and **Michael Peskin**.

The proceedings will contain the above-mentioned 30 page papers from each frontier. This part of the proceedings may also be published in print.

The electronic proceedings will also contain any papers submitted from the community. Norman and I will announce a formal procedure for submission soon. Roughly, the procedure will be:

1. submit the paper to the arXiv
2. fill in a form on the Snowmass wiki to have this paper indexed as a Snowmass contribution

There will be no length limit other than the admonition not to bore the intended audience.

Working within this structure, ILC supporters should get the word out about the many opportunities offered by the ILC.

There are many hooks that our overseas collaborators can use to become involved.

The first Higgs working group meeting took place earlier this week at Princeton. It included talks by **Keisuke Fujii** and **Tomohiko Tanabe** on the capabilities of ILC. See

<http://physics.princeton.edu/indico/conferenceTimeTable.py?confId=127>

Later today, Jim Brau will discuss some specific plans for ILC physics contributions to the study.

Good luck!