

ILC in the US

Snowmass and P5

Process

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AWLC 2020
October 2020

With the creation of the International Development Team and the prospect of formation of the ILC Pre-Lab in 2022, the ILC is now set on a schedule that could lead to its first data in the **mid-2030's**.

This is what the physics calls for. As the LHC experiments are reaching their final results on Higgs boson properties and new particle searches, the ILC will be able to advance these studies with the precision – in a broad array of scenarios – to conclusively demonstrate deviations from the Standard Model.

This schedule will also give experimental physicists now involved in the LHC detector upgrades the **opportunity to plan, construct, and operate new detectors** optimized for precision measurements of e^+e^- reactions.

The ILC is envisioned as a global accelerator project, supported by contributions from international partners.

The **CERN Council** has made its opinion known in the 2020 update to its Strategy for Particle Physics,

“The timely realisation of the electron-positron International Linear Collider (ILC) in Japan would be compatible with this strategy and, in that case, the European particle physics community would wish to collaborate.”

We will hear from representatives of **Canada** and **Latin America** later in this program.

But, the ILC cannot go forward without the support of physicists and government agencies in the United States.

The planning for future facilities and projects in the US proceeds in two steps:

A grass-roots community study (“Snowmass”), conducted by the APS Divisions of Particles and Fields and Beams

A HEPAP subpanel (“P5”) giving prioritized recommendations to the NSF, DOE, and Congress.

There will also be a National Research Council panel on the future of US particle physics in 2021.

The current round of the community study Snowmass 2021, is now underway. The conveners of this study are Young-Kee Kim and Tao Han, the 2020 and 2021 DPF chairs.

The ILC was discussed warmly in the **2014 P5 report** following Snowmass 2013. One of the recommendations in this report was:

“Motivated by the strong scientific importance of the ILC and the recent initiative in Japan to host it, the U.S. should engage in modest and appropriate levels of ILC accelerator and detector design in areas where the U.S. can contribute critical expertise. Consider higher levels of collaboration if ILC proceeds.”

Given the motion now toward establishment of the ILC Pre-Lab, a stronger conclusion is possible in this round.

It is obviously crucial to the proposed schedule of the ILC that US participation in the ILC should be highly recommended by the 2022 P5 panel.

This panel will be looking for a **strong physics argument** for ILC from the participants in Snowmass 2021, but it will also be looking for **strong community support and interest to participate** in the ILC experiments.

If you wish to have ILC as an option for your future, it is essential that you become involved in the Snowmass 2021 study.

Please join the Snowmass activities described at

<https://snowmass21.org>

especially those of the **Energy, Accelerator, and Instrumentation** frontiers. Meetings on all topics relevant to ILC are indexed on this site.

The conclusions of Snowmass 2021 will be brought together in a final meeting at the University of Washington, July 11 - 20, 2021.

Early-career physicists — who will be mid-career in 2035 — should take special notice of the Snowmass activities.

This is your opportunity to demand that the opportunity to join this project exists for you.

This may be the only new energy frontier accelerator proposed in your career in which you will be able to take a leadership role.

To assist ILC activities in the Snowmass 2021 study, the Working Group 3 of the IDT and its Physics subgroup have created resources for Snowmass studies:

“ILC Study Questions for Snowmass 2021”, [arXiv:2007.03650](https://arxiv.org/abs/2007.03650)

orientation to ILC physics, and 90 questions for possible Snowmass projects.

<http://ilcsnowmass.org>

web page with links to physics simulation tools for Snowmass, including a new version of Delphes and a Root-readable format for e⁺e⁻ event analysis, and tutorials for these. Standard Model event samples for the 250, 350, 500, and 1000 GeV ILC are provided in several formats.

The Wednesday morning parallel session of this meeting will review the ILC simulation frameworks for Snowmass. It will include a discussion session with feedback from early adopters. Please come to get involved in Snowmass projects and to help us support your projects more effectively.

The IDT WG3 (chaired by Hitoshi Murayama) and its Physics subgroup (conveners: Keisuke Fujii, Christophe Grojean, Michael Peskin) will organize a multi-author report

International Linear Collider – Report to Snowmass 2021

to be completed in June 2021. We welcome all of you to become authors of this report, and to participate in the writing of it.

The ILC Snowmass report will cover the following subjects:

ILC accelerator design for 250 GeV, 500 GeV, and 1 TeV, and latest results on ILC accelerator technology

ILC detector designs, simulation framework, and technologies for improved performance

ILC physics projections for **Higgs**, **W**, **top**, **precision electroweak** measurements, and new particle searches in **collider** and **fixed-target** modes

Unified **SMEFT** analysis of Standard Model parameter determinations and precision tests

Accelerator options for the **long-term future** of the ILC laboratory, and their **physics opportunities**

There is no doubt now that the construction of the ILC will dramatically increase our knowledge of the most mysterious aspects of elementary particle physics.

The creation of the ILC Laboratory will also initiate a long future program exploring successively higher energies with electron linear accelerators.

For Snowmass 2021, we intend to write a report that will enumerate both the near- and long-term prospects for this new world laboratory.

Please join us in defining this vision and in insuring that it will be realized.