

HEPAP and P5 Report

DIET Federation Roundtable

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Overview

I am here today to present the perspective of the U.S. particle physics community.

My two topics today are:

- **Scientific importance of the ILC**
- **ILC and the vision of P5 for our field in the U.S.**

The scientific interest and significance of the ILC has been reiterated in 3 major reports in the last 2 years in the U.S.

- **HEPAP Facilities Subpanel – March 2013**
- **“Snowmass” community study – August 2013**
- **HEPAP P5 report – May 2014**

Summary of Recent Studies

HEPAP Facilities Subpanel – to assess science & technical readiness of potential future scientific facilities

ILC was classified as “absolutely central” in scientific importance. Accelerator classified as technically “ready to initiate construction.

Snowmass community study - an initiative of the APS DPF

With purpose to study the scientific opportunities of field of particle physics

Scientific interest in ILC was quite high.

Significant scientific importance

Complementarity of the ILC to hadron colliders at CERN

desirable, or even necessary, to have both facilities available for the global scientific program.

Facility upon which one can build future opportunities

value of future upgrades of ILC to even higher collision energies.

P5 - a HEPAP subpanel, **Particle Physics Project Prioritization Panel.**

charged to advise the US agencies on future directions for investment in the HEP field, and to prioritize projects within specific budget “scenarios”.

P5 Prioritization was Science Driven

A strategic plan, executable over 10 years, in the context of a 20-year global vision, in *realistic* budget scenarios

The P5 report is the culmination of a community-driven process

- **Snowmass community study**
- **P5 committee**
 - Charged to advise agencies on future directions
(in specific budget scenarios)
 - Benefitted from 5 members from Canada, Europe, and Japan
including Hiroaki Aihara, Toshinori Mori

The P5 prioritization process was science driven.

- ***Snowmass – identified science questions & opportunities***
- **P5 distilled the questions into 5 “science drivers”**
 - **Higgs — significant change in scientific landscape**
 - **Neutrinos**
 - **Dark matter**
 - **Cosmic acceleration**
 - **New particles, new interactions**

Highlights of the P5 Report

Particle physics is global.

US planning should be done within global context.

Recommendation 1: Pursue the most important opportunities wherever they are, and host unique, world-class facilities that engage the global scientific community.

A strategic plan, executable over 10 years, in the context of a 20-year global vision, in *realistic* budget scenarios

A balanced program:

- Address all 5 science drivers
- Host projects in U.S. + participate in projects hosted elsewhere
- Large, medium, and small projects

Three large projects, unfolding with time

- High-Luminosity LHC, at CERN
- International neutrino program hosted in U.S.
- ILC hosted in Japan
- *Order based on budget constraints, physics needs, and readiness.*

P5 Recommendation for the ILC

“The interest expressed in Japan in hosting the International Linear Collider (ILC) is an exciting development.”

- **ILC addresses 3 of the 5 science drivers**

As the physics case is extremely strong,

Support for ILC planned at some level in all budget scenarios, through a decision point within the next five years.

Participation by the U.S. in ILC project construction depends on a number of key factors,

some of which are beyond the scope of P5 and some of which depend on budget Scenarios.

Possibilities:

- If the ILC proceeds, there is a high-priority option in Scenario C to enable the U.S. to play world-leading roles. (in C, new funds available)
- Even if there are no additional funds available, some hardware contributions may be possible in Scenario B, depending on the status of international agreements at that time.

P5 Recommendation for the ILC

Recommendation 11:

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.

ILC in Scenario C (C = an opportunity for additional investment)

P5: Should the ILC go forward, Scenario C would enable the U.S. to play world-leading roles in the detector program as well as provide critical expertise and accelerator components.

U.S. Activities on ILC after P5

Accelerator:

- Continued work on site-specific (Kitakami) **Beam Delivery System** (BDS)
- **Mike Harrison** is the **global accelerator director** for ILC (oversee design)
- Contributions to the site-specific **Conventional Facilities** development
 - workshops were held
- Development of **machine lattices**
- R&D on and building new prototype of the **positron source**

Physics & Detectors:

- Optimization of the **SiD** detector
- Developing **assembly** scenarios for the Kitakami site
- **Integration** with the BDS
- Development of **staging and running scenarios** for starting up
 - different energies and luminosities

Summary

US particle physics community has come together to make a plan.

- Driven by the science
- Meeting budget constraints
- Enabling U.S. leadership roles in the global context
- Providing a continuous flow of results while making essential investments for the future

Strategic plan is presented in *2014 P5 Report: Building for Discovery*.

The P5 report recommends U.S. engagement in the ILC as one part of a comprehensive U.S. strategic plan for particle physics.

- reiterated scientific interest and importance of the ILC
- recommended:
 - U.S. engagement in design, in areas of critical U.S. expertise
 - Consideration of higher levels of collaboration if ILC proceeds

The report & plan have been well received

- by the HEP community and
- by the funding agencies & decision makers.