

LC activities in Americas and P5 update

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Jefferson Lab

Acknowledgements

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- **Michael Peskin provided data on the Americas Linear Collider Workshop.**
- **The status of ILC in Canadian physics planning was provided by Jonathan Bagger**
- **The political situation vis-à-vis the Particle Physics Project Prioritization Panel (P5) was provided by Andy Lankford, High Energy Physics Advisory Panel (HEPAP) Chair.**

ILC Status in Americas - Outline

Explicit funding for ILC has been modest

Participation in physics case is strong

Experimental and Detector groups are active in both the SiD, ILD and CLIC collaborations

Accelerator work

**in some specific areas of CLIC
through LCLS II and SRF R&D is substantial**

Americas Linear Collider Committee active

P5 Report from 2014 was positive and is basis for current agency posture

Theory / Physics

Jim Brau: LCC Associate Director for Physics and Detectors

Linear Collider Committee Physics and Detectors Exec Board

US Members:

Dima Denisov (FNAL), Andy White (UT Arlington), Michael Peskin (SLAC), Norman Graf (SLAC)

Improved Formalism for Precision Higgs Coupling Fits

[Tim Barklow](#), [Keisuke Fujii](#), [Sunghoon Jung](#), [Robert Karl](#), [Jenny List](#), [Tomohisa Ogawa](#), [Michael E. Peskin](#), [Junping Tian](#)



Silicon Detector

Tracking System

SLAC, U.Oregon, UC Davis, ANL, UNM, Yale, (Bristol)

Electro-magnetic calorimeter

SLAC, U. Oregon

Hadronic calorimeter

UTA, SLAC, ANL

Muon system

FNAL

Forward region

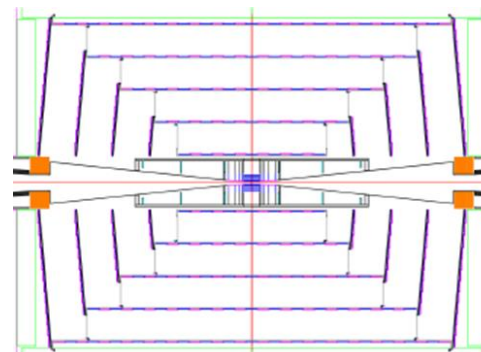
UCSC, SLAC

MDI/Installation

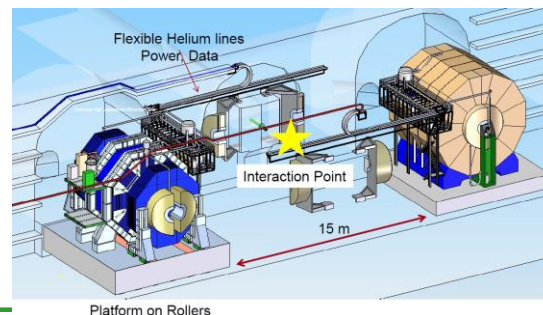
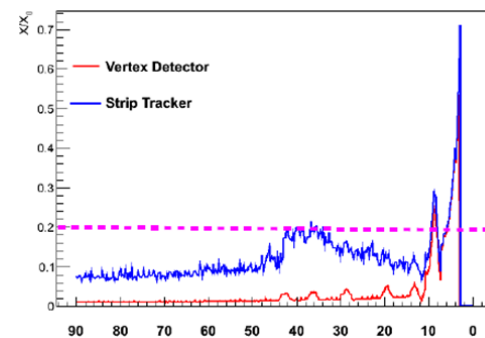
SLAC, (DESY)

Computing/Software/Physics

SLAC(DESY), PNNL, (Glasgow), UO, UTA, ANL



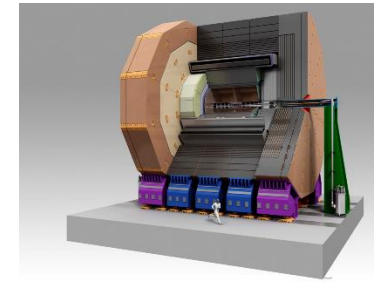
- Weekly detector optimization meetings (many students)
- Design options
- New (DD4HEP) simulation
- Physics studies
- Cost estimation/reduction
- Mechanical/electronics engineering to support conceptual design



Spokes
 Andy White,
 (Marcel Stanitski)



International Large Detector



- Letter of Intent published in 2010. Includes 12 US and 5 Canadian institutions.
- Since 2015, ILD has transitioned to a more formal management structure. Currently 71 institutions are members of the Institute Assembly including 7 from the US and Canada.
 - Carleton, Indiana, Kansas, McGill, NIU, Princeton, Victoria
- ILD's current effort is focused on preparing the groundwork for a real proposal and understanding better the detector optimization and performance.
- Pending the green-light, securing funding for ILC targeted work in North America has been difficult. Some limited funding possibilities with base-grant funding and now with US-Japan. Canada similar.
- Activities:
 - McGill, NIU – participation in CALICE R&D collaboration
 - Carleton, Victoria, Cornell – contributions to LC-TPC R&D collaboration
 - Kansas - physics and detector studies, ILD management (Wilson)
- Contacts in North America: Alain Bellerive (Canada) and Graham Wilson (US).

CLIC Detector

ANL, U. Michigan, and Pontificia Universidad Catolica, Santiago, Chili

Accelerator Development

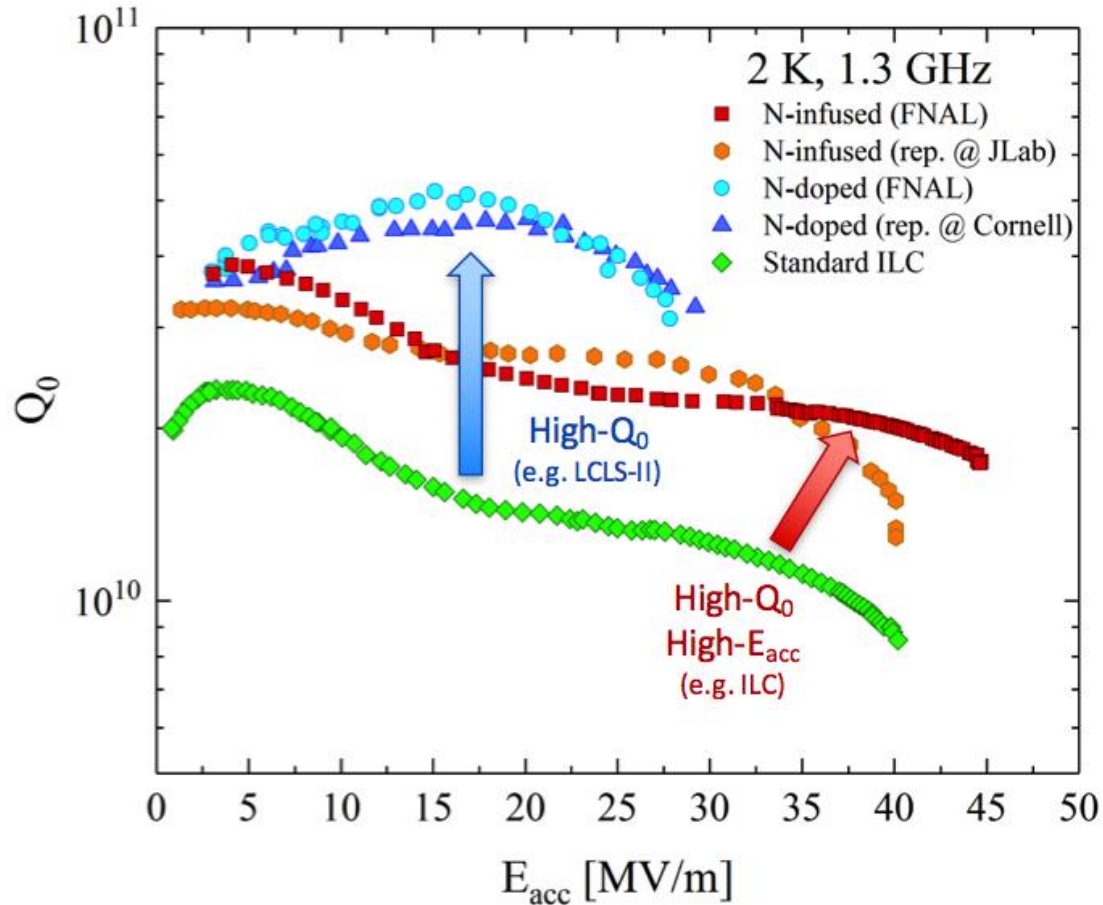
- **CLIC**

- **ANL- development (with Tsinghua) of X-Band dielectric accelerating structures**
- **Cornell – instrumentation development and testing on CESR**
- **SLAC – Development of X-band klystrons**

- **ILC Linac**

- **LCLS II Construction → Cost Savings**
 - **Nitrogen Treatment**
 - **Higher Q0 Values**
 - **Potential for Higher Gradients**
 - **Infrastructure FNAL, Jefferson Lab**
 - **Demonstration of production capability**
 - **Partnership – SLAC-FNAL-Jefferson Lab**
- **Niobium material**
 - **Material affects relevant performance characteristics**
 - **Ingot material gives potential further cost decrease**

R & D for *ILC* – *SRF* Cost Reduction



Americas Linear Collider Committee

- **David Asner (PNNL), Jonathan Bagger (TRIUMF), Barry Barish (Caltech), Alain Bellerive (Carleton), Jim Brau (Oregon), Marcel Demarteau (ANL), Dima Denisov (FNAL), Paul Grannis (Stony Brook), Mike Harrison (BNL), JoAnne Hewett (SLAC), Steve Holmes (FNAL), Nigel Lockyer (FNAL), Joe Lykken (FNAL), David MacFarlane (SLAC), Lia Merminga (SLAC), Hugh Montgomery (Jefferson Lab, Chair), Hitoshi Murayama (UC Berkeley, LBNL, Kavli Tokyo), Marc Ross (SLAC), David Rubin (Cornell), Andy White (UT Arlington), Graham Wilson (Kansas)**

Americas Workshop on Linear Colliders

- 151 registered participants



Burton Richter

Masanori Yamauchi

Benno List

- 1st Day Plenary

- Past and future of linear colliders:
- Future of KEK and Linear Colliders:
- Questions about ILC staging options:

- Open Day with major discussion and enhanced attendance

- Workshop attended by Hon. Ito

- Tour, Discussions with Participants
- Presentation – Outlook for ILC in Japan



ALCC Activities

- **P5 2013-14**
 - Presentation on the physics case, and on a model of US contributions to a 250 GeV ILC, with conversion from ILCU costs to US costs.
- **Hosted DIET visit to Washington DC in Spring 2017**
 - Following visits in 2014, 2015, 2016 with HEPAP Chair present
- **Americas Workshop on Linear Colliders, SLAC June 2017**
- **Active Participation International Arena**
 - Physics Studies
 - LCC Cost review
 - Linear Collider Board Discussions
- **Briefing to DOE HEP**
 - Staging/Scope of ILC250
 - Physics case for ILC250
 - Cost Savings from scope and funded R&D accrued and projected

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
- **Use the Higgs boson as a new tool for discovery**

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.

ILC Status in Americas

ILC is contained in the Canadian Subatomic Physics Long-Range Plan, covering the period 2017-2021 and so remains within its horizon

US P5 Report from 2014 was positive and is basis for current agency posture

It was very well received by DOE and by Congress

ALCC is interacting with DOE and HEPAP in preparation for positive Japanese announcement

It is unlikely that HEPAP will be requested to perform a broad study ahead of the European Strategy Study