



Status & Prospects in Americas

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Argonne National Lab & LCC

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Purpose & scope

High level overview of Status & Prospects in Americas

“Americas” is currently: Canada & USA

In future will reach out to rest of
Americas for “ILC in Japan” Currently no
involvement

Apologies if this is too
USA centric but currently in middle of
strategic exercise

Will use “ILC in Japan” as acronym
for Lepton Collider that is possible
in the near future.....

Any other options much
further in future

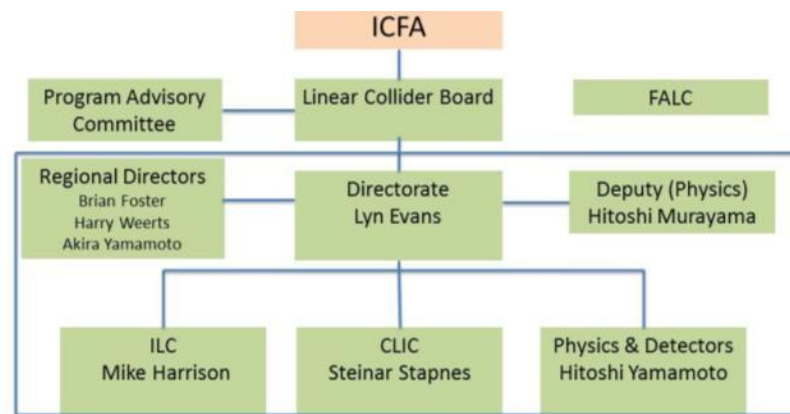


Some re-organization

After ILCSC, GDE and Research Directorate(RD) completed the TDR they & CLIC transformed into:

ILCS → LCB (S.Komamiya; chair)

GDE, CLIC & RD → LCC (L.Evans, director)



Had "separate" organizations for Accel and Phys & Det's: LCSGA and ALCPG

Americas:

They merged into new structure: American Linear Collider Committee (ALCC). Responsible for both.



Current organization

ALCC
tasks:

- Be advocate for & enable LC case especially towards funding agencies
- Coordinate activities.
- Cover both ILC and CLIC.
- Provide connection/conduit to LCC
- Organize regional workshops

There is a charge/charter

Membership:

Jonathan Bagger	<i>Johns Hopkins</i>	Graham Wilson	<i>Kansas</i>
Nigel Lockyer	<i>Fermilab</i>	Mike Harrison	<i>BNL</i>
David MacFarlane	<i>SLAC</i>	Marc Ross	<i>SLAC</i>
Lia Merminga	<i>TRIUMF</i>	David Rubin	<i>Cornell</i>
Hugh Montgomery	<i>JLab</i>	Joe Lykken	<i>Fermilab</i>
Director	<i>TRIUMF</i>	Andy White	<i>UT Arlington</i>
Harry Weerts	<i>ANL, chair</i>	Paul Grannis	<i>Stony Brook</i>
Jim Brau	<i>Oregon</i>	Dmitri Denisov	<i>Fermilab</i>

Try to represent all LC entities and communities

First meeting in June 2013

More later



The Linear Collider figures prominently in the current NSERC long range plan for subatomic physics, 2011-2016

Detector R&D at the \$75K-100K / yr funding level:

- Centered on TPC development (Carleton/TRIUMF) with the LCTPC collaboration
- calorimeter development (McGill/IPP) with the CALICE collaboration.

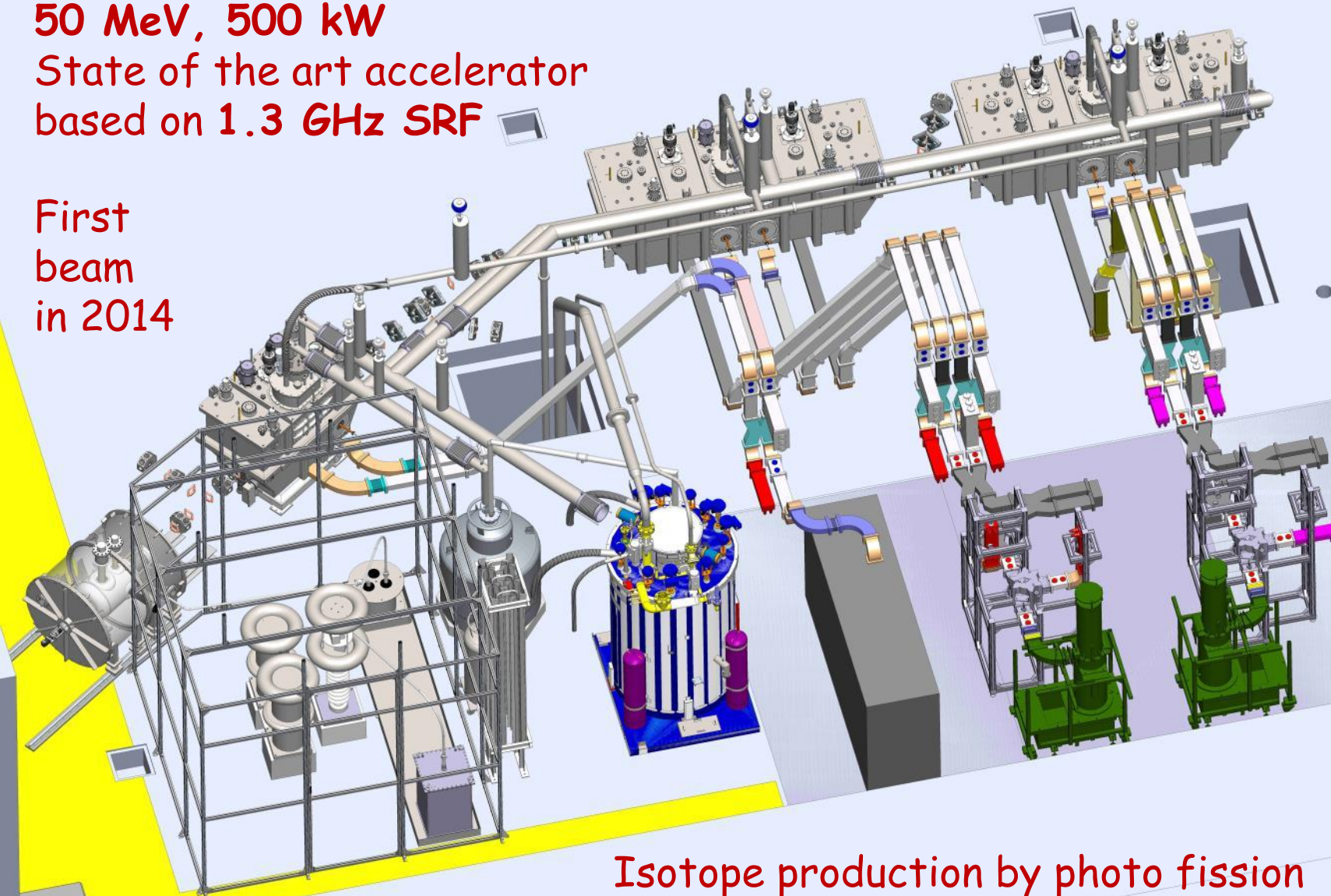
Detector R&D work for the LC has been going since 2000. In initial years there was also a very active participation by Canadian theorists to help define the physics case.

Apply TPC expertise to other experiments; grow expertise
Monitoring where "ILC in Japan" is going

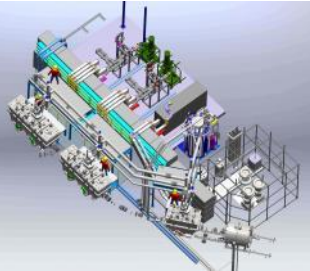


50 MeV, 500 kW
State of the art accelerator
based on 1.3 GHz SRF

First
beam
in 2014



Isotope production by photo fission
Possibility for other applications (FEL, ERL)



ISAC



-  Existing
-  ARIEL I
-  ARIEL II

Cyclotron

e-linac

- Completing and operating ARIEL is absolutely central to realizing laboratory vision

- ARIEL substantially expands RIB program:

- three simultaneous beams
 - increased number of hours/yr delivered
 - increased beam dev capabilities
 - enables sensitive and long beam time experiments
- new isotope species:
 - "clean" n-rich
 - proton-rich

Implementation:

- **Complementary electron linac driver for photo-fission**
- New target stations and front end
- New proton beamline



"Made in Canada"

Superconducting RF Cavities for ARIEL



Multi-cell cavity fabrication by PAVAC (BC)

ARIEL spec:

$$E_{acc} = 10 \text{ MV/m at } Q_0 = 10^{10}$$

Single-cell cavities:

7 out of 7 PAVAC/TRIUMF

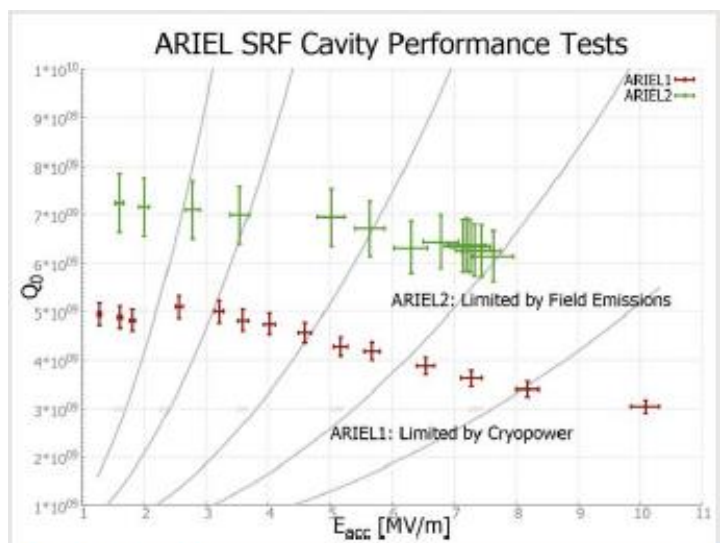
single-cells meet Q_0

requirement

gradient 25 MV/m

Status:

- Two cavities delivered - two more in fabrication - due Nov 30 and Jan 30
- ARIEL1 sent to FNAL for degassing



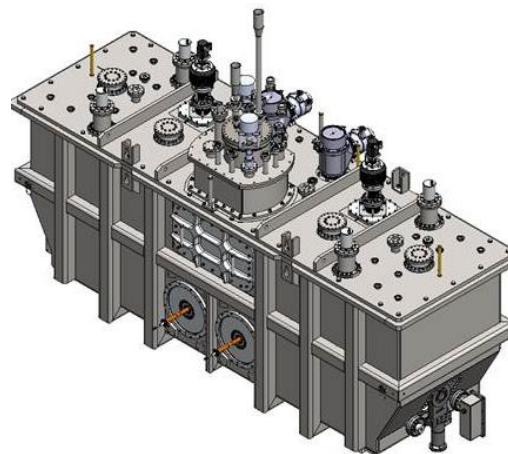


ISAC-II



ISAC-II
VECC

ARIEL



ARIEL
VECC

ILC -- future

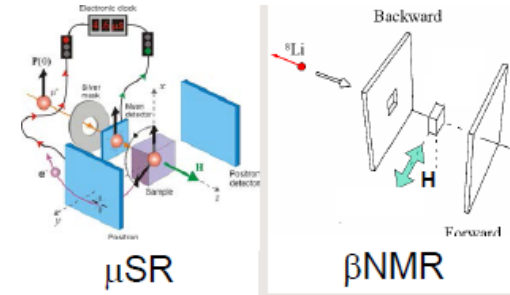


ILC



- Exploit TRIUMF's unique material science diagnostics and local university condensed matter expertise.

- Utilize μ SR and SQUID magnetometry for Nb and other *bulk* material properties testing.



- TRIUMF's β -NMR facility offers a sensitive new way to probe the near surface properties of Nb used in SRF cavities.

- We are designing a new beamline for β -NMR facility to apply a strong DC (up to 200 mT) and/or RF magnetic fields parallel to a sample

- Powerful tool for the experimental investigation of the effectiveness of multilayer coatings on bulk Nb

- Collaboration with: Prof. Yoshihisa Iwashita (Kyoto University)
Prof. Takayuki Saeki, Dr. Hitoshi Hayano, Dr. Takayuki KUBO (KEK)



Canada: ILC future

Summary:

- Currently very busy building SRF electron linac ARIEL @ TRIUMF
- Building up SRF expertise and is considering how to contribute possible to ILC, once it becomes more real
- Remain involved in Physics & Detectors
- 5 year budget request (2015-2020) includes some modest funding for ILC R&D funds



Recap of US activities/funding for LC

~2005 -----> 2012

Build up SCRF expertise-- FNAL, JLAB, Cornell, Argonne- engage industry

Everything: Cavities to cryomodules

M.Harrison Monday talk

Plus: sources, damping rings, RF distribution, civil etc

Involve all labs & univ

Physics & Detector: physics, calorimetry, tracking (Si & TPC), vtx, MDI

Collaborations: SiD, ILC, CALICE, LCTPC

Funding available: ~\$20-30M/yr for accelerator and
~\$2-3M/yr detector R&D

For 2013: funding set to zero; detector R&D already earlier going away

Continue
on:

carryover funds, generic R&D; Project-X
(SCRF), generic research funds

Based on: no
LC in sight



SLAC's proposed new FEL:LCLS-II

For BES
not HEP

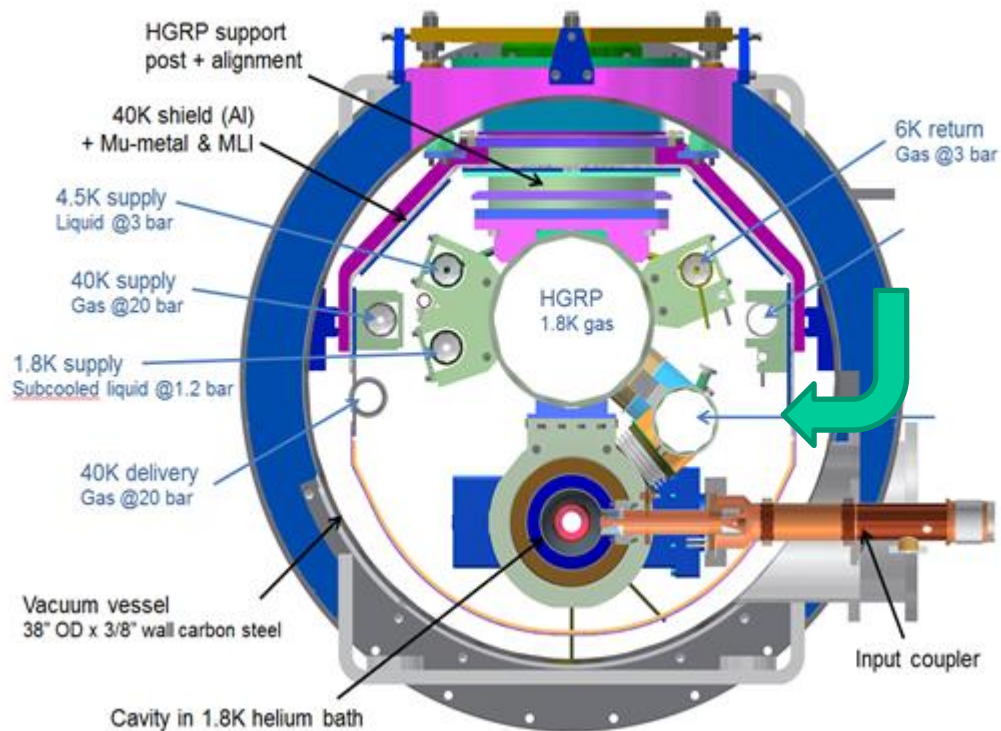
- (under development)
- 4 GeV CW Superconducting RF Linac
 - ◆ based on DESY XFEL / ILC 1.3 GHz cavities
 - ◆ 35 cryomodules / 280 cavities
 - ◆ Gradient 16 MV/m; Q_0 $2e10$ at 1.8 deg K
- 0.1 micro-amp typical / 1 MHz bunch rate
- 25 micron bunch length
- Average beam power 1.2 MW max
- Cryogenics power 5.5 MW

Build on SRF expertise developed through ILC R&D: 2005-2012



LCLS-II SCRF development and production:

- Fermilab
- Jefferson Lab
- Argonne Lab
- Cornell University
- SLAC
- These labs will form an SCRF partnership for development, production and testing; supported by DoE Office of Science - BES



Cornell ERL
Cryomodule
Cross-section
Showing increased
Cooling capacity

ILC point of view: Keeps expertise and keeps building until "*ILC is ready to go*"



Need to see in global context

Higgs discovery at LHC in 2012

ILC TDR (incl. DBD) was delivered in 2013

Despite no funding in US

"ILC in Japan" becomes a possible "near term " option for ILC

European strategy report 2013, with interest in "ILC in Japan"

2012: US starts new strategic planning process

Step 1:

Document science opportunities (done in Energy, Intensity & Cosmic frontiers) and what "tools" are needed (Instrumentation, Computing & Capabilities) plus Theory & Education/Outreach

Start in October 2012 →

Community Summer Study (CSS2013) aka "Snowmass"

July-August 2013

Nov 2013

Reports are complete from ~30 working groups; plus numerous white papers and summaries. Very comprehensive summary of opportunities in field and what is needed to execute them

Worldwide participation



Developments 2013

Conclusion of Snowmass on ILC:

There is a clear and convincing science case for the ILC (250→500GeV)
Reiterated by M.Peskin in plenary on Monday here

Snowmass output serves as input into next step

Step 2: Formation of Particle Physics Project Prioritization Panel (P5) in September 2013.

Charge: "develop a strategic plan for U.S High Energy physics that can be executed over a 10 year timescale, in the context of a 20-year global vision for the field"
=fit within a given budget.

- Budget scenarios:**
- constant funding for 3 years and then +2%/yr
 - constant funding for 3 years and then +3%/yr
 - Unconstrained funding to mount a leadership program
- Indicate priorities

It is clear that only a fraction of proposed fits



P5 membership & activities

Membership

Steve Ritz (UCSC) - chair
Hiroaki Aihara (Tokyo)
Marty Breidenbach (SLAC)
Bob Cousins (UCLA)
André de Gouvea (Northwestern)
Marcel Demarteau (ANL)
Scott Dodelson (FNAL/Chicago)
Jonathan Feng (UCI)
Bonnie Fleming (Yale)
Fabiola Gianotti (CERN)
Francis Halzen (Wisconsin)
JoAnne Hewett (SLAC)

Wim Leemans (LBNL)
Joe Lykken (FNAL)
Dan McKinsey (Yale)
Lia Merminga (TRIUMF)
Toshinori Mori (Tokyo)
Tatsuya Nakada (Lausanne)
Steve Peggs (BNL)
Saul Perlmutter (Berkeley)
Kevin Pitts (Illinois)
Kate Scholberg (Duke)
Rick van Kooten (Indiana)
Mark Wise (Caltech)
Andy Lankford (UCI) - *ex officio*

Members
are/were
associated
with ILC;
some are even
here

- P5 is currently in "input mode" until end of 2013
- Then formulate roadmap.
- First draft ~March 2014

Open Meetings:
2-4 November Fermilab
2-4 December SLAC
15-18 December BNL

"input
mode":

Get time lines and cost profiles from projects



P5 interactions "with ILC"

Goal: US ILC community wants to be part of "ILC in Japan"

➔ Need time lines and US cost profiles for "ILC in Japan"

ALCC has started
interaction with P5
chair:

- One meeting so far
- Told us what P5 needs from "ALCC"
- ILC will be discussed at BNL meeting
- Public & Executive session presentation on US strategy/plan for "ILC in Japan"
- P5: physics case was made at Snowmass & accepted

ALCC in process of drafting a US strategy for "ILC in Japan" for P5.

Plan is for draft by end of November

ILC director (M.Harrison) identifying possible US lab contributions to accelerator

- Difficulty:**
- No clear definition of "ILC in Japan"
 - Is there an agreed upon time line? (do not want to make one up)
 - Are there expectations about contributions? Not known

Inside Japan, ILC is obviously moving forward; however without a clearer sign it is difficult to incorporate in strategic plans of others, who want to participate



P5 meeting at Fermilab-1

Energy frontier summary (M.Peskin)

First
talk

1. “The Higgs changes everything.”
2. There is a compelling case for physics at the LHC up to 300 /fb.
3. There is a compelling case for the High-Luminosity LHC.
3. There is a compelling case for a lepton collider beyond LHC. ILC, on the table now, can meet this goal.
5. Maintain the vision of future high-energy colliders.

Excellent case for energy frontier program including “ILC in Japan”.

One of reasons why P5 “has bought” the science case for ILC



P5 meeting at Fermilab-2

Talks to global program from R.Heuer, A.Suzuki & Y.Wang

Important for ILC:

- No substantive discussion in public part of meeting about ILC strategy in US.
- KEK-DG emphasizes highest priority in Japan remains ILC ("on top of pyramid")
- CERN-DG: emphasizes global program with global participation

The vision for a global program from "10 miles up":

- LHC → HL-LHC in Europe
 - ILC in Japan
 - LBNE in US
- All with global participation



Summary

The physics case for a Lepton Collider has been made by the worldwide community & agreed upon

"ILC in Japan" (250 → 500 GeV) is currently the only option worldwide for realizing a lepton collider as the next step for particle physics at the energy frontier.

In US preparing the strategy to be presented to P5 in Dec 2013 for *US participation in "ILC in Japan"* so it becomes part of the US HEP roadmap

In Americas waiting for a clearer sign/indication from Japan on intentions to move forward, so "ILC in Japan" can be better included in the HEP roadmap.

"The car is running, all world regions are on board, but the driver (Japan) has to put it in first gear, so we can start the journey..... and see where it takes particle physics & the world"



THE END