

Summary of 2014 & Outlook in the ILC Landscape as seen from Irfu/CEA & IN2P3/CNRS

M.Winter / IPHC-Strasbourg

Contents

- *Evolutions outside of France through 2014*
 - in Japan
 - outside of Japan
 - world wide
- *Evolutions in France through 2014*
- *Conclusions and Outlook toward 2016*

Most slides borrowed from PECFA & ICFA meetings (**J.Fuster**, M.Krammer, R.Heuer, J.Mnich, S. Stapnes)

ICFA Statement on its Support of the ILC, its Endorsement of the Strategic Plans of Europe, Asia and the United States, and its Encouragement of International Studies of Future Circular Colliders

ICFA endorses the particle physics strategic plans produced in Europe, Asia and the United States and the globally aligned priorities contained therein. Here, ICFA reaffirms its support of the ILC, which is in a mature state of technical development and offers unprecedented opportunities for precision studies of the newly discovered Higgs boson. In addition, ICFA continues to encourage international studies of circular colliders, with an ultimate goal of proton-proton collisions at energies much higher than those of the LHC.



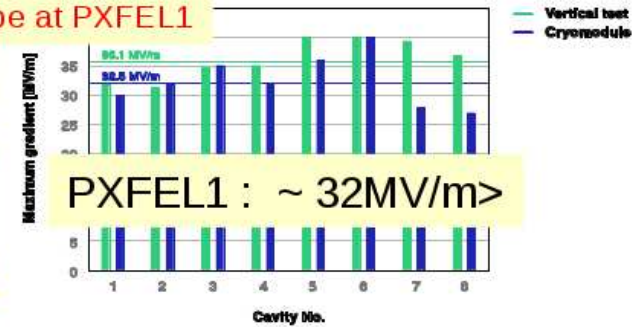
Cryomodule System Tests

DESY: FLASH

- ❖ 1.25 GeV linac (TESLA-Like tech.)
- ❖ ILC-like bunch trains:
- ❖ 600 ms, **9 mA** beam (2012) **Demonstrated**
- ❖ 800 ms 4.5 mA (2012)
- ❖ RF-cryomodule string with beam **Demonstrated**
- ❖ PXFEL1 operational at FLASH



XFEL Prototype at PXFEL1

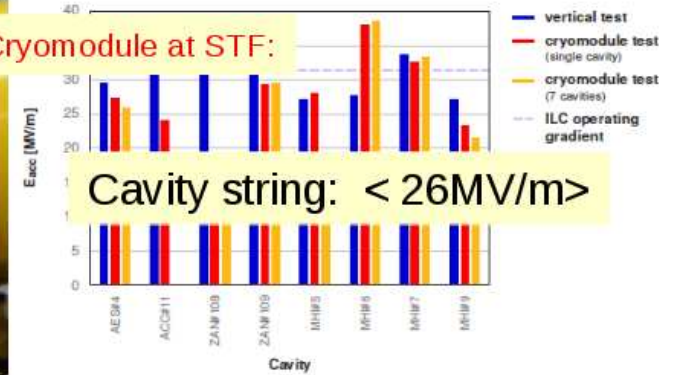


KEK: STF/STF2

- ❖ S1-Global: completed (2010)
- ❖ Quantum Beam Accelerator (Inverse Laser Compton): 6.7 m **Demonstrated**
- ❖ CM1 test with beam (2014 ~ 2015)
- ❖ STF-COI: Facility to demonstrate CM assembly/test in near future



S1 Global Cryomodule at STF:



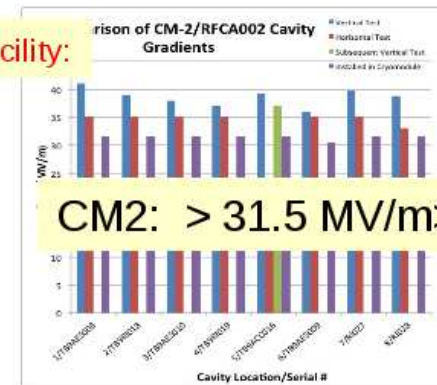
FNAL: ASTA

(Advanced Superconducting Test Accelerator)

- ❖ CM1 test complete
- ❖ CM2 operation (2013)
- ❖ CM2 with beam (soon)



CM2 at NML Facility:



World Wide P.P. Strategy : P5 Report

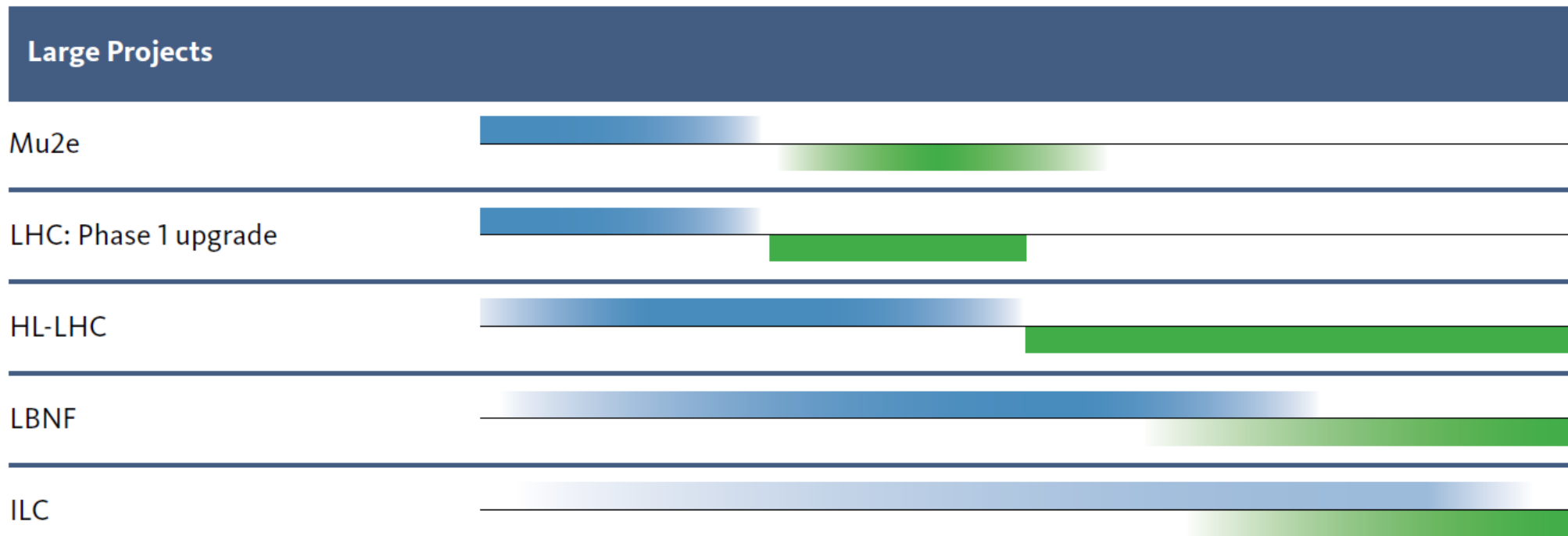


FIGURE 1 Approximate construction (blue; above line) and expected physics (green; below line) profiles for the recommended major projects, grouped by size (Large [$>$ \$200M] in the upper section, Medium and Small [$<$ \$200M] in the lower section), shown for Scenario B. The LHC: Phase 1 upgrade is a Medium project, but shown next to the HL-LHC for context. The figure does not show the suite of small experiments that will be built and produce new results regularly.

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.

Scientific Strategy

● R. Heuer

96th PECFA

28th Nov.'14

- Two main pillars of physics activities at CERN
 - High Energy Frontier, i.e. LHC, FCC, CLIC
 - Unique fixed target program, i.e. AD and ELENA, HIE-IsoIde (and TSR), n-ToF(EAR1,2)

- Two main pillars for physics activities outside CERN
 - Neutrino Platform (mainly in Europe and the US: LBNF)

Collaboration forming

ICARUS has arrived at CERN

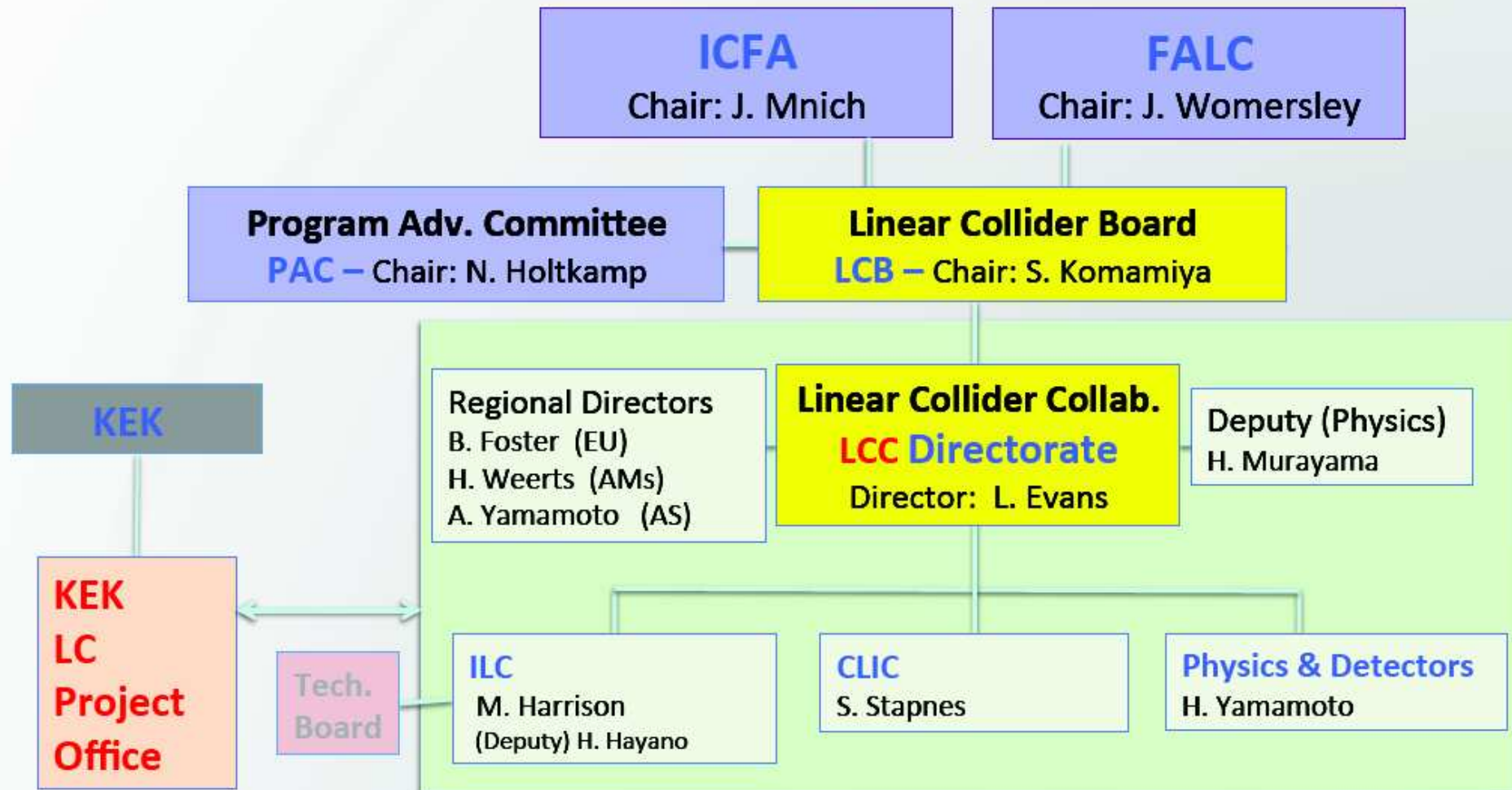
KEK <-> CERN offices opened



Evolutions in Japan : KEK LC Project Office



The new Linear Collider Collaboration



Evolutions in Japan : Academic Expert Committee

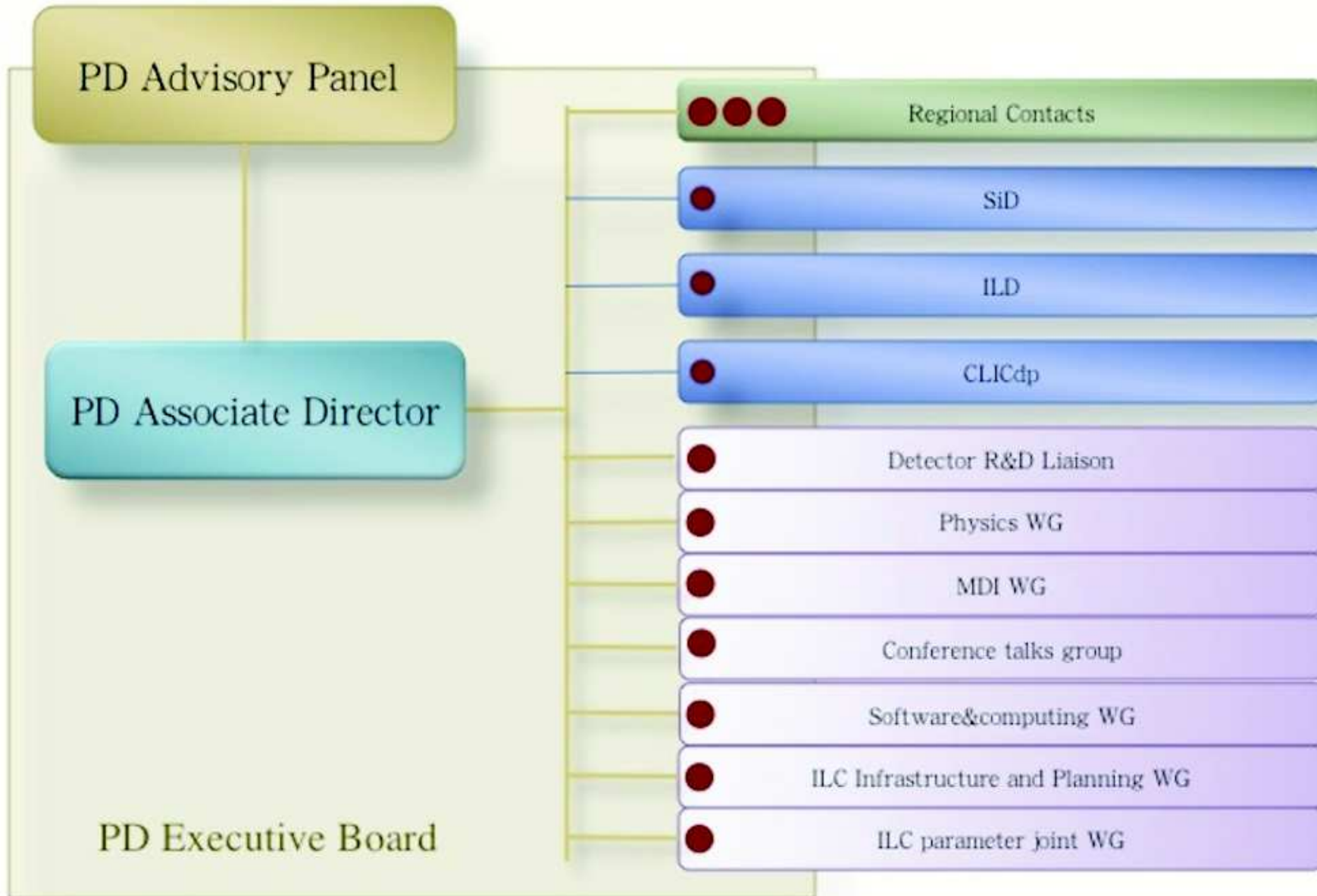
- MEXT has requested \$0.5M for investigatory study which was approved on Dec 24, 2013.
 - Not a fund request by a researcher, but by MEXT.
 - Approved by the ministry of finance and then by an official cabinet decision.
 - Will be doubled next year (i.e. ~1M\$)
- An expert committee was established under MEXT
 - 13 members (could increase)
 - A few particle physicists included
 - No 'ILC proponents'
 - Kickoff meeting held on May 8, 2014
 - Report to be completed by FY2015 (i.e. end of March 2016)
- The outcome is critically important for the ILC

Evolutions in Japan : Academic Expert Committee

- The topics to be evaluated includes:
 - Physics case of the ILC
 - Total budget and international sharing
 - Prospects for securing necessary human resources during construction and operation
 - Domestic organization for the ILC
 - Social and economic effects by siting the ILC in Japan
- Two subcommittees started: reports in ~1 year
 1. On the ILC physics case with respect to other future projects
 2. On the project readiness including human and financial resources

Material is requested at any time.

Building up LCC : Physics and Detectors



<https://www.linearcollider.org/P-D/Organisation>

LCC Organisation : Detector R&D Liaison

- **Conveners:**
 - Maksym Titov
 - Jan Strube
- A document describing current detector R&Ds relevant to LC is produced
- To be updated
 - Software R&Ds are to be included

INTERNATIONAL WORKSHOP ON FUTURE LINEAR COLLIDERS
06-10 OCTOBER '14
INN VINCA
BELGRADE

LC Detector R&D: Report from Liaisons

ILDC14
LWS14

Jan Strube (Tohoku University)
Maxim Titov (CEA Saclay)

The workshop will be devoted to the study of the physics cases for future high energy linear electron-positron colliders, taking into account the recent results from LHC, and to review the progress in the detector and accelerator design for both the LC and CLIC projects.

Plenary Talk, Belgrade, Serbia, October 6, 2014

- For a description of current R&D activities see talk by M. Titov at:
<http://agenda.linearcollider.org/event/6389/session/17/contribution/19>

LCC Organisation : Physics & Detector Structure

- **Composition of E.B. :**

- Hitoshi Yamamoto, *Associate Director*
- Juan Fuster, *European Regional Contact*
- Dmitri Denisov, *North American Regional Contact*
- Keisuke Fujii, *Asian Regional Contact & Physics*
- Mark Thomson, *CLICdp*
- Marcel Stanitzki, *SiD*
- Ties Behnke, *ILD*
- Maksym Titov, *Detector R&D liaison*
- Christophe Grojean, *Physics*
- Michael Peskin, *Physics*
- Karsten Buesser, *MDI*
- Frank Simon, *Conference Talks*
- Norman Graf, *Software & Computing*
- Jim Brau, *ILC Parameters*
- Sakue Yamada, *ILC Infrastructure & Planning*

- **E.B. meets every two weeks**

LCCPD-EB : Physics Working Group

- Conveners
 - Keisuke Fujii, Christophe Grojean, Michael Peskin
- Members:
 - (Americas) Tim Barklow, Maxim Perelstein, James Wells, Jaehoon Yu
 - (Europe) Roberto Contino, Jenny List, Juergen Reuter, Frank Simon, R.Poeschl
 - (Asia) Shinya Kanemura, Hyungdo Kim, Mihoko Nojiri, Tomohiko Tanabe, Yuanning Gao
- Observer
 - Hitoshi Murayama (LCC deputy director)
- **For the MEXT subcommittee:**
 - Preparing material presented to the MEXT subcommittee
 - Together with the Japanese group (a large overlap of membership)
 - Producing a brief document on the ILC physics case
 - Intended for intelligent non-experts

LCCPD-EB : ILC Parametres Joint Working Group

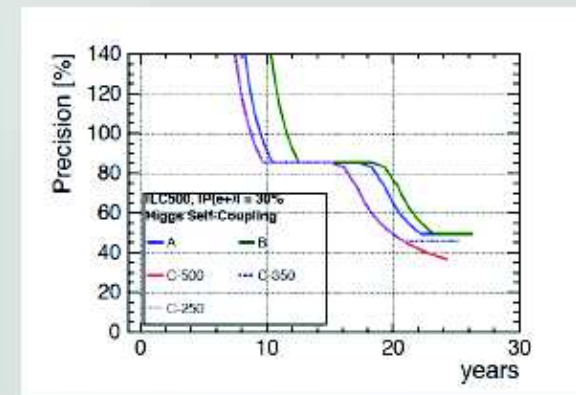
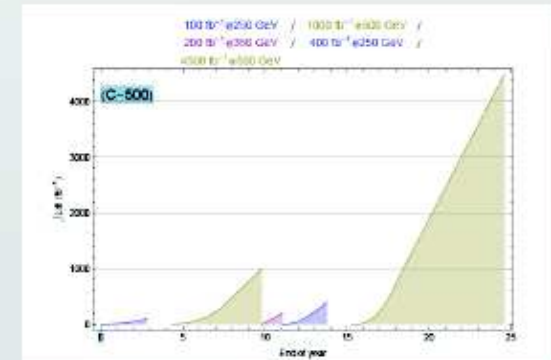
Goal: to come up with energy staging scenarios of ILC

- **Members**

- **Physics/Detector:** Tim Barklow, Jim Brau (co-convener), Jenny List, Keisuke Fujii
- **Accelerator:** Gao Jie, Nick Walker (co-convener), Kaoru Yokoya

- **Procedure :**

- ILC parameter WG produces 'a few' scenarios
 - A draft is have been produced, was reviewed by the physics WG and LCCPDeb
- LCC/LCB will review the draft



LCCPD-EB : ILC Infrastructure and planning Working Group

- **Charge**
 - Studies the time-profiles of the human and budgetary needs of the ILC detector activities.
 - Proposes the organizational structure where the detector groups interact with the ILC laboratory.
- **Members**
 - **Sakue Yamada (chair)**, Kiyotomo Kawagoe, Yasuhiro Sugimoto, Frank Simon(Mary-Cruz Fouz:deputy), Karsten Buesser, Marcel Stanitzki, Marty Breidenbach
- **Inputs to the MEXT TDR validation working group**
 - The TDR validation WG is to review the detector issues in ~Feb, 2015
 - Inputs to the LCB subcommittee on governance and management

ILC Project Preparation

- **Studies for MEXT are of crucial importance :**
 - they require the knowledge of the whole community
 - all R&D groups should do their best to help the Working Groups
 - they are essential for building up the japanese position expected to be taken by FY-2016
- **Contributions are largely based on existing knowledge :**
 - they usually don't require significant budgets
 - they require TIME and AVAILABILITY

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- **Contributions are largely based on existing knowledge :**
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 - they require TIME and AVAILABILITY

⇒ **Contributions are compatible with mitigated budget periods**

Important Meetings in 2014

- **Prominent Int. Workshops :**

- Americas Workshop on LCs (AWLC) : FNAL, May '14 → P5 reco. release
- LCWS-14 : Beograd, Oct.'14
- 11th ICFA seminar : Beijing, Oct.'14 → bring together gov. officials involved in HEP strategy

- **Others :**

- LC Forum : launched in 2014 → already several meetings
- LC School : Frauenchiemsee (GE), Aug.'14

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⇒ **Concern : attendance of French groups decreasing steadily ...**

LCWS14 BELGRADE 06-10 OCTOBER 2014

INTERNATIONAL WORKSHOP ON FUTURE LINEAR COLLIDERS

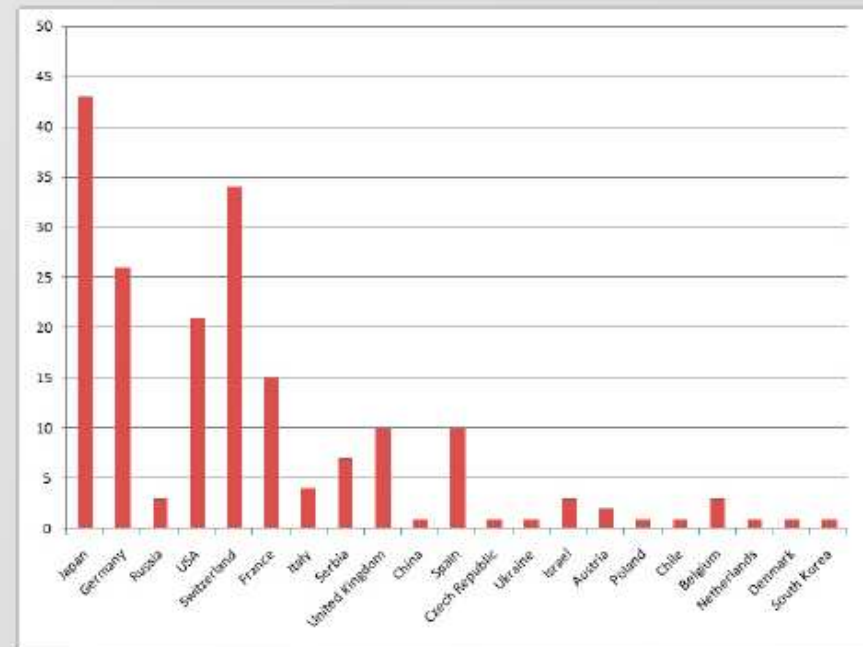
The workshop will be devoted to the study of the physics cases for future high energy linear electron positron colliders, taking into account the recent results from LHC, and to review the progress in the detector and accelerator design for both the ILC and CLIC projects

www.vlnca.rs/lcws14

lcws14@vlnca.rs



- Participants: 206
 - M/F: 182/24 (88/12)%
 - Countries: 21
 - Institutions: 84
- Talks: 243
- Total duration of talks: 114 h 10'



LCB and the European LC Forum

Launch of a bi-directional information channel between the European members of LCB and the European linear collider community.

Web site (for information and subscription): <http://elcf.desy.de>

Home Meetings Contact

European Linear Collider Forum

European Linear Collider Forum

Mandate of the European Linear Collider Forum

The European Linear Collider Forum (ELCF) was created by ECFA in order to channel European discussions concerning future linear colliders and to facilitate input for the International Linear Collider Board (LCB) meetings.

Participation in the ELCF

Participation in the ELCF is open to all physicists working on linear collider projects in Europe. Especially senior colleagues are encouraged to participate.

News and upcoming meetings

The next meeting of the ELCF is scheduled for Tuesday, 11 February 2014, 10:00 CET.

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Coordinated by J. Mnich
Technical support by
Thomas Schörner-Sadenius

About 100 colleagues have
meanwhile subscribed to
the forum.

European LC Forum

- 1st meeting, February 11 (all meetings using Webex)
Discussion on the mode of operation of the forum and on the agenda of the following LCB meeting
- 2nd meeting, March 11
Report from the LCB meeting February 20, main points, discussion
- 3rd meeting, June 26
Preparation of the following LCB meeting
- 4th meeting, July 17
Report from the LCB meeting July 6, main points, discussion

- **Linear Collider School, 11-15 August 2014**
Frauenchiemsee (about 100 Km from Munich)
<http://lcschool.desy.de>
Local Chair: G. Moortgat-Pick (Helmholtz Alliance)
- The school is aimed at PhD students and postdoctoral researchers working on linear collider research. The programme consists of lectures covering the following topics:
 - Accelerators
 - Detectors
 - Standard Model
 - Higgs
 - Supersymmetry
 - Relation to LHC Physics
- **Linear Collider School, 19-28 August 2016**
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Helmholtz Alliance
PHYSICS AT THE TERASCALE
Helmholtz Alliance

Fifth Linear Collider School
An introduction to the physics of linear colliders

11 - 15 August 2014
Frauenchiemsee, Germany

Topics:

- Accelerators – concepts, technology and realisation
- Detectors and detector integration
- Higgs and electroweak physics
- Top physics
- Beyond-Standard Model physics

International Advisory Committee
S. Bertolini (CERN), P. Burrows (Univ. Oxford),
S. Chattopadhyay (Cockcroft Institute), C. Damerell (RAL),
B. Foster (DESY), N. Glover (Univ. Durham), R. Godbole
(Bangalore), W. Hollik (MPI for Physics, Munich), E. Irocci
(INFN), J. Menik (DESY), T. Omasi (KEK), M. Ongia (Univ.
Chicago), P. Ouland (Univ. Bergen), F. Richard (Orsay),
D. Schulte (CERN), T. Teubner (Univ. Liverpool), M. Thomson
(Univ. Cambridge), R. Wöhrle (Argonne), S. Yamada (KEK),
H. Yamamoto (Univ. Tohoku)

Programme and Organising Committee
K. Bussler (DESY), I. Fleck (Univ. Siegen),
J. List (DESY), G. Moortgat-Pick (Univ. Hamburg),
Z. Nagy (DESY), S. Heermann (DESY),
J. Reuter (DESY), T. Schömer-Sadenius (DESY),
E. Simon (MPI for Physics),
A. Sopczak (Univ. Prague)

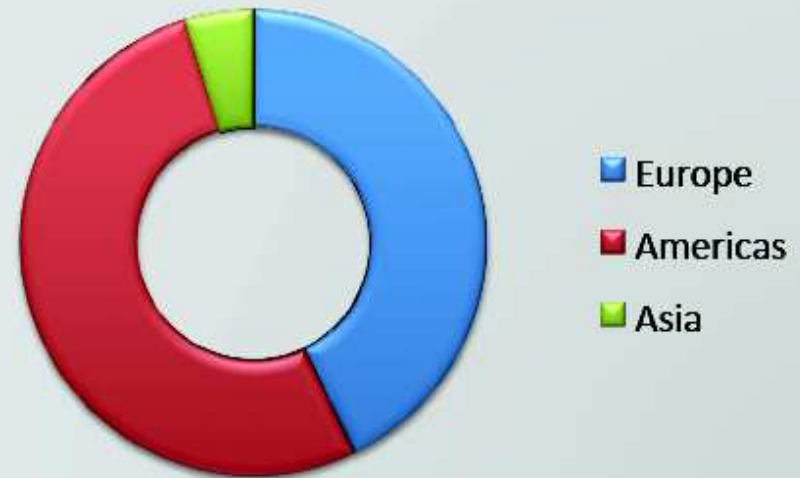
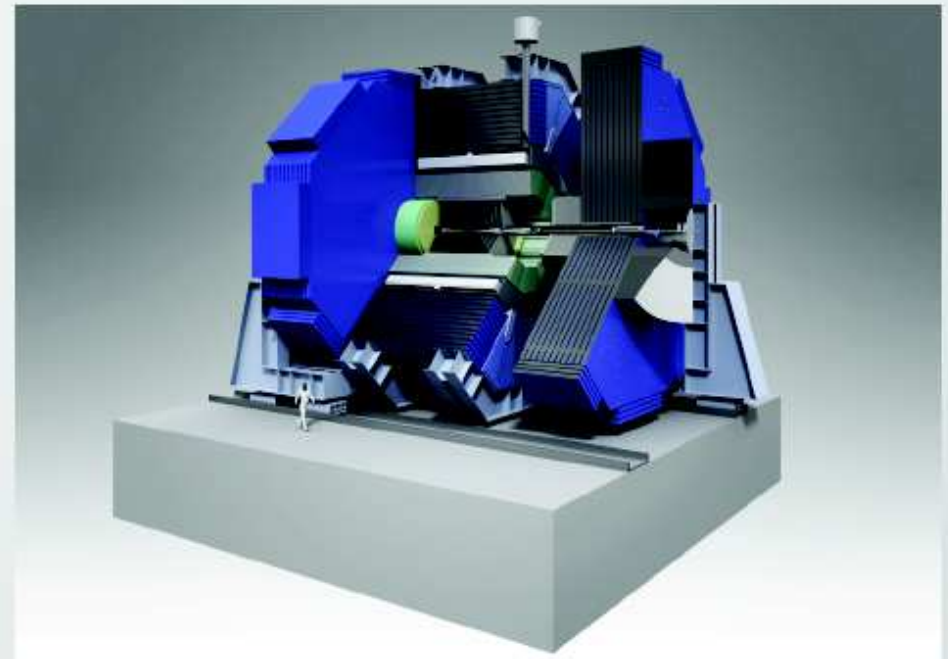
Contact: anacoo@desy.de

For more information and registration go to:
www.terascale.de/lcschool2014
<http://lcschool.desy.de>

DESY

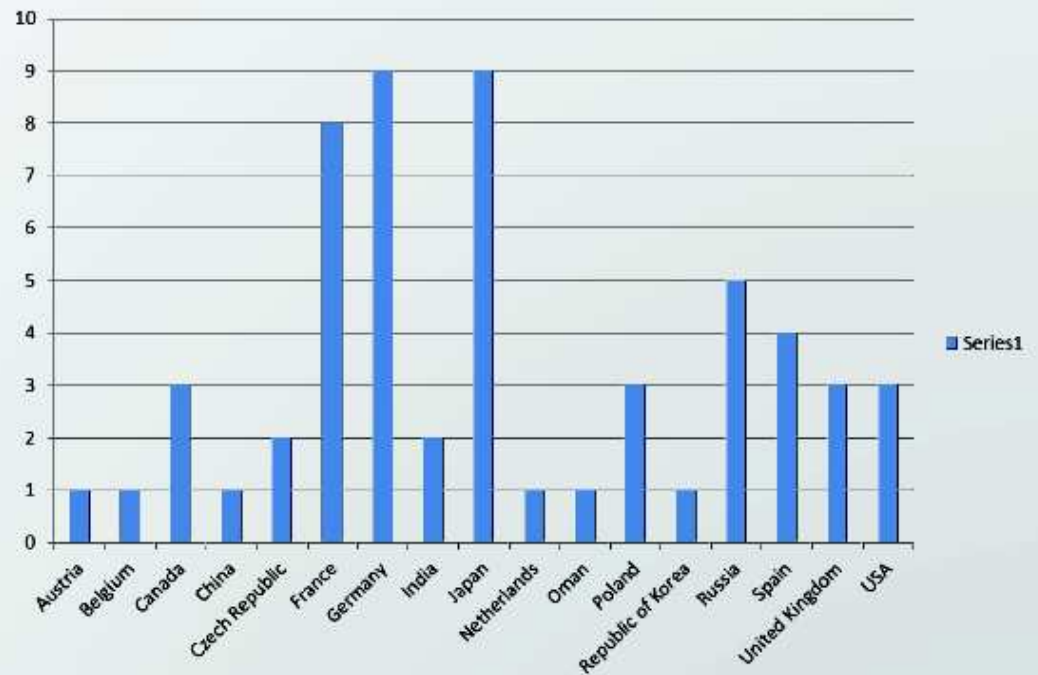
Detector R&D Activities : SiD Concept

- SiD Goals for 2015
 - Reassess Detailed Baseline Design
 - Support the necessary detector R&D
 - Site-specific studies in Japan
 - Physics studies to further sharpen ILC physics
- SiD Consortium
 - Has been established, byelaws in place
 - IB board chair has been elected: Philip Burrows, Oxford
 - 22 Groups have signed on (40 % from Europe)
- Next Workshop
 - SLAC, January 12th-14th, 2015
 - www.silicondetector.org



Detector R&D Activities : ILD Concept

- ILD concept group:
58 member institutes
have signed up.
- Jan Timmermans elected
first chair of institute
assembly



- Strengthen the physics case through comprehensive physics studies
- Goals: re-optimize the detector (cost – performance optimization)
- Prepare a scientific discussion of the different technological options, push technologies to be comparable
- Strong support to well focussed test beam effort to validate technologies

ILC Events in 2015

- **Asian Linear Collider Workshop 2015, 20-24 April**
KEK
Chair: Y. Okada. Local chair: A. Yamamoto
Special separated event (April 22) with Japanese authorities is planned during the workshop at Tokio that will consist of a plenary session in the morning, and a (political) symposium in the afternoon.
Good attendance to this meeting will give an important and positive message to Japanese politicians
- **LCWS15, Americas, 2015, Vancouver & date to be decided**

- **Other events :**

- **Visit of Nomura Inc. (mandated by MEXT) :**
 - investigate position of ILC in P.P. priorities of main EU countries
- ILD and/or SiD meetings, FJPPL (Okinawa in May), LC School in Japan (Summer)
- Interim reports to MEXT
- Etc.

⇒ **Landscape will evolve : stay tuned and on the boat ...**

French Landscape : Prominent Steps in 2014

- **Jan. '14** : IN2P3 Science Council supports detector R&D and physics studies of the 9 labs involved
- **May '14** : Visit of MEXT rep. for large infrastructures (M. Oodoï) : explicit interest for accelerator R&D and construction activities related to XFEL
- **May '14** : Parliament representatives got informed about ILC before their visit to Japan in June (incl. Tohoku region)
- **Aug. '14** : Overview of ILC project and panorama of French activities (incl. XFEL contributions) transmitted to Ministry of Research
- **Sept. '14** : National meeting (lab directors & large project contacts) to debate participation of IN2P3 to future frontier collider projects : conclusions highlight asset of an e^+e^- collider with $E \gtrsim 500$ GeV (like ILC), expected to bridge the gap between HL-LHC & FCC-hh

⇒ **Significant progress achieved through 2014**

French Landscape : Prominent Steps in 2014

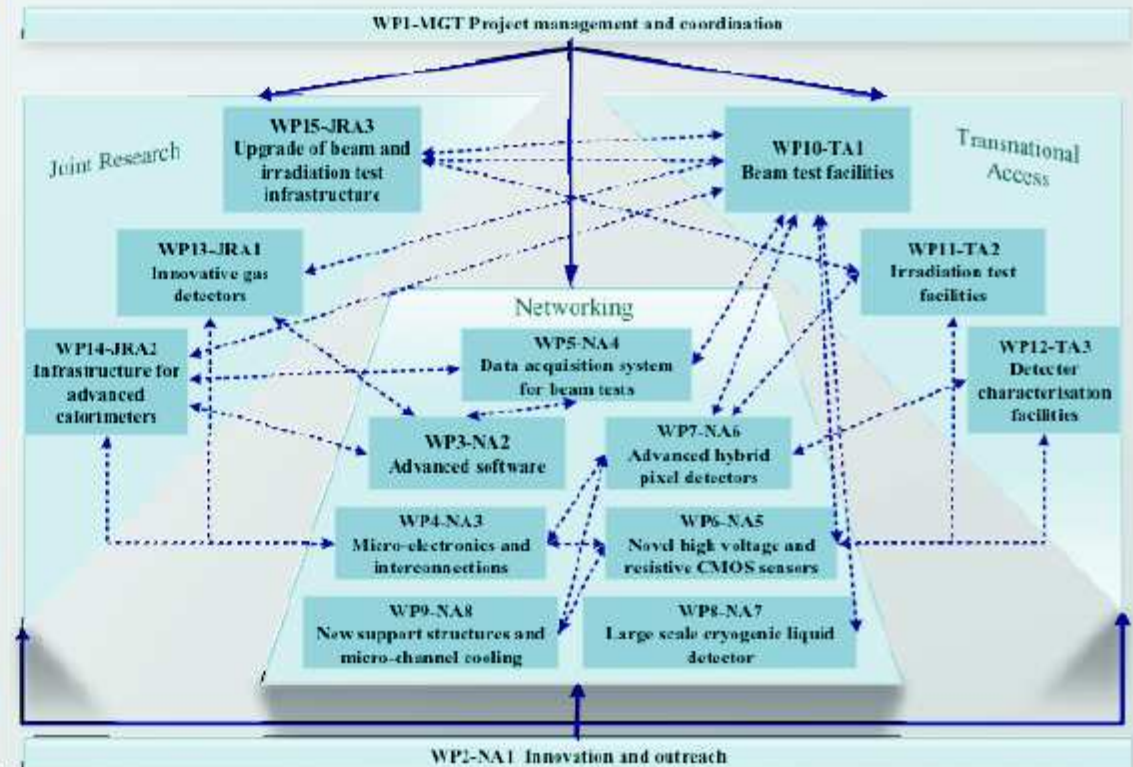
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⇒ **HOW DO WE KEEP MOMENTUM IN THE COMING YEARS ?**

Detector R&D Activities : AIDA-H2020 Proposal

The AIDA-2020 proposal was submitted EU by early September 2014 (L. Serin)

Key R&D Issues	WPs related to activity
HL-LHC	
Radiation hard detectors : - New pixel and tracker detector - Forward Calorimeter - Micro-Electronics Beam and irradiation prototypes testing, Industrialisation process, Software simulation and reconstruction	WP 2, 3, 4, 6, 7, 9, 10, 11, 12, 13, 14, 15
ILC	
Low mass pixel and track detectors, High granularity calorimeters, Low power electronics, Industrialisation, Combined system performance, Software simulation and reconstruction	WP 2, 3, 4, 5, 6, 7, 9, 10, 12, 13, 14, 15
CLIC (Compact Linear Collider)	
As for ILC, plus the need for nano-second time stamping in all systems	WP 2, 3, 4, 6, 7, 9, 10, 11, 12, 13, 14, 15
Long-baseline neutrinos	
Large-scale cryogenic detectors, electronics Beam test	WP 2, 3, 8, 10
FCC (Future Circular Collider)	
See HL-LHC	WP 2, 3



About 25% include Linear Collider R&D related activities

- Other fundings : travel support for EU-Japan partnership ?

CONCLUSIONS

- **ILC project** appears at the forefront of the roadmap in all 3 Regions, all of them being actively trying to make the project turn into reality within their economical, political and social-cultural framework
- **Appropriate framework** to combine all potential contributions around the world in an optimal (consensual) manor is yet an Issue \Rightarrow delays to be expected
- **Japan actively examining ILC** for a wide panel of its different aspects
FY-2016 expected to represent a crucial step \equiv milestone for all Regions
 \Rightarrow whole community should feel able to contribute to final report
- **Essential that IN2P3-Irfu community stays present and active on the scene**
- **Prospects impacted by difficult financial conditions :**
 - **Concern 1 :** how can ILC progressively become part of the French roadmap ?
 - **Concern 2 :** R&D currently rather considered as general purpose activity
 \Rightarrow R&D community tends to get committed and disseminate in spin-off applications