

Update on European Developments



Karsten Buesser
28.02.2019

European Strategy Update Process

Defines long-term commitments of European particle physics community

- Implications on national and EU roadmaps and funding at CERN and beyond

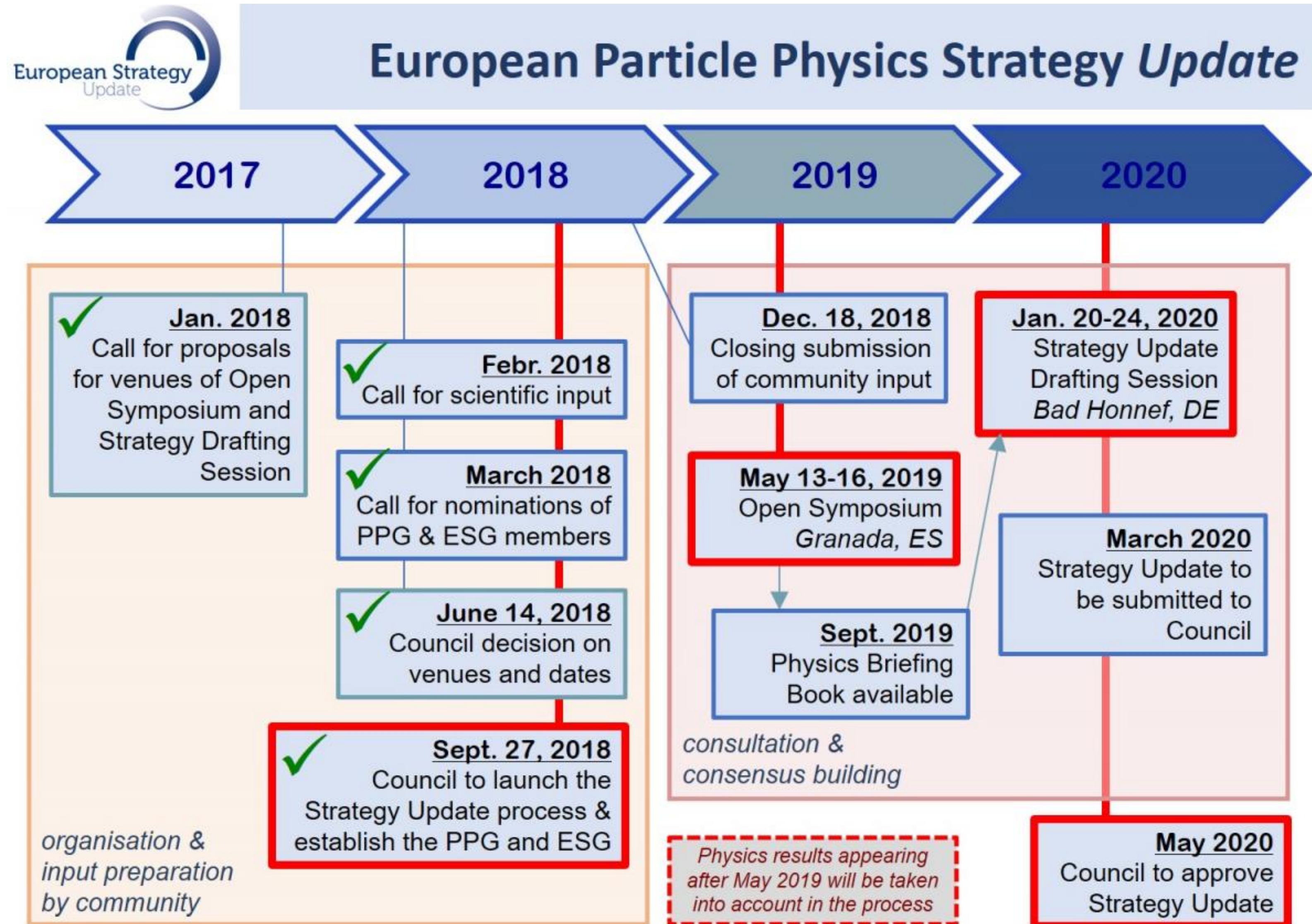
Initiated and approved by CERN Council

- Main bodies:
 - Strategy Secretariat
 - European Strategy Group (ESG)
 - Physics Preparation Group (PPG)

Community Input

- Community Documents
 - 10 pages max.
 - may include links to supporting documents
 - Anyone can submit
 - Deadline: December 18th, 2018
- Open Symposium
 - 13.-16.05.2019, Granada, Spain

<http://europeanstrategy.cern>



CERN Council Open Symposium on the Update of

European Strategy for Particle Physics

13-16 May 2019 - Granada, Spain



Physics Preparatory Group

Halina Abramowicz (Chair)
Shoji Asai Beate Heinemann
Stan Bentvelsen Xinchou Lou
Caterina Biscari Krzysztof Redlich
Marcela Carena Leonid Rivkin
Jorgen D'Hondt Paris Sphicas
Keith Ellis Brigitte Vachon
Belen Gavela Marco Zito
Gian Giudice Antonio Zoccoli

Local Organizing Committee

Francisco del Águila Juan José Hernández
Antonio Bueno (Chair) Mario Martínez
Alberto Casas Carlos Salgado
Nicanor Colino Benjamín Sánchez Gimeno
Javier Cuevas José Santiago
Elvira Gámiz
María José García Borge
Igor García Irastorza
Eugeni Graugés

<https://cafpe.ugr.es/epps2019/>

epps2019@pcgr.org



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European Strategy for Particle Physics

13-16 May 2019 - Granada, Spain



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IMAGE OF THE WEEK

ILC squat team



6 October 2011

Image: Nicholas Walker

DESY's Eckhard Elsen, Karsten Buesser and Klaus Sinram take a Segway tour of Granada, Spain, while assessing whether Segways would also be a suitable mode of transport for the ILC tunnel.

my last time in Granada
at LCWS11...



LCWS11

European Strategy Update Process



Strategy Secretariat

- Charge: Coordination of the Strategy Update Process
- Members: Scientific Secretary (Chair): Halina Abramowicz, SPC Chair: Keith Ellis, ECFA Chair: Jorgen D'Hondt, Chair EU Lab-Directors Meeting: Lenny Rivkin

European Strategy Group

- Charge: Establish a proposal for the European Strategy for approval by CERN Council
- Members: Strategy Secretary (Chair), one representative from each member state, one representative from each European Lab (CERN, CIEMAT, DESY, Irfu, LAL, Nikhef, LNF, LNGS, PSI, STFC-RAL), CERN-DG, SPC Chair, ECFA Chair
- Invitees: President of CERN Council, one representative each from the Associate Member States, Observer States, European Commission, the Chairs of ApPEC, NuPECC, FALC, ESFRI, members of the Physics Preparatory Group

Physics Preparatory Group

- Charge: Prepare the scientific input („Briefing Book“) based on community input
- Members: Strategy Secretary (Chair) and the other members of the secretariat, four members appointed by recommendation of the SPC, four members appointed by recommendation of ECFA, one representative appointed by CERN, two representatives each for Asia and the Americas

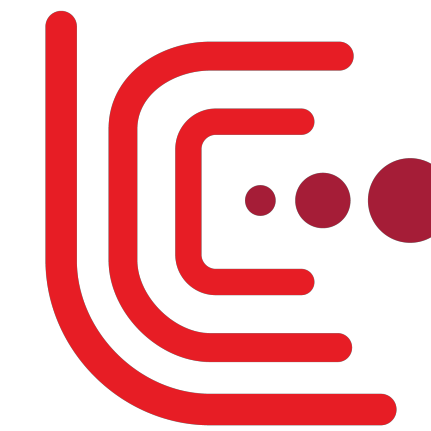
All names on <http://europeanstrategyupdate.web.cern.ch/introduction>

LC Input for the European Strategy Update



Official Input Documents

- ILC:
 - „ILC - a Global Project“: physics and machine
 - „ILC - a European Perspective“: European role and potentials
 - Coordinated by Jim Brau, Juan Fuster, Steinar Stapnes
- CLIC:
 - CLIC project (accelerator & detector)
 - CLIC physics
 - Edited by CLIC/-dp collaboration
- Additional documents expected, e.g. from ILD



Supporting Documents

- ILC: LCB/ICFA statements, reports from physics group on ILC-250, European Preparation Plan, ...
- CLIC: Project Implementation Plan, Preparation Phase Plan, 2018 Summary Report, Physics Potential, Detector Technologies, Parameters and Performance

LC Community Meeting

- Goals: Bring together the LC community and prepare for the Open Symposium in Granada
- Try to define a coherent approach for the realisation of a Linear Collider somewhere in the world
- 08.-09. April 2019, Lausanne, CH

LC Community Meeting

8-9 April 2019, Lausanne, CH

Organised on initiative by LCB/ICFA

Main topics:

- Initiate formation of a strategy for future linear collider activities
- Discuss how to present the case for linear colliders at the Open Symposium in Granada
- Address the future organisation of the international linear collider activities beyond LCC

Registration:

- <https://indico.cern.ch/event/789524/>

Linear Collider Community Meeting

8-9 April 2019

SwissTech Convention Center, Lausanne

Europe/Zurich timezone

Search...



Overview

Program Committee

Timetable

Participant List

Registration

Payment information

Venue and access

Visa Information

Accommodation

Lausanne Tourism

LC Community Meeting 19

✉ LC19-LOC@cern.ch

The meeting has three main objectives:

- Initiate the formation of a strategy for future linear collider activities.
- Discuss how to present the case for linear colliders at the Open Symposium in Granada.
- Address the future organisation of the international linear collider activities beyond LCC.

In addition to the input provided by CLIC and ILC to the European Strategy process, the decision of Japan concerning hosting the ILC is expected to be known at the time of the meeting.

The meeting will be open. It will start Monday 8.4 at 11:00 and conclude Tuesday 9.4 at 16:00.

The meeting is arranged on the initiative of LCB/IFCA and is supported by ECFA. CERN and EPFL act as local organisers.

The venue is the SwissTech convention centre at the EPFL campus: <https://www.stcc.ch/fr/>

Juan Fuster (ECFA LC physics&detector study)

Steinar Stapnes (LC/CERN)

Tatsuya Nakada (LCB and EPFL)



National Inputs - Example Germany

Series of workshops on future projects:

- The Future of e^+e^- Colliders, 05/2016, Munich
- The Future of Neutrino Physics, 02/2017, Heidelberg
- The Future of Non-Collider-Physics, 04/2017, Mainz
- Future Hadron Colliders at the Energy Frontier, 12/2017, DESY

Concluding Strategy Workshop for Particle Physics, 05/2018, Bonn

Workshop Summary Statement:

- <http://www.ketweb.de/e199632/e199635/e268373/e296589/Abschlusserklaerung.pdf> (sorry, German)

The Committee for Particle Physics (KET) has drafted an input document for the European Strategy Update, based on the workshop summary statement

- Discussed and approved at a community meeting on November 16./17. 2018 in Bad Honnef
- Will be handed over to German Funding Agencies (BMBF)

Input to the Strategy Update is being prepared from many national communities



German Community Input Related to ILC

Support for running and approved projects

- LHC HL upgrades, Belle-II

Future Collider Projects

- On e+e- colliders:
 - **„An electron-positron collider, upgradeable to a center-of-mass energy of at least 500 GeV, should be realized, with the highest priority, as the next international high- energy project.“**
 - „The physics case for such a project is well defined and underlined by the state-of-the-art results from collider experiments. The SM, and possible deviations from it, will be probed to unprecedented precision with an electron-positron collider by operating it as a Higgs factory and by studying the top quark, W and Z boson production, and the Higgs potential.“
- On the ILC:
 - **„We strongly support the Japanese initiative to realize, as an international project in Japan, the ILC as a "Higgs-Factory" with an initial center-of-mass energy of about 250 GeV.“**
 - „An energy of 250 GeV is regarded to be appropriate for an initial precision Higgs program. Concurrent running with the HL-LHC is highly desirable. Upgradeability to 500 GeV and beyond should be foreseen from the beginning.“

Also statements on Future Hadron Collider R&D, Non-collider experiments, Neutrinos, Theory, Outreach, Infrastructures (CERN, DESY), etc.

Remember: all input documents have been written before the SCJ statement was known!

Input from National Communities Related to ILC

Austria

- „If the ILC is built, Austrian participation would be in line with HEPHY’s tradition, in view of its past major role at LEP and its present strong involvement in the Belle II experiment at the Japanese 10 GeV e+e- facility KEK.“

Belgium

- „We are therefore primarily looking forward to a statement from the Japanese policy makers concerning a reduced energy linear e+e- collider. We are keen to investigate the possibility to contribute to its detector construction program, but would surely benefit from a CERN coordinated European activity located at the CERN laboratory sites.“

Canada

- „The Canadian community also looks forward to helping to develop and then support the global consensus on potential new long-range large projects under consideration, including the EIC, ILC, CLIC, HE-LHC, FCC, CEPC and others.“

Czech Republic

- „Europe should also support the ILC project if a positive decision on its realization is taken by the Japanese authorities in viable future. At the same time, the future ILC upgrade to the energy above tt threshold should be foreseen.“

Input from National Communities Related to ILC

France (SPF)

- „We believe that the next accelerator must be an e^+e^- collider reaching high luminosities and allowing precision measurements, beyond HL-LHC. We are aware of the few projects in preparation and we believe the final choice among them, must be driven by the physics case at the time of the decision, the maturity of the technology and the cost. In any case, Europe and CERN must play an important role, or even the leading role, in all phases of this new machine.“

France (CEA)

- „The International Linear Collider (ILC) is an advanced electron-positron linear collider project. The decision process for its construction is dependent on a statement from the Japanese government on the intent to host the ILC in Japan as an international project. In case of a positive decision, based on its experience gained with the successful E-XFEL construction, CEA-Irfu is expected to contribute in particular to the cryo-module assembly as part of a European contribution. On the detector side, CEA-Irfu could capitalize on R&D programmes carried out over a decade on Micromegas readout, electronics and dual-phase CO₂ cooling for the TPC central tracker, and on CMOS active sensors for the pixel detector. The recognized expertise in the design of large superconducting magnets (ATLAS, CMS) could lead CEA-Irfu to participate in the design of the ILD detector solenoid.“

Input from National Communities Related to ILC

France (IN2P3)

- „In case of a positive announcement by the Japanese government regarding the ILC project, we recommend establishing a strong European participation in the experimental program. The ILC will be a complementary machine to the HL-LHC and the European contribution to the ILC would therefore have to be compatible with maintaining Europe's full capacity to host the FCC.“

France (IN2P3 - ILC Groups)

- „The need for such a machine has generated several e^+e^- collider options, among which the ILC appears distinctively with a unique degree of readiness and its high energy extendability, associated to a cost for Europe well below what is demanded for any alternative option.“

Germany

- „An electron-positron collider, upgradeable to a centre-of-mass energy of at least 500 GeV, should be realised, with the highest priority, as the next international high- energy project.

We strongly support the Japanese initiative to realise, as an international project in Japan, the ILC as a "Higgs-Factory" with an initial centre-of-mass energy of about 250 GeV.“

Input from National Communities Related to ILC

Israel

- „Beyond the HL-LHC, the Israeli community is supportive of a future high-energy collider. (...) The realization of any of these facilities will be immensely beneficial to the field. The Israeli community plans to participate in the future collider experimental program that is chosen by the wider HEP community. The community is already involved in development of future detector projects, and has active R&D targeting the various future proposals.

Japan (JAHEP)

- „With the discovery of the 125 GeV Higgs boson at the LHC, construction of the International Linear Collider (ILC) with a collision energy of 250 GeV should start in Japan immediately without delay so as to guide the pursuit of particle physics beyond the Standard Model through detailed research of the Higgs particle. In parallel, continuing studies of new physics should be pursued using the LHC and its upgrades.“

Netherlands

- „The Netherlands strongly support the construction of an electron-positron collider, complementary to the LHC, that can study the properties of the Higgs boson and other particles with unprecedented precision, and whose energy can be upgraded.

We look forward to the imminent statement from Japan on hosting the ILC, including guidance about the resources foreseen. In the scenario that the ILC (phase-1) project in Japan is approved, CERN should take a visible and vivid role in its design, construction and exploitation and utilize the full potential of CERN's capabilities. CERN's CLIC technology is seen as an ideal opportunity for an energy upgrade in the ILC infrastructure in Japan. „

Input from National Communities Related to ILC

Norway

- „If the Japanese government gives green light for the construction of the ILC, physicists from Norway will participate in the accelerator and experiment, as it opens a new avenue for detailed SM studies on a timescale that is very interesting. In this context we rely on CERN to take responsibility to coordinate the European groups and create a platform in which also small countries like Norway can participate.“

Poland

- „There is a strong scientific case for an electron-positron collider (...). If such a project is proposed outside Europe, CERN should be the leading European partner allowing for and coordinating additional contributions to such project from CERN's Member and Associate Member States in Europe. If the Japanese government decides to host the ILC in Japan, Polish groups are eager to participate and contribute to such projects in either of the cases. „

Input from National Communities Related to ILC

Spain

- „The present LC proposals, conceived as a Higgs factory at 250 GeV centre-of-mass energy with potential upgrades to higher energies, are positively seen by the community. The scientific program is sound and the project technically feasible. In general, the community prioritize an e^+e^- collider extendable in energy. At this level both e^+e^- lineal collider proposals, ILC and CLIC, are supported with a preference for the ILC due to its a more mature technology and for its faster implementation.

If the Japanese government proposes to construct and to host the ILC250, the Spanish community will be in favour of a participation in this new endeavour. A possible future contribution from Spain to ILC250 should be negotiated in close collaboration with the rest of interested European countries, including a possible CERN participation in technology, science and logistics.“

Sweden

- „The community considers the construction of an e^+e^- collider with a centre-of-mass energy up to at least 500 GeV as essential. We want to contribute to ILC if a positive decision will be taken regarding its construction (...).“

Input from National Communities Related to ILC

UK

- „The UK is active and playing leading roles in both accelerator and detector aspects of a possible future linear collider. Should such an accelerator be realized, this community would engage in both of these activities.“

US (DPF)

- „The international particle physics community is awaiting a decision by the Japanese government about the construction of the ILC in Japan. A positive decision here has the potential to reshape global plans beyond the HL-LHC.

(...)

In accordance with the US P5 recommendations, the current efforts on HL-LHC, SuperKEKB, ILC Higgs factory, and PIP-II are strongly supported.

Not in favour of Linear Colliders:

- Italy, Switzerland, Denmark,...

Table 1: HEP accelerator programs with the currently existing efforts and possible future projects.

	Current Projects	Future Projects
Hadron Colliders	HL-LHC: 14 TeV/3 ab ⁻¹	HE-LHC: 27 TeV/15 ab ⁻¹ FCC-hh: 100 TeV/30 ab ⁻¹ SPPC: 100 TeV/30 ab ⁻¹
Lepton Colliders	SuperKEKB: 3.5 GeV e ⁺ on 7 GeV e ⁻ /8 × 10 ³⁵ /cm ² /s C-Tau at RINP: 2.5 GeV/1 × 10 ³⁵ /cm ² /s ILC: 250 GeV/2 ab ⁻¹ , 80% & 30% pol.	ILC: 0.5 (1) TeV/4 (8) ab ⁻¹ CLIC: 0.38,1.5,3 TeV/0.5,1.5,3 ab ⁻¹ FCC-ee: 250 GeV/ 5 ab ⁻¹ CEPC: 240 GeV/ 5 ab ⁻¹ μ ⁺ μ ⁻ colliders: 0.125, 3, 14 TeV e ⁺ e ⁻ 1(3) TeV plasma colliders
Lepton-Hadron Colliders		LHeC: 60 GeV⊕7 TeV/1 ab ⁻¹ FCC-eh: 60 GeV⊕50 TeV/2 ab ⁻¹
Intensity Frontier	J-PARC : 1.3 MW upgrade PIP-II: 1.2 MW/200 kton·MW·years for DUNE and >1.5 MW for precision program	PIP-III: 2.4 MW/ 700 kton·MW·years for DUNE Neutrino Factory: 10 GeV/5·10 ²⁰ ν/yr

Other Input

Specific input for dedicated projects

- ILC, CLIC, FCC, PBC, Neutrinos, DM Searches, etc.

Input from few universities

Input from related fields

- Astroparticle, Nuclear Physics, etc.

Input from (groups of) individuals

- Example:

A View on the European Strategy for Particle Physics

Contact Person: Michel Spiro (mspiros@admin.in2p3.fr)

Abstract Worldwide, the particle physics and accelerator community is very actively working towards the next major facility. Based on the designs and performance of linear and circular e^+e^- colliders in the 90 (Z) to 365 (above top-antitop) GeV centre-of-mass energy range, we consider a circular collider at CERN to be the most attractive option. It is also an investment in the future for a possible later stage as a 100 TeV hadron collider.

Signed by (among others):

- 2 ex CERN-DGs
- 2 ex CERN Council Presidents
- 4 ex CERN Directors
- 5 ex CERN Department/Division Heads
- 12 (ex) CERN Experiment Spokespersons

My Impressions

Just based on the input documents. Remember - this is only the beginning of the strategy process!

(Almost) all agree on lepton colliders as the key infrastructure for the future

The ILC is seen as an opportunity

- Many Europeans are looking forward to joining the ILC project in Japan
- It is understood that ILC would bring fresh money to the field but also requires contributions from Europe
- CERN should play a central role in the coordination of possible ILC contributions

The future of CERN is the paramount issue in the strategy discussions

- Besides a possible involvement in offshore projects, CERN needs a future machine beyond HL-LHC
 - accompanied by a vital programme of smaller and beyond collider experiments
- The ILC discussion seems to be somewhat de-coupled from the discussion of the future of CERN
- FCC-ee/hh seems to be the favoured future project for CERN
 - CLIC is mentioned much less frequently

There is nevertheless strong opposition against the ILC

- Mostly from proponents of circular machines
- Worries that any offshore project with strong European participation might jeopardise the existence of CERN

It all depends on the Japanese Government now...

If there is a statement that is seen to be „positive enough“ to persuade the European community that the ILC is a real option, there is a good chance to place the ILC high on the priority list of the Strategy Update

- At this time strong support in the input documents from many national communities

If the statement is seen as „too weak“, opinions can change fast

- Already now the ILC is seen as „dead“ by many after SCJ statement
- Remember: the input documents have been written before!

Where is the dividing line between „positive enough“ and „too weak“?

- ICFA/LCB interpretation is important
- Nevertheless, the opinion makers will move fast

The strategy definition process takes on until spring 2020

- Developments following a possible positive statement from Japan will be watched closely
- Reactions on statement by governments, possible start of negotiations, will have an impact!

Contact

DESY.

Deutsches Elektronen-Synchrotron

Karsten Buesser

karsten.buesser@desy.de

www.desy.de