Update on LC Activities in Europe

Karsten Buesser
29.11.2018

HELMHOLTZ RESEARCH FOR GRAND CHALLENGES

DESY.

„The Abduction of Europa“
J.-F. de Troy, 1716

European Strategy

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

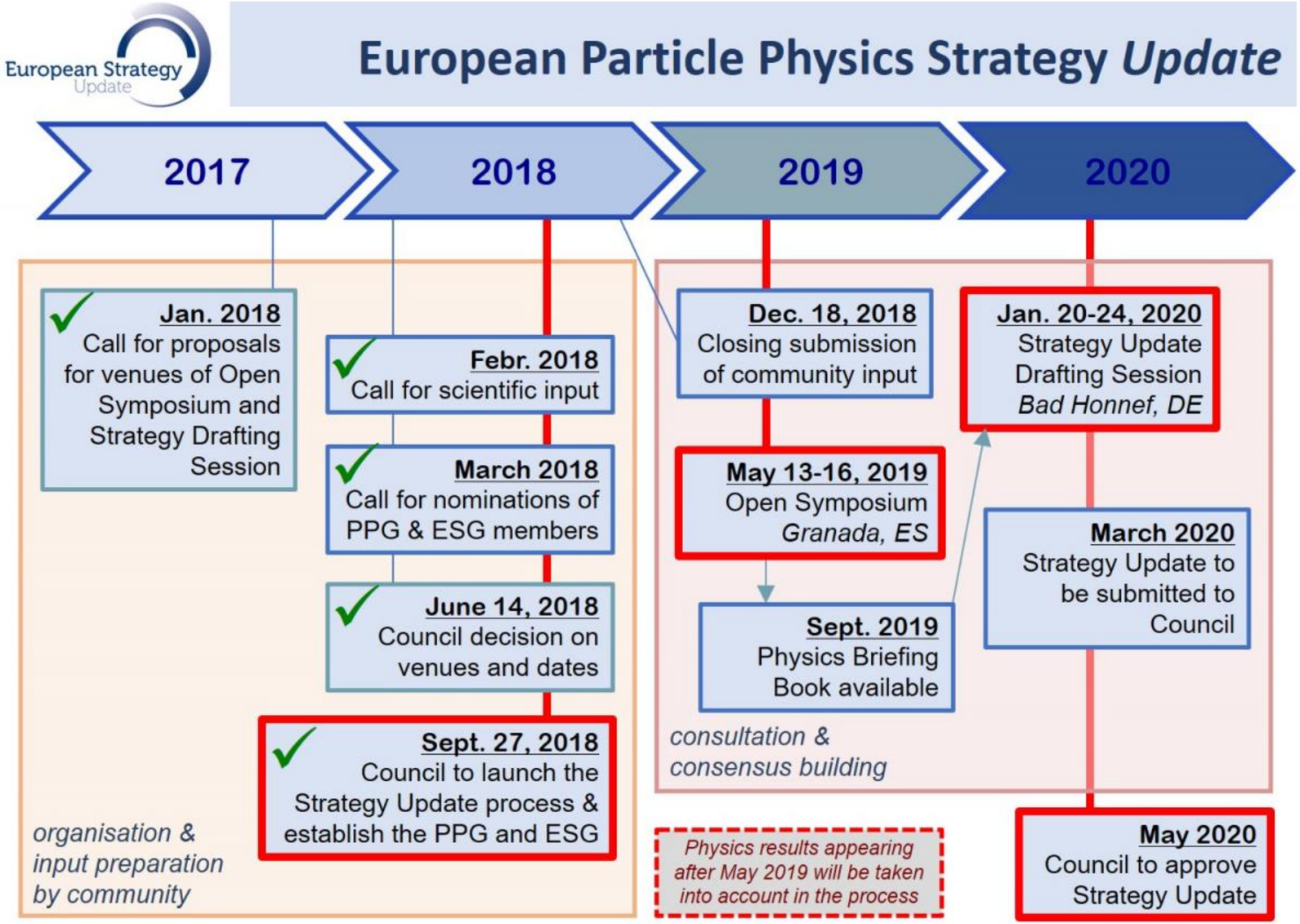
Initiated and approved by CERN Council

- 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
Stan Bentvelsen
Caterina Biscari
Marcela Carena
Jorgen D'Hondt
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Beate Heinemann
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Paris Sphicas
Brigitte Vachon
Marco Zito
Antonio Zoccoli

Local Organizing Committee

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

https://cafpe.ugr.es/eppsu2019/

eppsu2019@pcgr.org

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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

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

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.

European Preparation Plan for the ILC

European Preparation Plan

Started following a request by KEK

- To complement the KEK ILC Action Plan from 2016
- Drafting delegated to E-JADE management
- CERN Council (06/2018): *„The Council took note of a document provided for information, entitled "Preparation plan for European participation in the International Linear Collider", by the coordinator of the Europe-Japan Accelerator Development Exchange Programme (E-JADE), Professor Stapnes."*

Potential European involvement in the ILC

- Assumes the ILC will be realised as an international project lead by Japan
- Provides input for the Europan Strategy preparations
- No commitments at this time!

Assumes three phases:

- 2017-2018: Pre-preparation phase
  - Now, waiting for decisions…
- 2019-2022: Preparation phase
- 2023 and beyond: Construction phase

July 2, 2018

Preparation Plan for European Participation in the International Linear Collider

Towards a European Contribution to the ILC

Authors: Philip Bambade (LAL Orsay)
Philip Burrows (Oxford)
Angeles Faus-Golfe (IFIC-Valencia and LAL)
Brian Foster (DESY)
Andrea Jeremie (LAPP Annecy)
Benno List (DESY)
Olivier Napoly (CEA-Saclay)
Thomas Schörner-Sadenius (DESY)
Marcel Stanitzki (DESY)
Steinar Stapnes (CERN)
Nick Walker (DESY)
Hans Weise (DESY)

Content

E-JADE
Europe -Japan Accelerator Development Exchange Programme

Pre-Preparation Phase

Current Activities in Europe

- Machine:
  - Major activities are related to large ongoing projects:
    - XFEL, ESS
  - And to R&D facilities:
    - CLIC, ATF2
- Detector R&D is strong in Europe

Item/topic	Brief description	CERN	France CEA	Germany DESY	Time line
SCRF	Cavity fabrication including forming and EBW technology,	✓			2017-18
	Cavity surface process: High-Q &–G with N-infusion to be demonstrated with statics, using High-G cavities available (# > 10) and fundamental surface research		✓	✓	2017-18
	Power input-coupler: plug compatible coupler with new ceramic window requiring no-coating	✓			2017-19
	Tuner: Cost-effective tuner w/ lever-arm tuner design	✓	✓		2017-19
	Cavity-string assembly: clean robotic-work for QA/QC.		✓		2017-19
Cryogenics	Design study: optimum layout, emergency/failure mode analysis, He inventory, and cryogenics safety management.	✓			2017-18
HLRF	Klystron: high-efficiency in both RF power and solenoid using HTS	✓			2017- (longer)
CFS	Civil engineering and layout optimization, including Tunnel Optimization Tool (TOT) development, and general safety management.	✓			2017-18
Beam dump	18 MW main beam dump: design study and R&D to seek for an optimum and reliable system including robotic work	✓			2017- (longer)
Positron source	Targetry simulation through undulator driven approach			✓	2017-19
Rad. safety	Radiation safety and control reflected to the tunnel/wall design	✓			2017 – (longer)

Table 1: Current common studies between European institutions and Japan relevant for the ILC.

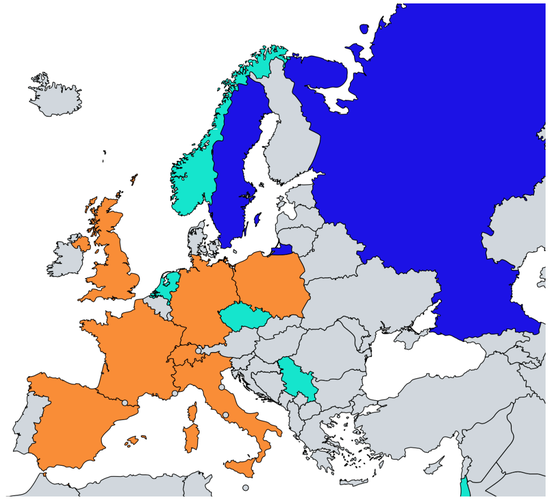


Figure 7: The European countries with current ILC-related activities in the accelerator (blue), detectors (cyan), or both (orange).

	CERN	DESY	Czech Republic	France	Germany	Italy	Israel	Netherlands	Norway	Poland	Serbia	Spain	UK
Vertexing	✓	✓	✓	✓	✓	✓				✓		✓	✓
Tracking	✓	✓		✓	✓			✓				✓	✓
Calorimetry	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
MDI	✓	✓							✓				✓
System Integration	✓	✓		✓								✓	

Table 6: An overview of present activities in the area of ILC-related detector R&D and integration in Europe.

Preparation Phase

The Preparation Phase will only start if:

- The Japanese government sends a positive signal
- The European Strategy Update ranks European participation in the ILC as a high-priority item

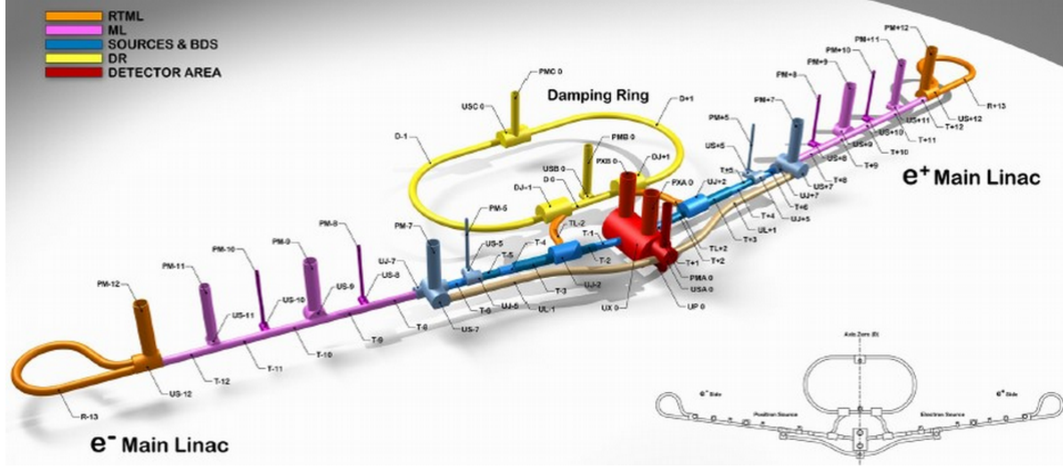
The preparation phase focuses on preparation for construction and agreement of the deliverables and their allocations to the regions

In Europe:

- Technical preparation of European deliverables for the construction phase
  - Final technical specifications, final prototypes, finalisation of pre-series orders
  - Industry involvement
  - Knowledge transfer from XFEL (and ESS) construction to ILC
- European Design Office (most likely at CERN)
  - Satellite offices at other labs
- Documentation based on XFEL experience (EDMS)
- Negotiations about final European contributions, organisation of the project, governance

The founding of the ILC International Lab will be prepared during the preparation phase

Construction Phase



The construction phase starts

- after the establishment of the international ILC laboratory
- after inter-governmental agreements are in place

Preparation plan only describes existing capabilities in Europe

- Detailed contributions will have to be defined during preparation phase and formalised by inter-governmental agreements

Good learning cases are the construction of the XFEL and ESS cryomodules:

	Germany	France		Italy	Poland			Russia	Spain
	DESY	CEA Saclay	LAL	INFN Milan	IFJ PAN	WUT	NCBJ	BINP	CIEMAT
Linac									
Cryomodules	✓	✓		✓					
SCRF Cavities	✓			✓					
Power Couplers	✓		✓						
HOM Couplers							✓		
Frequency Tuners	✓								
Cold Vacuum	✓							✓	
Cavity String Assembly	✓	✓							
SC Magnets	✓				✓				✓
Infrastructure									
AMTF	✓				✓	✓		✓	
Cryogenics	✓								
Sites & Buildings									
AMTF hall	✓								

Table 2: Responsibility matrix for cryomodule production and testing for the European XFEL.

	Germany	France		Italy		Poland	Spain	Sweden		UK
	DESY	CEA	IPNO	Elettra	INFN-LASA	IFJ-PAN	ESS Bilbao	ESS	Uppsala	STFC
RF systems				✓			✓	✓		
LLRF									✓	
Cryomodules		✓	✓							
SCRF Cavities		✓	✓		✓					✓
Power Couplers		✓	✓							
HOM couplers										
Frequency Tuners		✓	✓							
Cold Vacuum		✓	✓					✓		
Cavity String Assembly		✓	✓							
RF Tests (Cavites)	✓									✓
RF Tests (Cryomodules)		✓	✓			✓		✓	✓	

Table 3: Responsibility matrix for the cryomodule production and testing for the ESS.

EU-Funded Projects

EU Funds for Detectors

Follow-up to successful EUDET and AIDA projects

10 M€ EU funds, total 30 M€

- Leverage on national matching funds: 20 M€
- 50% LHC, 25% LC, 25% generic

LC highlights:

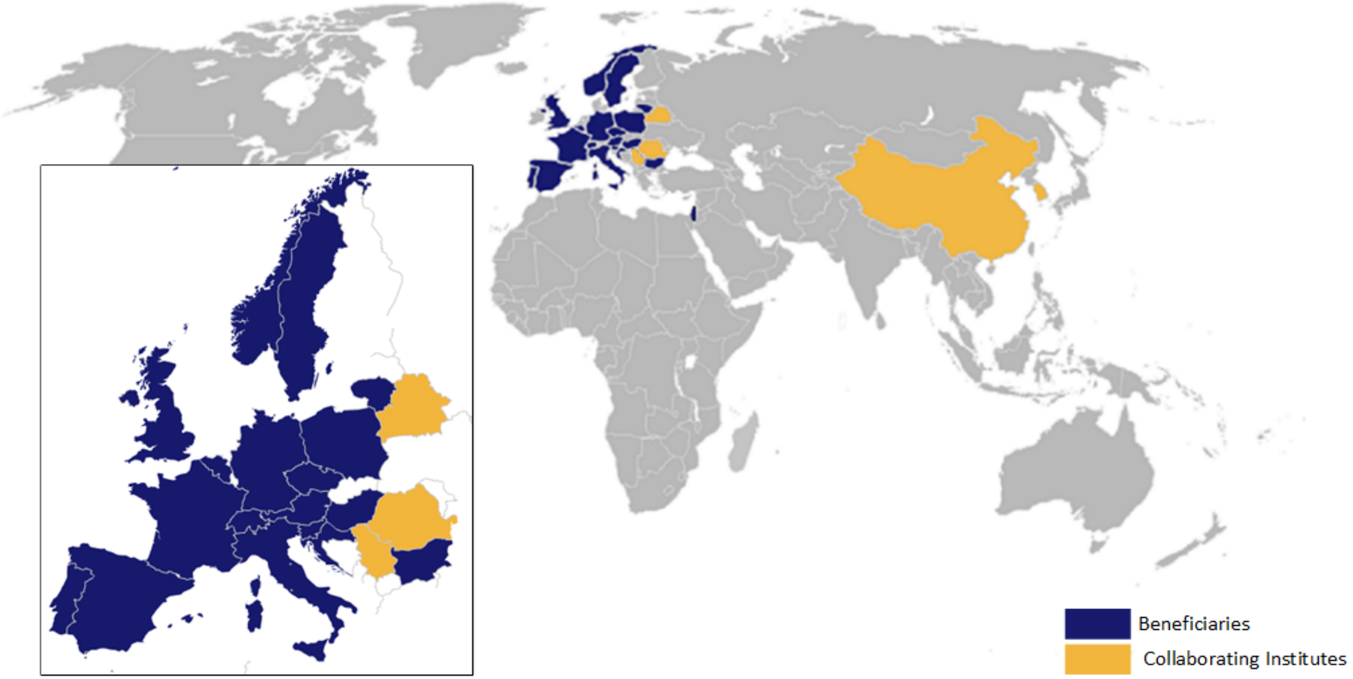
- Common test beam DAQ, reference pixel & st trackers
- Calorimeter infrastructure, software, ASICs

Started 2015 for originally 4 years

- Extended until 4/2020

Expect new call with deadline in 2020 - when new European Strategy in place

https://aida2020.web.cern.ch



- 38 institutes, 19 countries

Slide from F. Sefkow

E-JADE

Europe-Japan Accelerator Development Exchange Programme

- Marie Sklodowska-Curie Resarch and Innovation Staff Exchange Programme (RISE)
- Funded by the EU under Horizon2020

Travel support to Japan for accelerator and detector R&D:

- LHC consolidation, upgrades and R&D for future hadron machines
- Nanometre scale beam handling at ATF
- Linear Collider targeted R&D
- Training and knowledge transfer, Management, Dissemination

18 Partners (14 in Europe, 4 in Japan)

E-JADE researchers have spent so far more than 4500 days doing research in Japan!

Programme ends in this year

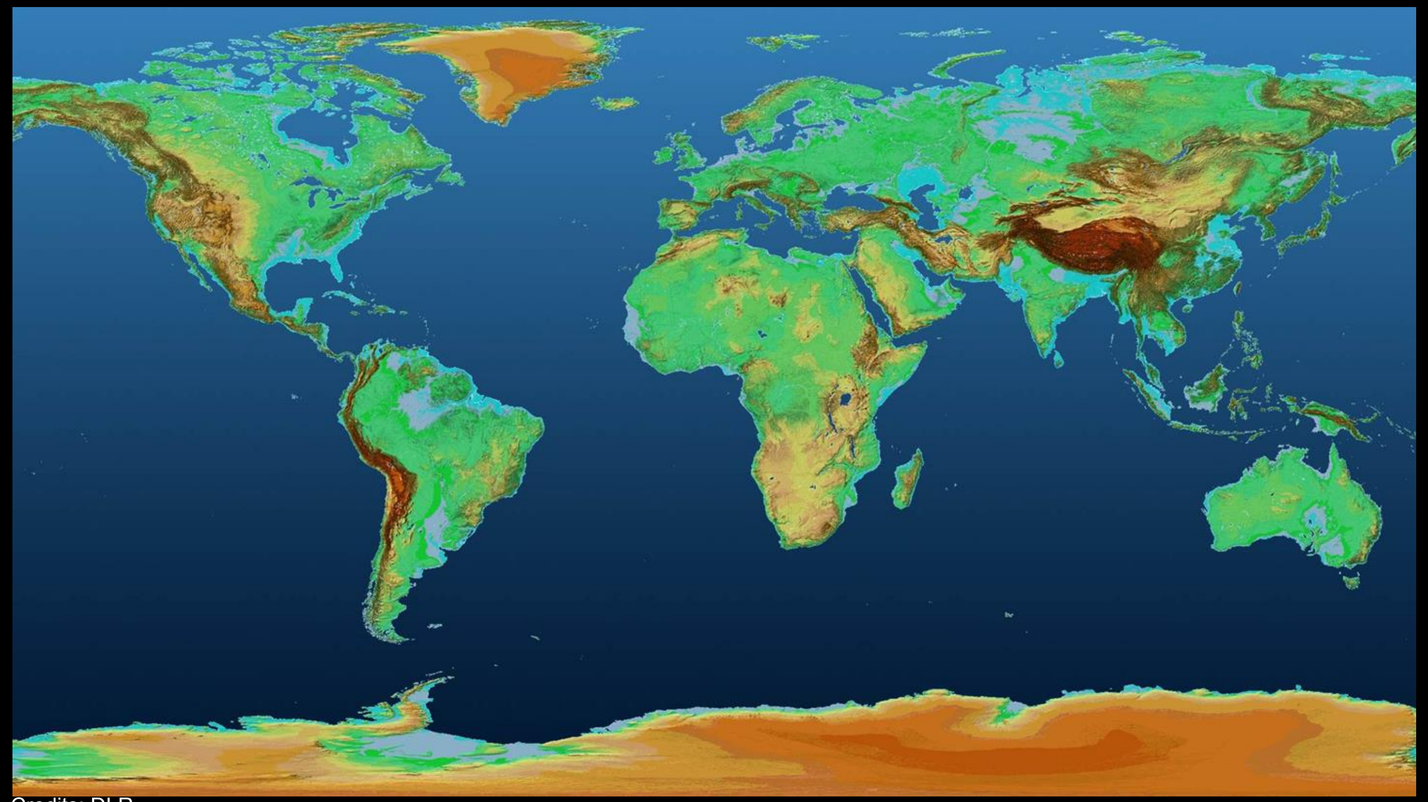
- Ideas for a successor programme - including accelerator and detector R&D - exist
- Wait for positive sign from Japan

Conclusion

Europa - „the Far-Sighted“

Europe’s strategy will have a global perspective

- the global Linear Collider community should give coherent input



Credits: DLR

Contact

DESY.
Deutsches Elektronen-Synchrotron

www.desy.de

Karsten Buesser
karsten.buesser@desy.de

Thanks for input from many colleagues.
Among others: Ties Behnke, Phil Burrows, Juan Fuster, Aidan Robson, Thomas Schoerner, Felix Sefkow, Steinar Stapnes