Report from the European Committee for Future Accelerators

H. Abramowicz - ECFA chair
Tel Aviv University
ECFA Mandate

• Hold regular meetings of Plenary and Restricted ECFA;

• Sponsor or organize ad hoc symposia and conferences;

• Set up study groups and review groups;

• Visits to CERN member states to review organization and resources, repeated at regular intervals; provide written reports to funding authorities;

• Monitor the ongoing implementation of the European Strategy for Particle Physics;

• Represents Particle Physics community in other organizations.
ECFA supported Workshops, Studies and Schools

- 2\textsuperscript{nd} Workshop on HL-LHC: 21-23 Oct. 2014, Aix-les-Bains. Summary published as ECFA note (ECFA/15/289), 3\textsuperscript{rd} workshop - preliminary proposal just received for Oct 4-7 2016

- Study on Future Circular Colliders, 1st annual meeting March 23-27, 2015, Washington (DC), next one April 11-15, 2016 in Rome

- Memorandum on the evaluation of Experimental Particle Physicists - joint ECFA/HEPP-EPS document, distributed
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RECFA Country Visits in 2015

- Czech Republic, March 27/28 (Charles Univ. Prague)
- Portugal, May 15/16 (Coimbra Univ.)
- Norway, October 2/2 (Oslo Univ.)

General conclusions from country visits

- Excellent science, in line with European Strategy
- Vibrant communities
- Impressive outreach programmes
- Straggle with funding for HL-LHC detector upgrades and for young researchers

Plenary ECFA in 2015

- July 25, joint ECFA-EPS, Vienna
  “Connecting Scales: bridging the infinities”
- November 19/20, CERN - highlights follow
Schedule of ECFA meetings in 2016

- PECFA meetings
  - Grand Sasso, June 30/July 1
  - CERN, November 24/25, (mid-term rep. by Netherlands, Italy, Poland, Serbia)

- RECFA
  - Switzerland, April 1/2, Zurich
  - Sweden, May 20/21, Lund
  - Turkey, September 30/October 1, Istanbul (preliminary)
• Usual reports on activities at CERN, DESY, Frascati
  - considering in the future to add other accelerator based national labs
• IPPOG report
  - outreach activities
• Mid-term reports from Spain and Romania
  - steady though slow improvements in Romania, hardship in Spain
• Physics session - physics highlights of pp, ee, ep and µµ interactions
  - pre European Strategy update, concentrate on physics merits
• Report on ECFA linear collider physics and detector study
  - keep European community informed on ongoing activities
• CERN neutrino platform
  - keep European community informed on ongoing activities
• Detector R&D - status report from CALICE
  - innovative technologies for calorimetry
• Accelerator science - Applications of Particle Accelerators
  - expand horizons
• Astroparticle physics - Dark matter searches
  - expand horizons
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Report from DESY (Ties Behnke)
XFEL status - 60/100 modules have been delivered; module 100 scheduled for April 2016

Aerial view of the experimental area 10/2015

View into the tunnel with modules installed.
Accelerators infrastructures at LNF today

330 staffs
100 students & post-docs
800 users
Operation budget 13 ME

Pierluigi Campana
In June DAΦNE reached a record luminosity of $2 \times 10^{32}$ cm$^{-2}$s$^{-1}$

SPARC_LAB setting up for advanced R&D on plasma accelerating structures (PWFA and LWFA) and photonic sources
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Report to ECFA, November 19th 2015

Hans Peter Beck:

34 members from 26 countries + CERN, DESY, FNAL and 5 experiments
to formalize cooperation through MoU

Evolution of Masterclass participation

- 2005: 18 countries
- 2006: 58 institutes
- 2007: 72 masterclasses
- 2008: 3k students
- 2009: 12 video conferences
- 2010: 42 countries
- 2011: 193 institutes
- 2012: 255 masterclasses
- 2013: 10k students
- 2014: 68 video conferences
- 2015: 42 countries
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- “A beam of particles is a very useful tool...”
- Accelerators for Americas Future Report, pp. 4, DoE, USA, 2011

Suzie Sheehy

There are roughly 35,000 accelerators in the world (Above 1 MeV...)

- Radiotherapy accelerators
- Ion implanters, surface & bulk modification
- Industrial processing and research
- Low energy accelerators for research
- Medical radioisotope production
- Synchrotron light sources
- High energy accelerators for research (E>1GeV)
Lower dose  
Synchrotron radiation - reconstruction of 3D structure of DNA packaging with a resolution of 0.2 nm  
e-beams - treating waste water

Higher dose

e-beams - electronic pasteurisation

Primary uses of beams:
- e-beams - irradiating topaz for color
- e-beams - treating waste water
- Synchrotron radiation - reconstruction of 3D structure of DNA packaging with a resolution of 0.2 nm
- Neutrons - cargo containers scanned
News from the e⁺e⁻ collider(s)

⇒ Physics goals of future lepton collider
   - Testing self-consistency of the SM - indirect search for new physics
   - Higgs, top, and EW precision measurements
   - Sensitivity for low mass and EW new physics

⇒ Exploration of Higgs Physics at the LHC on its way
   - HL-LHC will set a high bar for Higgs physics
   - Potential limited by systematic uncertainties with possibility for improvements

⇒ Circular collider potential
   - Edge on luminosity at lower energies (relevant for Higgs and top physics)
   - Pave the path for future hadron collider

From M. Klute, LCWS2015
News from the e⁺e⁻ collider(s)

ILC – linear – TDR for acc./det. – “ready to go”
CLIC – linear – TDR for acc./det. end of 2018 – large synergy with ILC community
CEPC – circular – similar to FCC in China – pre-CDR
FCCee – least explored
## News from the $e^+e^-$ collider(s)

<table>
<thead>
<tr>
<th>Uncertainties</th>
<th>HL-LHC*</th>
<th>$\mu^-$</th>
<th>CLIC</th>
<th>ILC</th>
<th>CEPC</th>
<th>FCC-ee</th>
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<tbody>
<tr>
<td>$m_H$ [MeV]</td>
<td>40</td>
<td>0.06</td>
<td>40</td>
<td>15</td>
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<td>$\Gamma_H$ [MeV]</td>
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<td>0.16</td>
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<td>1.2</td>
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<tr>
<td>$g_{Hbb}$ [%]</td>
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<td>1.3</td>
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<td>0.5</td>
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<td>3.3</td>
<td>4.7</td>
<td>1.5</td>
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<td>-</td>
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<td>24</td>
<td>30</td>
<td>-</td>
<td>-</td>
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</table>
News from the International Linear $e^+e^-$ collider (ILC)

• There is a large community in Europe (and beyond) interested in ILC/CLIC with major contributions to detectors R&D and software infrastructure for the whole community (FP6 – EUDET; FP7 – AIDA; H2020 – AIDA2020)

• Umbrella organization: Linear Collider Collaboration and Linear Collider Board originally mandated till 2016 - life span of LCC and LCB extended by one year (end of 2016) with FALC funding

• Message from Japan (potential host of ILC), from KEK DG
  - costs have to be shared internationally,
  - request to community to make their governments aware of great interest in ILC.

• Synergy with CLIC was a life line for ILC activities in Europe (especially for small countries) - may not be sufficient in CLIC Project Implementation Plan phase

Getting EU funding is crucial for the next years
Need to find a “home” in Europe till next European Strategy update
"In a spectacular case, American collector, William Koch, sued a German wine dealer, claiming four bottles – allegedly belonging to former US president Thomas Jefferson – purchased for 500,000 dollars, were fake."

On a lighter note:
ion beams can detect wine fraud with (CNRS – Arcane) – test chemical composition of “ancient” wine bottle and compare to data base.
Thank you Agnieszko, Rolf and Sergio for making ECFA feel welcome at CERN

Gratitude to the Council support team for all their help

Happy and Peaceful Holidays
Backup slides
The Linear Collider Collaboration

**ICFA**
Chair: J. Mnich

**FALC**
Chair: J. Womersley

**Program Adv. Committee**
PAC – Chair: N. Holtkamp

**Linear Collider Board**
LCB – Chair: S. Komamiya

**Linear Collider Collab.**
Director: L. Evans

**Regional Directors**
- B. Foster (EU)
- H. Weerts (AMs)
- A. Yamamoto (AS)

**KEK**
LC Project Office

**KEK**

**ILC**
- M. Harrison
  (Deputy) H. Hayano, N. Walker

**CLIC**
- S. Stapnes

**Physics & Detectors**
- H. Yamamoto

**Deputy (Physics)**
- H. Murayama
The new Linear Collider Collaboration: LCB members

5 members x 3 regions + chair = 16 members + secretary

Chair       Sachio Komamiya (The University of Tokyo)

Americas   Jonathan Bagger (TRIUMF)
           Nigel Lockyer (Fermilab Director)
           David MacFarlane (SLAC)
           Lia Merminga (TRIUMF)
           Hugh Montgomery (Jefferson Lab)

Asia       Jie Gao (IHEP, Beijing)
           Rohini Godbole (Indian Institute of Science)
           Sunkee Kim (RISP)
           Atsuto Suzuki (KEK Director)
           Yifang Wang (IHEP Director)

Europe     Rolf Heuer (CERN Director-General)
           Joachim Mnich (DESY Director of Particle Physics)
           Victor Mateev (JINR Director)
           Francois Le Diberder (IN2P3)
           Lenny Rivkin (PSI) 

Secretary  Roy Rubinstein

Present LCC/LCB mandate and structure has been extended by ICFA to end of 2016. Common fund was also approved by FALC till 2016.

** ECFA should position itself and think on the next step and possible organization
• CLIC workshop 2015, 26-30 Jan., CERN, Geneva (Switzerland)
  https://indico.cern.ch/event/336335/
  Attendance >200 participants

• Asian Linear Collider Workshop 2015, 20-24 April 2015, KEK (Tsukuba) and Tokio, Japan
  Chair: Y. Okada. Local chair: A. Miyamoto
  Special separated event (April 22) with Japanese authorities in Tokio was very successful. About 300 participants. Very much ILC oriented.

• International Workshop on Future Linear Colliders, Whistler (Canada), 2-6 Nov. 2015
  http://lcws15.triumf.ca/index.html
  Chair: D. Denisov. Local Chair: Shane Koscielniak
  Attendance ~200 participants.
• CLIC workshop 2016, CERN, 18-22 Jan.  
  https://indico.cern.ch/event/449801/

• ECFA - Linear Collider Workshop 2016, 30 May – 5 June  
  Santander (Spain)  
  Local chair: Alberto Ruiz  
  “Omnibus” type workshop: Accelerator, ILD, CLICdp, SiD, R&D Collaborations, Plenaries, etc..

• LCWS16, Asia, place and date to be decided
Possible ILC Site at Kitakami

- Proposed by Japanese HEP community
- Endorsed by LCC
- Not decided by Japanese government

Kitakami
Ichinoseki
Sendai
Tokyo

50 km
80 km
300 km
Shinkansen Line