Recent developments (since Daresbury, September 02)
International Technical Review of LC
Recommendation by the German Science Council
Management proposal for the project
Aspects of the future possibilities
A Few Comments

- TTF2 review: Next talk
- DESY financial situation in 2003
- Status of Search for TESLA Project Leader
- New TESLA logo:
The TESLA Collaboration

- The TESLA Collaboration is growing further:

- 3 UK institutes have applied to join:
  UCL (D. Miller)
  Royal Holloway UL (G. Blair)
  Queen Mary UL (Ph. Burrows)

Discussion tomorrow in Coll Board
Report From
The International Linear Collider Technical Review Committee

Presented at the ICFA seminar, October 2002

Here: Comments relating to TESLA
**Charge**

- To assess the present technical status of the four LC designs at hand, and their potentials for meeting the advertised parameters at 500 GeV c.m. Use common criteria, definitions, computer codes, etc., for the assessments.

- To assess the potential of each design for reaching higher energies above 500 GeV c.m.

- To establish, for each design, the R&D work that remains to be done in the next few years.
Ranking Criteria for R&D

R1
R&D needed for feasibility demonstration of the machine

R2
R&D needed to finalize design choices and ensure reliability of the machine

R3
R&D needed before starting production of systems and components

R4
R&D desirable for technical or cost optimization
R1 None

R2

• Test of a complete main linac RF sub-unit (as identified in machine description) with beam

• Testing of several cryomodules at nominal field (23.4 MV/m) over long enough periods to verify breakdown and quench rates, and measure dark current

.... Plus further topics under R2, R3, R4
R1

- Building and testing of a cryomodule at 35 MV/m and measurement of dark current

R2

- Study of tighter requirements at 800 GeV on damping ring alignment and suppression of electron and ion instabilities
- Test of RF components at higher power
- Test of superstructures: gradients, HOMs, couplers

... Plus further topics under R2, R3, R4
JLC(X)/NLC Ranking

**R1**
- Test of complete accelerator structure at design gradient with detuning and damping, including study of breakdown and dark current
- Demonstration of SLED II pulse compression system at design power level

**R2**
- Test of a complete X-band main linac RF sub-unit (as identified in machine description) with beam
- Full test of KEK 75 MW, 1.6 \( \mu \text{s} \) PPM klystron at 150 or 120 Hz

... Plus further topics under R2, R3, R4
Quotes:

- If one had to “launch” a project today for 500 GeV, TESLA would be the only one having “essentially” proven performance specs for the main linac RF system.

- By the end of 2003, we should hopefully know if TESLA can reach 800 GeV at 35 MV/m (with the addition of RF power and cryogenics).

The TRC has thus **confirmed** the assessment of the German Science Council.

**The big question:** How to address the technology choice.
- Calorimeter R&D (CALICE collaboration):

  8 countries, 24 institutes, 138 people from all three world regions
  + LCCAL, forward calorimeter

- Vertex Detector R&D: (CCD, CMOS technologies)

  CCD readout chip mask

- Main Tracking Detector (TPC) R&D:

  Required: unprecedented hermeticity, momentum resolution, jet energy resolution, flavour identification

  Global coordination of R&D has started
The German Science council has converted its statement on 14 November into a recommendation.

The Science Council requests the Federal Government to give its binding consent to German participation in the LC as soon as possible after the project proposal has been submitted with specific details concerning international funding and international cooperation.

The Science Council requests the Federal Government to give its binding consent to German participation in the TESLA X-FEL project as soon as possible after the revised project proposal has been submitted.

DESY has answered on 24 October to the SC.
The proposed organisational and management structure of the TESLA Project is based on the concept that

- the responsibility for most subsystems is shared between different institutions and even regions, in order to exploit best the know-how available around the globe.

The same principle is being implemented for ALMA.

A specific proposal has recently been submitted to the German Science Council
TESLA XFEL Laboratory

with dedicated Linac in separate tunnel
The Updated Proposal for the XFEL

Albrecht Wagner, TCM_Jan02
MoU between **DESY** and **SLAC** on a close collaboration in X-ray laser research, to make joint efforts to promote this trend-setting field of research:

“Collaborative Research Effort to Enable the Exploitation of the Scientific Capabilities of the Linac Coherent Light Source (SLAC project LCLS) and the TESLA X-Ray Free-Electron Laser”.

The Memorandum was signed on Friday, November 1, in the Department of Energy (DOE) in Washington.

The MoU specifies the exchange of personnel, equipment, research results and data, as well as know-how. This will accelerate and contribute to the scientific programs of both facilities, which complement one another in their qualities.
## Roadmap towards X-FELs

<table>
<thead>
<tr>
<th>Year</th>
<th>Wavelength</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>120 nm</td>
<td>TESLA Test Facility at DESY</td>
</tr>
<tr>
<td></td>
<td>530, 350 nm</td>
<td>LEUTL at APS in Argonne</td>
</tr>
<tr>
<td>2004</td>
<td>24 ... 6 nm</td>
<td>VUV-FEL facility at DESY</td>
</tr>
<tr>
<td>2005/6</td>
<td>20 ... 30 nm</td>
<td>SCSS SPring-8</td>
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<td>2008</td>
<td>0.15 nm</td>
<td>LCLS at Stanford</td>
</tr>
<tr>
<td>20??</td>
<td>100 ... 1 nm</td>
<td>BESSY FEL in Berlin?</td>
</tr>
<tr>
<td>20??</td>
<td>0.1 nm</td>
<td>X-ray FEL laboratory at TESLA?</td>
</tr>
</tbody>
</table>
A European X-FEL Laboratory

European Governments

European XFEL Corporation

TESLA Linac Corporation

Lab 1  Lab 2  ...  Lab n

Linac Network

Linac

injector

beam lines

undulators

experiments
In collaboration with BESSY, MBI, TUD

Start of operation on 30 January 2002

Experience at TTF1 have again underlined the key importance of the RF gun development

The Photo-Injector in Zeuthen

Albrecht Wagner, TCM_Jan02
Transverse Emittance Measurement

Image taken on August 16, 2002

gradient ≅ 29 MV/m
Charge = 0.5 nC

RMS size at EMSY: 1.71 mm / 1.23 mm

Example

Intensity behind a slit mask
LC Steering Groups

ICFA initiative:

Asian SG  US SG  European SG

Gov  Gov  Gov

International LC SC

ECFA
Agenda of ILCSG meeting in Feb 03

• Reports from regional Steering Groups
• Discussion of Physics Scope paper and how to finalise it
• Report on 'communications' activities
• Formation of the Subcommittee on Accelerator Issues
• Discussion of proposal to work together globally on problems common to all technologies
• Time schedule for discussion of regional considerations on overall management and organisation
• Plan for technology recommendation process
• Creation of criteria for basing recommendations
The charge is:

• From a European Perspective, work out possible models for the design, construction and operation of a linear collider* as a truly international project.

• Develop a road map towards setting up the project

*This refers specifically to a 0.5 to 1.0 TeV electron-positron machine with a latest completion date of 2014.

The members are:

George Kalmus (chair)
Torsten Akesson
Ian Corbett
Umberto Dosselli
Jos Engelen
Joel Feltesse
Lorenzo Foa
Eva Groniger Voss
Peter von Handel
Helmut Krech
Chris Llewellyn Smith
Norman McCubbin
Guy Wormser
NN
Consultative Group on Particle Physics: Final report July 2002

- CG concurs with world-wide consensus on LC
- Recommends significant period of concurrent running of LHC and LC
- Consultations between interested countries should start soon
- Cost of LC broadly comparable with that of LHC and can be accommodated if historic spending pattern on particle physics is maintained
Continuation of CG

- GSF felt that Consultative Group (CG) should continue in a form to be decided by the interested countries
- UK should continue to be the lead country
- Non-OECD representatives must be invited
- Majority of CG work related to LC
- Next meeting of GSF in Jan 03, proposal of charter by CG should then be available
- Meeting of QECD science ministers in early 2004
- Therefore: Meeting of CG March/April 03 and Nov 03
The North German Science ministers have given TESLA officially their backing.

The SC regards the funding of facilities of this size as continuous process.

The SC has said in November 2002 that it will submit concrete recommendations on the priorities for implementation, which take into account the science policy debate on the goals and funding of the facilities.

Political decision expected in 2003.
Site Planning Status

Agreement between the states Schleswig-Holstein and Hamburg for joint legal procedure

Most of the necessary planning and studies have been completed.

Start of the legal procedure linked to upcoming political decision
There will be one X-FEL in Europe, most likely at DESY.

It will complement storage ring based light sources.

Operation will start a few years after LCLS.

Construction and operation would best be embedded in European network.

The form of European organisation must be decided.

Can one share the work load (and funding) for the accelerator between several labs, as proposed by DESY?
• There will only be one LC world-wide
• There exists a clear will in all regions to collaborate as partners
• Site and technology choices are correlated and will probably be driven by political decisions
• Is Germany willing/in a position to be the host?
• How big must the host country contribution be?
Conclusions

• The Science Council has recommended TESLA under conditions which we believe to have met
• The financial situation of DESY (which is similar to that of all other research organisations) will lead to some delay in the completion if the TTF
• A political decision on large infrastructure facilities might be taken in a few months
• A lot of international coordinating efforts are taking place
• KEK will present the JLC TDR on 12 February 2003