

# **International Technology Recommendation Panel**

## **ITRP**

**Barry Barish  
ILCWS  
20-April-04**

# Why ITRP?

- **Two parallel developments over the past few years (the science & the technology)**
  - The precision information from LEP and other data have pointed to a low mass Higg's; Understanding electroweak symmetry breaking, whether supersymmetry or an alternate will require precision measurements.
  - Designs and technology demonstrations have matured on two technical approaches for such an accelerator that would be well matched to our present understanding of the physics
  - There are strong arguments for having a period of complementarity between such a machine and LHC

# TESLA

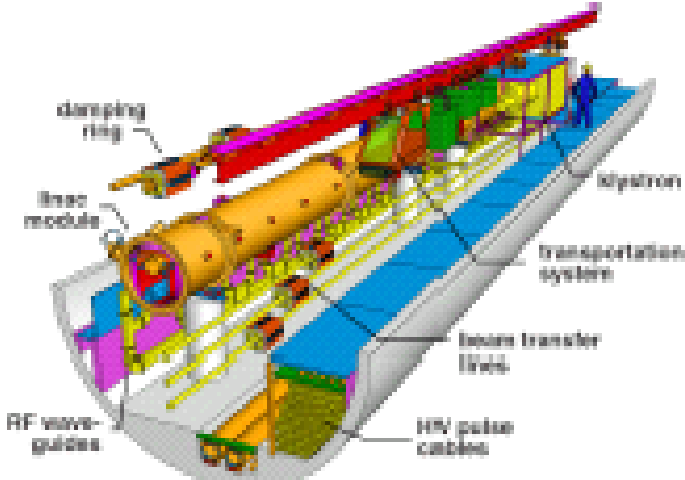
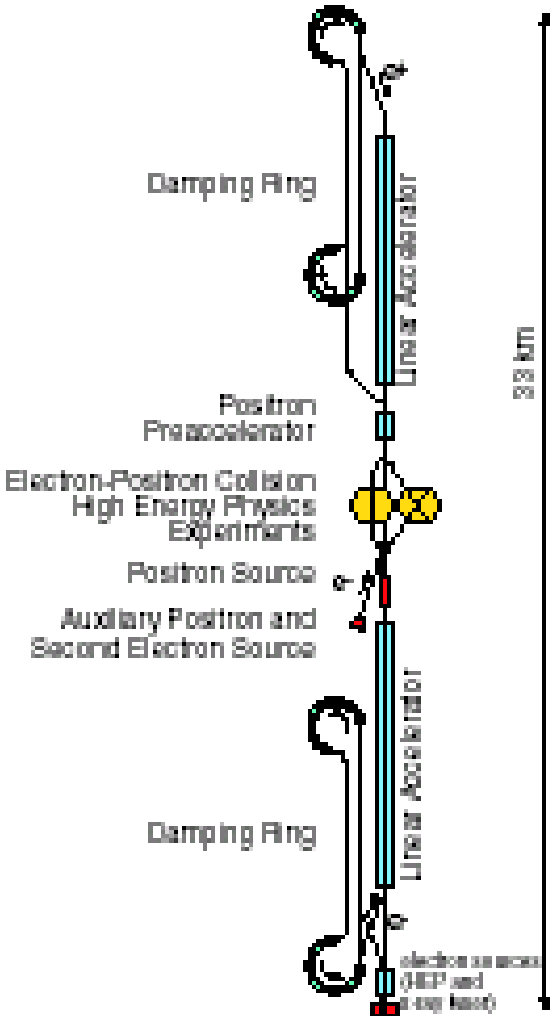
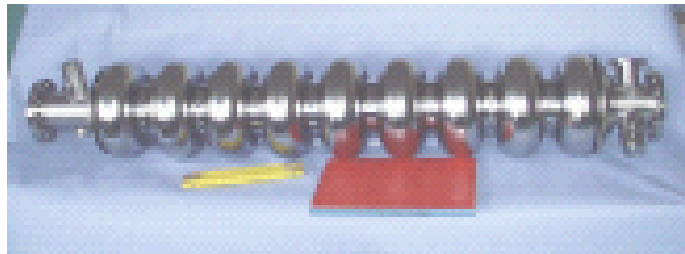
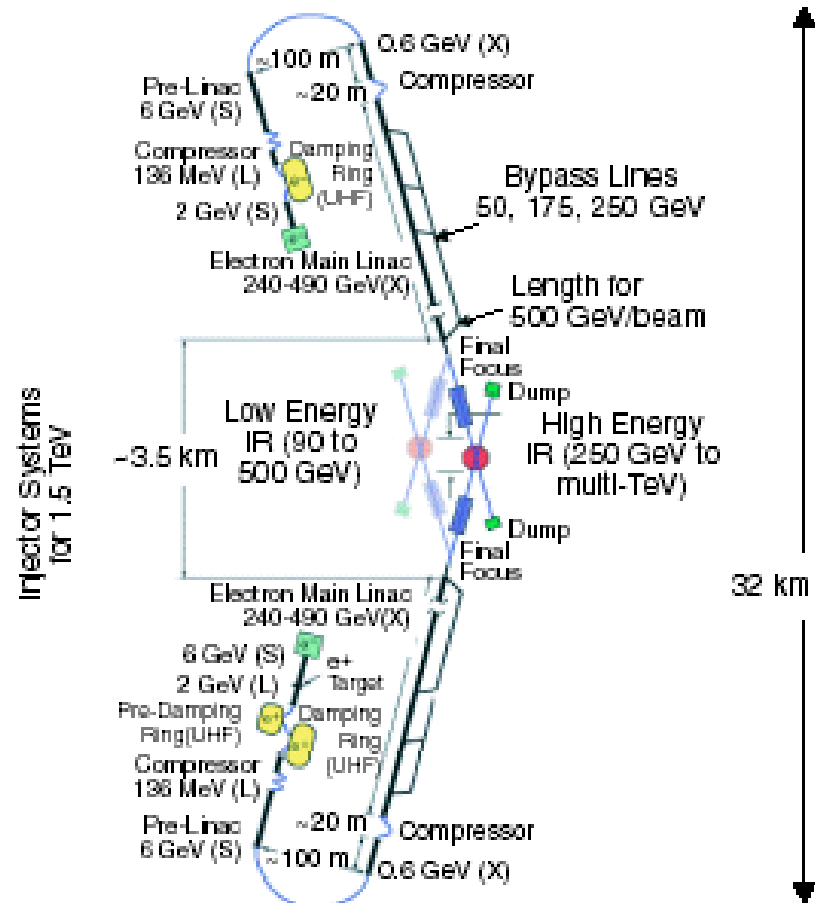


FIGURE 2. Sketch of the 5 m diameter TESLA linac tunnel

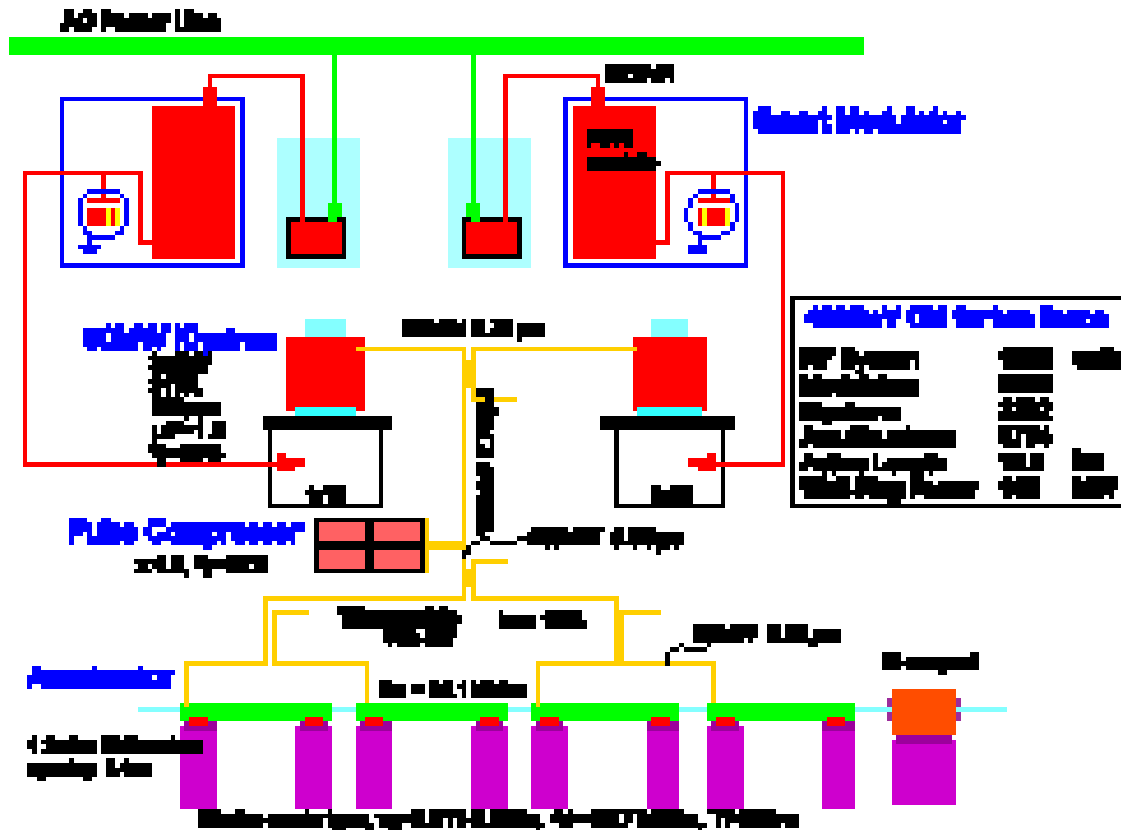


# NLC-X

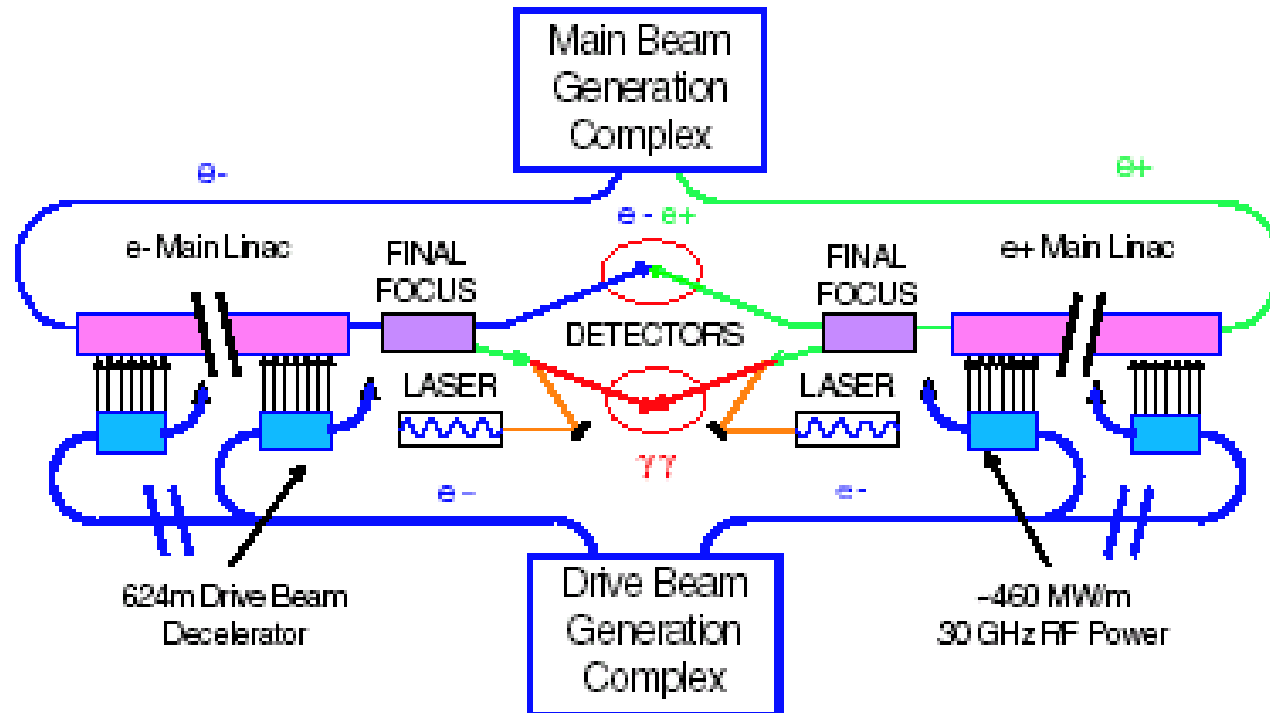


# JLC - C

## C-band RF Systems Unit for Linear Collider



# CLIC



INTERNATIONAL LINEAR COLLIDER  
TECHNICAL REVIEW COMMITTEE  
SECOND REPORT  
2003

**Validated Readiness of Tesla and NLC-X  
Concepts**

# Why Downselect Now?

- **We have an embarrassment of riches !!!!**
  - Two alternate designs -- “warm” and “cold” have come to the stage where the show stoppers have been eliminated and the concepts are well understood.
  - R & D is very expensive (especially D) and to move to the “next step” (being ready to construct such a machine within ~ 5 years) will require lots of money, organization and worldwide effort.
  - It is too expensive and too wasteful to try to do this for both technologies (and governments will not support it).
  - The final decision on construction of such a new machine will be enabled by such a down select and design program consistent with LHC and physics developments.
  - **The final decision and funding to build such a machine will be decided at that time.**

# Charge for the International Technology Recommendation Panel

## General Considerations

**The International Technology Recommendation Panel (the Panel) should recommend a Linear Collider (LC) technology to the International Linear Collider Steering Committee (ILCSC).**

**On the assumption that a linear collider construction commences before 2010 and given the assessment by the ITRC that both TESLA and JLC-X/NLC have rather mature conceptual designs, the choice should be between these two designs. If necessary, a solution incorporating C-band technology should be evaluated.**

**The recommendation should be based on all relevant scientific, technical, schedule and cost considerations. Major references for the Panel will be the recently issued “International Linear Collider Technical Review Committee Second Report 2003” (<http://www.slac.stanford.edu/xorg/ilc-trc/2002/2002/report/03rep.htm>) and the document outlining the case for the electron-positron linear collider “Understanding Matter, Energy, Space and Time” ([http://sbhep1.physics.sunysb.edu/~grannis/lc\\_consensus.html](http://sbhep1.physics.sunysb.edu/~grannis/lc_consensus.html))**

**To reach its recommendation the Panel will hear presentations from the design proponents addressing the above issues. The agendas of the presentations will be approved by the Panel in advance to assure uniformity of coverage of the technologies put forward. The Panel may ask for expert advice on any of the considerations listed above, drawing first on the ILCSC and its expert subcommittees, then moving beyond the ILCSC as necessary and appropriate. Relevant input from the world particle physics community will be solicited.**

## Scientific Criteria

The technology recommended shall be capable of meeting the scope and parameters set forth by the ILCSC, in the document “Parameters for the Linear Collider”, as accepted by the ILCSC on 19 November 2003.

## Technical Criteria

Using the ICFA Technical Review Committee report and materials supplied by technical experts that may be called, the Panel will make its recommendation based on its judgment of the potential capabilities of each **conceptual design** for achieving the energies and the peak and integrated luminosities needed to carry out the currently understood scientific program, as envisioned in the ILC Parameters Document.

## Schedule Criteria

Aiming for timely completion of the project, the Panel should compare milestones relating to design, engineering and industrialization for each of the two technologies being considered.

## **Report of the Panel**

**Unanimity in the Panel's recommendation is highly desirable in order to establish the firmest foundation for this challenging global project. The Panel is urged to report its recommendation as soon as possible, with a firm deadline by the end of 2004.**

**A full written report with the Panel's evaluation of each of the technologies considered should be available as soon as possible after the Panel's deliberations have been concluded**

**The making of the technology choice is a key event in the world particle physics program and thus timeliness in the Panel's reporting is of prime importance. The science agencies need to see a demonstration of the particle physics community's determination and ability to collaborate and to unite around the technology chosen by the Panel, as a trigger for their efforts to collaborate in forming a global project.**

## Operation of the Panel

**The ILCSC would like to make some suggestions regarding procedure. The Accelerator Sub-committee of the ILCSC is prepared to give an extensive tutorial on the LC. This would inform the Panel about LC issues and acquaint it with the experts from whom they can solicit advice.**

**Following that, visits to the major LC technology sites, in as close a sequence as possible, would help to solidify understanding of the status and issues while allowing the Panel to receive input on each technology.**

**To afford the Panel access to expert advice when needed, the ILCSC Accelerator Sub-committee should be in session on site at the Panel meeting place during their meetings.**

**It is expected that the presentation sessions will be open to the scientific and funding agency communities.**

# ITRP Members

**Jean-Eudes Augustin (FRANCE)**

**Jonathan Bagger (USA)**

**Barry Barish (USA) - Chair**

**Giorgio Bellettini (ITALY)**

**Paul Grannis (USA)**

**Norbert Holtkamp (USA)**

**George Kalmus (UK)**

**Gyung-Su Lee (KOREA)**

**Akira Masaike (JAPAN)**

**Katsunobu Oide (JAPAN)**

**Volker Soergel (Germany)**

**Hiroataka Sugawara (JAPAN)**

**David Plane - Scientific Secretary**



## Parameters for the Linear Collider

September 30, 2003

**Over the past decade, studies in Asia, Europe and North America have described the scientific case for a future electron-positron linear collider [1,2,3,4]. A world-wide consensus has formed for a baseline LC project with centre-of-mass energies up to 500 GeV and with luminosity above  $10^{34} \text{ cm}^{-2}\text{s}^{-1}$  [5]. Beyond this firm baseline machine, several upgrades and options are envisaged whose weight, priority and realisation will depend upon the results obtained at the LHC and the baseline LC. This document, prepared by the Parameters Subcommittee of the International Linear Collider Steering Committee, provides a set of parameters for the future Linear Collider and the corresponding values needed to achieve the anticipated physics program.**

# ITRP

- **Six Meetings scheduled**
    - **RAL (Jan 27,28 2004)** → **Tutorial and organization**
    - **DESY (April 5,6 2004)**
    - **SLAC (April 26,27 2004)**
    - **KEK (May 25,26 2004)**
    - **Caltech (June 28,29,30 2004)** → **Deliberations Begin**
    - **Korea (August 11,12,13)**
    - **More meetings as needed**
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graph LR; RAL["RAL (Jan 27,28 2004)"] --> Tutorial["Tutorial and organization"]; DESY["DESY (April 5,6 2004)"]; SLAC["SLAC (April 26,27 2004)"]; KEK["KEK (May 25,26 2004)"]; Caltech["Caltech (June 28,29,30 2004)"]; Korea["Korea (August 11,12,13)"]; More["More meetings as needed"]; Tutorial --- SiteVisits["Site Visits"]; DESY --- SiteVisits; SLAC --- SiteVisits; KEK --- SiteVisits; Caltech --- Deliberations["Deliberations Begin"]; Korea --- Deliberations; More --- Deliberations;
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## Tuesday 27 January

## 1st Meeting RAL

Morning (9:00 – 12:30) – Meeting of the Panel, including :

- § Discussion on how to organize the panel's work
- § Presentation of the ITRP charge – Maury Tigner
- § Telephone inputs from the Laboratory Directors & ICFA Chair
- § Round table – panellists present issues which they think are key to the ITRP recommendation
- § Coffee break in the middle of the morning

Afternoon (13:30 – 18:00) - Tutorials

- § 13:30 – 14:30 : Detector related issues – David Miller
- § 14:30 - 17:45 : X-band linear collider – Kaoru Yokoya, Tor Raubenheimer
- § 15:30 – 15:45 : Tea break

Evening : Dinner, hosted by RAL. Leave hotel at 19:15 h.

## Wednesday 28 January

Morning (9:00 – 13:00) – Tutorials

- § 9:00 – 12:15 : L-band linear collider – Reinhard Brinkmann, Nick Walker
- § 10:30 – 10:45 : coffee break
- § 12:15 – 13:15 : conclusions of the Technical Review Committee report – Gerald Dugan

Afternoon (14:00 – 18:00) – panel discussions

# Criteria for making the Linear Collider technology choice

This document sets out the criteria by which the International Technology Recommendation Panel (ITRP) ([http://www.fnal.gov/directorate/icfa/ITRP\\_Charge.pdf](http://www.fnal.gov/directorate/icfa/ITRP_Charge.pdf)) will select the technology for a  $e^+e^-$  Linear Collider (LC), initially operating at energies up to 500 GeV, with subsequent upgradability to about 1 TeV, and with some potential options. The parameters for the LC were adopted by the International Linear Collider Steering Committee (ILCSC) in November 2003 ([http://www.fnal.gov/directorate/icfa/LC\\_parameters.pdf](http://www.fnal.gov/directorate/icfa/LC_parameters.pdf)).

The elements of the criteria 'matrix' below will be evaluated for the superconducting and room temperature rf technologies on the basis of demonstrated test results, simulations, and experience with similar systems. They will be made with a judgment of the risks for technical performance, costs, schedule, remaining R&D, and the ability to meet the scientific goals of the LC. The information needed to make the judgments will be taken from the written design descriptions for the warm and cold technologies, presentations to the ITRP, responses to questions posed to the machine designers for discussion at ITRP visits, the 2003 Technology Review Committee (TRC) report (<http://www.slac.stanford.edu/xorg/ilc-trc/2002/2002/report/03rep.htm> ), documents prepared both regionally and inter-regionally for the scientific case and detector requirements for the LC, and special documents solicited by the ITRP from other experts.

**The overriding criterion for the choice of technologies will be the ability to meet the scientific goals for the Linear Collider, as set forth in “*Understanding Matter, Energy, Space and Time: the Case for the Linear Collider*”, prepared under the auspices of the ILCSC (<http://blueox.uoregon.edu/~lc/wwstudy/>), and the documents prepared by the Asian, European and North American collaborations cited therein.**

**The elements for the criteria matrix are grouped into six major areas: the scope and parameters specified by the ILCSC; technical issues; cost issues; schedule issues; physics operation issues; and more general considerations that reflect the impact of the LC on science, technology and society. The matrix will be used qualitatively to guide the ITRP in differentiating the two technologies, and in highlighting the areas that require particular focus during the process.**

# Conclusions

- The ITRP process is underway
- You can follow our progress at [http://www.ligo.caltech.edu/~donna/ITRP\\_Home.htm](http://www.ligo.caltech.edu/~donna/ITRP_Home.htm)
- We are analyzing the design choice through studying a matrix having six general categories:
  - the scope and parameters specified by the ILCSC;
  - technical issues;
  - cost issues;
  - schedule issues;
  - physics operation issues;
  - and more general considerations that reflect the impact of the LC on science, technology and society
- We need your input and opinions