

Challenges for Realising the ILC



Albrecht Wagner
DESY and Hamburg University

Models for International Projects - HERA

Accelerator was built with help (manpower) and contributions (hardware) of Italy, France, Poland, China

Operation is paid by Germany

Became known as 'HERA model'

Experiments were built by large international collaboration

Operation cost are shared



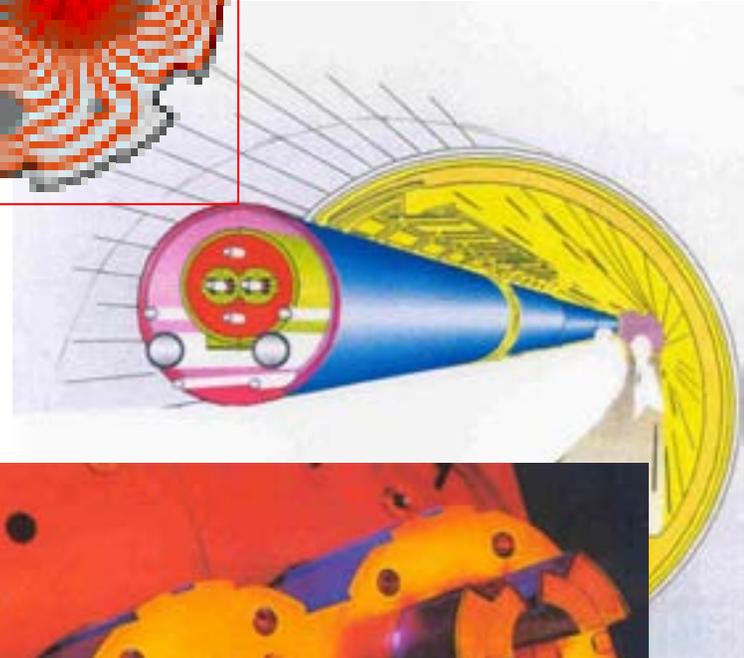
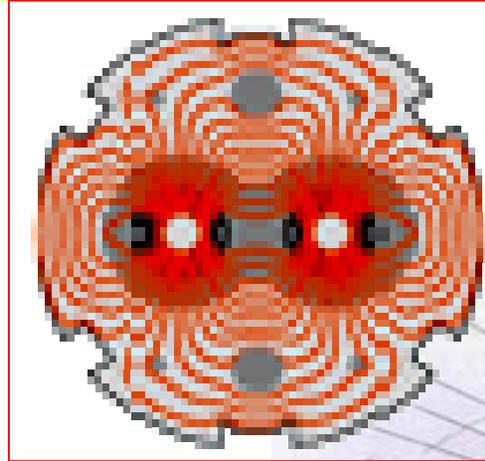
The Large Hadron Collider

proton-proton collider, under construction in the LEP tunnel (27 km circumference)

first luminosity in 2007

Accelerator and experiments built with substantial international contributions, well beyond CERN member states

CERN as host is an international organisation



The International Linear Collider

- Many reasons speak for a truly global project:
 - Necessary funding
 - Scientific challenges
 - Political climate concerning basic research
 - Big time gaps between new projects
- Many steps have been taken in this direction:
 - Scientific consensus
 - Technology choice
 - World-wide organisation of accelerator work
 - World-wide organisation of detector work
 - OECD
 - Funding agencies
- Many challenges lie ahead

The Scientific Case for a LC

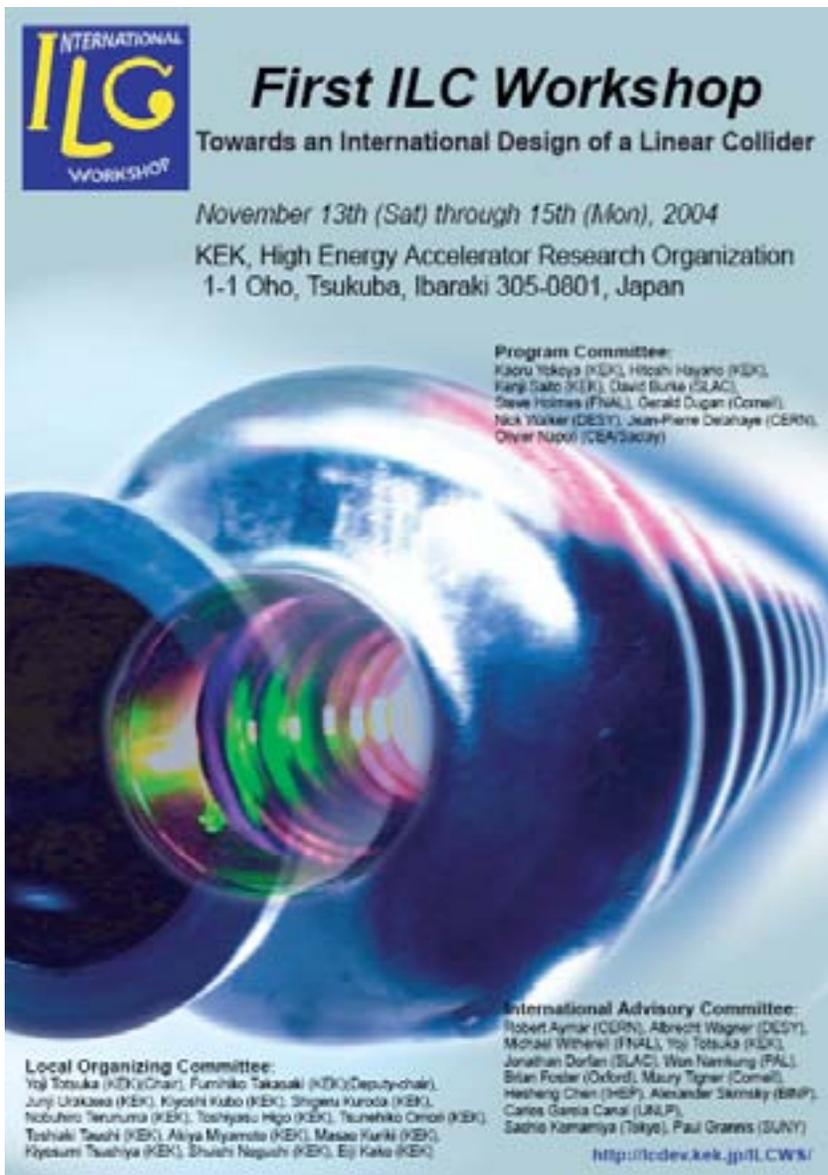
From 'Discovering the Quantum Universe':

	IF LHC DISCOVERS:	WHAT ILC COULD DO:	QU
MYSTERIES OF THE TERASCALE	A single Higgs boson, similar to that predicted by the standard model	Discover the effects of extra dimensions or other new phenomena by measuring Higgs couplings to other particles.	1,3
	More than one Higgs-like particle	Discover a new source of matter-antimatter asymmetry by observing angular distributions in Higgs decays.	9
	Superpartner particles	Confirm the symmetry of supersymmetry, or detect inconsistencies in the theoretical framework.	1,2

'Discovering the Quantum Universe' illustrates very clearly, that **from a scientific point of view** the scientific case for the ILC is very strong and does not need results from the LHC as justification.

This needs to be distinguished from possible other boundary conditions

Successful Start of the Global Design Initiative



INTERNATIONAL ILC WORKSHOP

First ILC Workshop

Towards an International Design of a Linear Collider

November 13th (Sat) through 15th (Mon), 2004

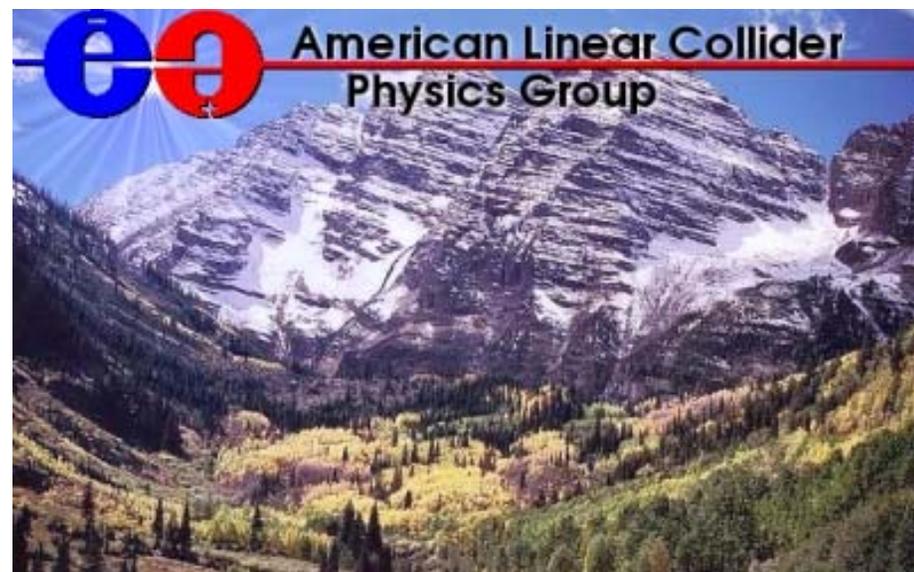
KEK, High Energy Accelerator Research Organization
1-1 Oho, Tsukuba, Ibaraki 305-0801, Japan

Program Committee:
Kaoru Yokoya (KEK), Hiroshi Hayano (KEK),
Kangji Saito (KEK), David Burke (SLAC),
Steve Holmes (FNAL), Gerald Dugan (Cornell),
Nick Walker (DESY), Jean-Pierre Delahaye (CERN),
Olivier Napel (CEA/Saclay)

Local Organizing Committee:
Yoji Totsuka (KEK) (Chair), Fumihiko Takasaki (KEK) (Deputy-Chair),
Junji Ueki (KEK), Kiyoshi Kubo (KEK), Shigeru Kuroda (KEK),
Nobuhito Terunuma (KEK), Toshiyasu Higo (KEK), Tsunehiko Omori (KEK),
Toshiaki Tsuchi (KEK), Akiya Miyamoto (KEK), Masao Kuriki (KEK),
Kiyosumi Tsunoha (KEK), Shuichi Nagasu (KEK), Eiji Kato (KEK)

International Advisory Committee:
Robert Aymar (CERN), Albrecht Wagner (DESY),
Michael Witte (FNAL), Yoji Totsuka (KEK),
Jonathan Dorfan (SLAC), Won Namkung (PAL),
Brian Foster (Oxford), Maury Tigner (Cornell),
Hesheng Chen (IBCF), Alexander Skrzypczak (BNP),
Carlos Garcia Canal (LALP),
Sadho Hamamya (Tokyo), Paul Grannis (SUNY)

<http://tcdex.kek.jp/ILCW04/>



Impressive progress and convergence

European Activities on ILC-related Matters

- TESLA Technology Collaboration (very international)
- TTF and VUV-FEL (now running as user facility)
- European XFEL (in detailed planning stage)
- CLIC R&D

European Union support (funding presently until 2007)

- CARE: Coordinated Accelerator Research in Europe
- EuroTeV: ILC related accelerator programme
- EuDet: LC detector development  new

The total European resources for ILC R&D over the next 3 years is ~100M€, of this ~ 25 M€ are fresh money from the EU.

- National programmes (e.g. UK LC accelerator and beam delivery)

TESLA Technology Collaboration

Taking into account all recent developments (XFEL, ILC) the TESLA collaboration has **redefined its mission** and has changed its name in to **TESLA Technology Collaboration**. The **mission**:

- **advance SCRF technology** research and development and related accelerator aspects across the broad diversity of scientific applications,
- keep open and **provide a bridge for communication and sharing of ideas**, developments, and testing across projects.

The collaboration will support and encourage **free and open exchange of knowledge**, expertise, engineering designs, and equipment.

- KEK and SLAC have joined TTC
- other labs have stated that they want to join

European Funding for ILC R&D



Structured and integrated European area in the field of accelerator research and related R&D.

3 Networking Activities and 4 Joint Research Activities.



European Design Study

(27 institutions, including CERN and DESY)

With top marks (score: 4.8/5),
EU funding: ~9 M€

EU and the ILC Project

The European Union is thinking about a stronger role in research infrastructure

- The evaluators of the ILC design study EUROTeV emphasised the importance of the project
- EUROTeV plays the role of a **focus and nucleus for the European part** of the global activities
- **Global projects** represent a new challenge for European science coordination
- The ILC is **one of the possible domains for the strategic road map**

European Industrial Forum on SC RF

In discussions with companies which have already provided components for TTF the idea emerged that it might be useful to create a European Superconducting RF Forum

Kick-off meeting took place at DESY on 7/8 April 2005, attended by ~ 100 participants from more than 40 companies and institutes.

A similar forum exists in Japan for the ILC

Also in the US such a forum has been organised.

Steady Progress towards the ILC

- 2001 • Road map discussions in the three regions, leading to a consensus about scientific priorities
- 2002 • Science Council evaluation of TESLA in Germany
- 2003 • First meetings of the funding agencies (FALC)
 - Consultative group of OECD
- 2004 • OECD Ministerial Statement supporting the ILC
 - Decision on technology
 - First ILC workshop
 - FALC establishes a Resource Group
- 2005 • ICFA appoints director for Global Design Effort
 - Regional directors
 - EPP2010 panel in the US
 - 2nd ILC workshop
 - Start of convergence towards BCD

This list is incomplete, but illustrates the steady progress

Structural Issues to be addressed

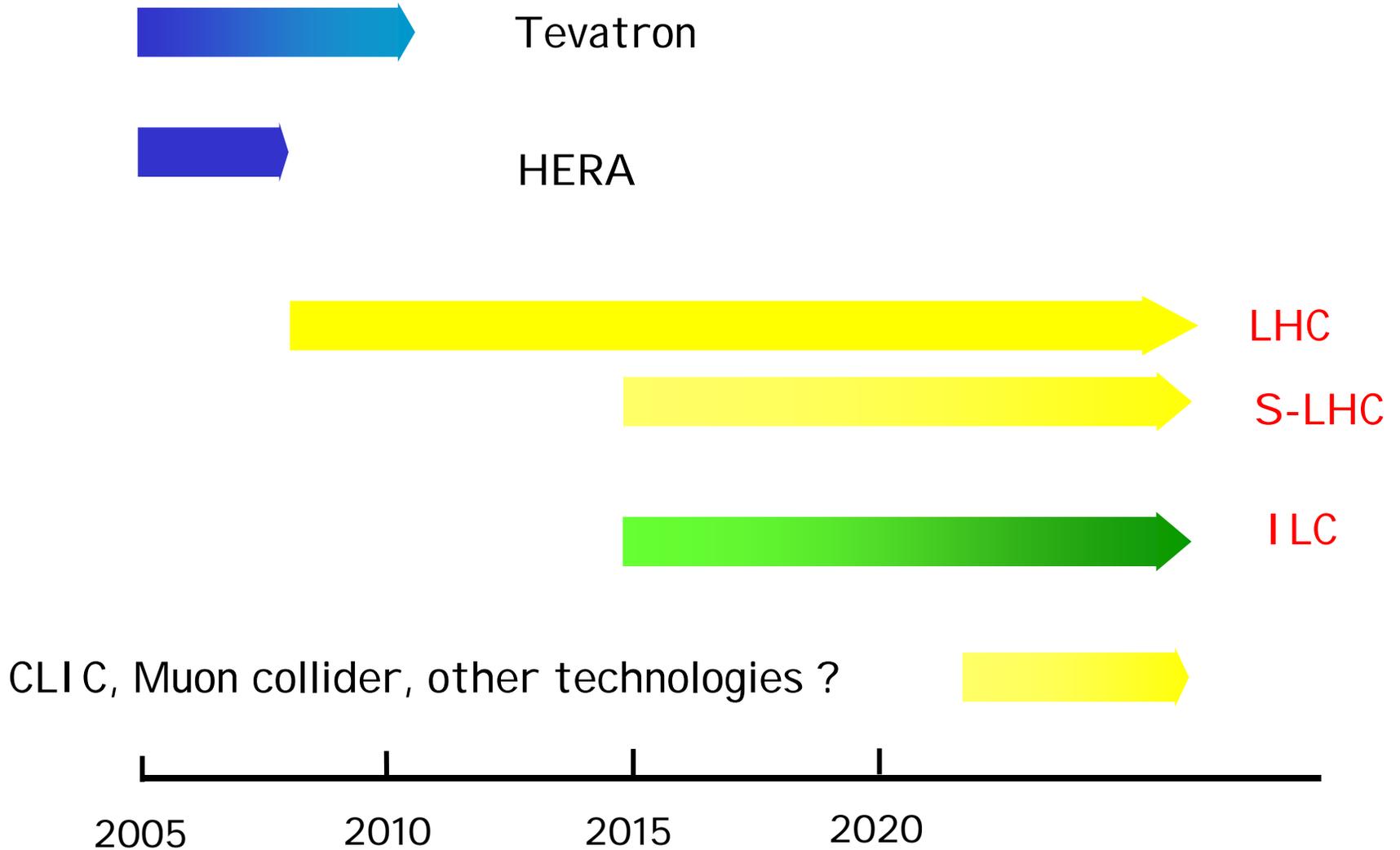
- Which is the best structure for an international project?
- How and why should the labs which participate in the construction be involved in the operation?
- How to guarantee a long term project stability
- Does it require a international organisation with treaties?
- Understand the balance between host and non-host regions
- When and how should the site choice be made?
- What can we learn from ITER?

The Global Situation



- Today's map of labs running major particle physics facilities
- This picture will change significantly by the end of the decade
- ICFA will address the question of how to face the long term future of the field in the upcoming seminar at Daegu (Korea)

A Road Map for the Energy Frontier



Summary

- The scientific case for a Linear Collider is strong and convincing, a world consensus exists on its importance
- Several bodies have positively reviewed or are reviewing the case for an ILC
- Europe has always demonstrated a strong dedication to the ILC
- National programmes and the EU provide substantial funding
- The European XFEL will be of major importance for the ILC (e.g. industrialisation, construction, commissioning)
- Politicians are following the process (technical decision, joint global design, self-organisation,..)
- A lot of challenging questions lie ahead