

1. The role of ICFA for the ILC – past and future
2. Status and Outlook

Albrecht Wagner, Chair ICFA

Created in 1976 as a WG by the International Union of Pure and Applied Physics to facilitate international collaboration in the construction and use of accelerators for high energy physics. Its purposes, as stated in 1985:

- To **promote international collaboration** in all phases of the construction and exploitation of very high energy accelerators.
- To **organize regularly world-inclusive meetings** for the exchange of information on future plans for regional facilities and for the formulation of advice on joint studies and uses.
- To **organize workshops** for the study of problems related to super high-energy accelerator complexes and their international exploitation and to foster research and development of necessary technology.

The Committee has sixteen members, selected primarily from the regions most deeply involved in high energy physics.

CERN Member States:	T Akesson, R Aymar, AW (chair)
Russia:	Y. Tikhonov, A Zaytsev
China:	H Chen
Japan:	S Komamiya, A Suzuki
4th Region:	V Sahni, S Novaes, SC Lee
USA:	S Dawson, J Dorfan, P Oddone
Canada:	D Karlen
Chair C11:	G Herten
Guest:	R Petronzio (chair FALC)



International Committee

ICFA Panels

- ICFA Instrumentation Innovation and Development Panel
- [ICFA Beam Dynamics Panel](#)
- [ICFA Panel on Advanced and Novel Accelerators](#)
- [ICFA Standing Committee on Interregional Connectivity](#)
- [International Linear Collider Steering Committee](#)
- [International High Energy Physics Computing Coordination Committee](#)

4 Meetings since summer 2005

- 3 July 2005, Uppsala (during Lepton-Photon)
- 29 September 2005, Daegu (during [ICFA Seminar](#))
- 9/10 February 2006, CERN (with lab directors invited)
- 30 July 2006 Moscow
- [Next meeting 8/9 February 2007 in Beijing](#)

Main Focus:

[Future of particle physics](#) (Broad picture discussed at ICFA Seminar)

[Guidance for the ILC](#) with the help of ILCSC 

- ICFA has been helping guide international cooperation on the Linear Collider since the mid 1990's.
- Reason: World-wide consensus that 500 GeV e+e- linear collider (upgradeable to ~1 TeV) is next major accelerator following LHC

1995: First ILC TRC Report, under Greg Loew as Chair

1999: ICFA Statement on Linear Collider

2002: ICFA commissioned the second ILC TRC Report, under Greg Loew as Chair

2002: ICFA establishes the International Linear Collider Steering Group (ILCSC) with Maury Tigner as Chair

- At ICHEP 2004 (Beijing) ICFA endorsed the [Technology Recommendation](#) made by the ITRP
- This led to a [major convergence of world-wide efforts](#) towards the LC
- [GDE](#), with director Barry Barish, formed in early 2005
- GDE produced [Baseline Configuration Document \(BCD\)](#) in late 2005; now under configuration control

- Early 2006: ILCSC set up a Machine Advisory Committee (MAC), chaired by Ferdinand Willeke (DESY)
- 1st MAC report April 06, 2nd in October 06
- **Reference Design Report** by February of 2007. Will include costs (to accuracy of 20%)
- -> **Very impressive momentum has built up**



International Committee

New Mandate for ILCSC

- ILCSC mandate originally written in 2002. Many changes since.
- ICFA approved a revised mandate at its meeting in Moscow
- The ILCSC membership remains unchanged
- ILCSC has decided to reactivate the 'Parameter Group' as discussion partner for GDE

- Directors of the **major particle physics related laboratories** in the three regions that provide core support to ILC (**CERN, DESY, Fermilab, KEK, SLAC**)
- **One** representative each from the three **regional steering groups**
- **One** representative each from the **physics community of the three regions**
- One representative from **Russia**
- One representative from **China**
- One ICFA representative from the “**Other Countries**” category
- **Chairperson (Shin-ichi Kurokawa)**

The ILCSC sub-group on parameters is asked to

Revisit the Baseline Machine performance and Energy Upgrade parameters it had established two years ago, taking into account possible new insights and developments

Discuss, together with the GDE and WWS, all areas of the RDR design optimisation affecting the performance parameters

Revisit the Options Beyond the Baseline Machine it had established two years ago, and provide clear cost versus performance guidance as its effects the initial machine configuration

Make report (and interim report if necessary) well in phase of the development of RDR

Members of the 'parameter group' : R.-D. Heuer (chair), S. Komamiya, D. Son, P.Grannis, M.Oreglia, F.Richard,

- At what amount of integrated **luminosity** are systematic effects becoming dominant?
- Is there any impact of decreasing (increasing) **beamstrahlung** by a factor of two relative to the standard parameters, i.e. trading off luminosity vs background?
- Is there any benefit from electron plus **positron polarisation** (80 and 60%) or from increased electron polarisation in the absence of positron polarisation?
- Are there other accelerator parameters strongly influencing the measurement?

Plus special questions to each WG

Group presented preliminary conclusions ->

Highest possible energy is called for but at present there is no known measurement which could not be done at slightly reduced energy.

**Removing safety margins in energy reach is acceptable.
Max. lumi not needed at the top energy (500 GeV)**

However, 500 GeV should be reachable assuming nominal gradient before knowing more about physics scenarios which are realised

Upgrade to 1 TeV must be included in planning, design and implementation

All measurements are statistically limited,

Lowering luminosity by a factor 2 results in doubling the running time.
Interested in **integrated luminosity**:

Reducing luminosity should be the very last option.
Staging in the first few years possible and to be discussed.
No permanent de-scoping.

Most measurements suffer from increased beamstrahlung thus requiring more luminosity for achieving same accuracy

On the other hand reduced beamstrahlung results in luminosity gain

Reduced beamstrahlung equivalent to some luminosity gain dependent on physics channel (e.g. M_H at $E=350$ GeV)

Consequence:

→ with reduced beamstrahlung slightly lower current acceptable

Higher beamstrahlung undesirable (to be quantified)

Many measurements gain from positron polarisation, thus also requiring less luminosity for same accuracy.

Positron Polarisation is very beneficial in many scenarios, including SM scenarios
→ **this option mandatory to be kept open**

Note: Recently the possibility of initial positron polarisation as high as 30% was

mentioned for the ILC baseline configuration (eq. to 10% lumi gain?)

Assuming this, a slight reduction in luminosity seems acceptable

→ to be verified and quantified by the physics groups

Two experiments are required.

If large cost saving with one IR: Push-Pull could be an option.

However:

- reasonably short time to switch over (1 week or so?) in order not to lose much lumi
- frequent moves desired (every 2-3 months?) in a predefined rhythm, in order to treat both exp'ts equally

-> short transfer times and frequent change are a must

Two detectors highly desired, one IR feasible

→ See report by the push-pull task force

Gamma-Gamma

Should be kept as an option for the reasons given in the 2003 document.

However:

more realistic studies plus possibly investments are required.

Giga-Z

to be kept as an option for the reasons given in the 2003 document

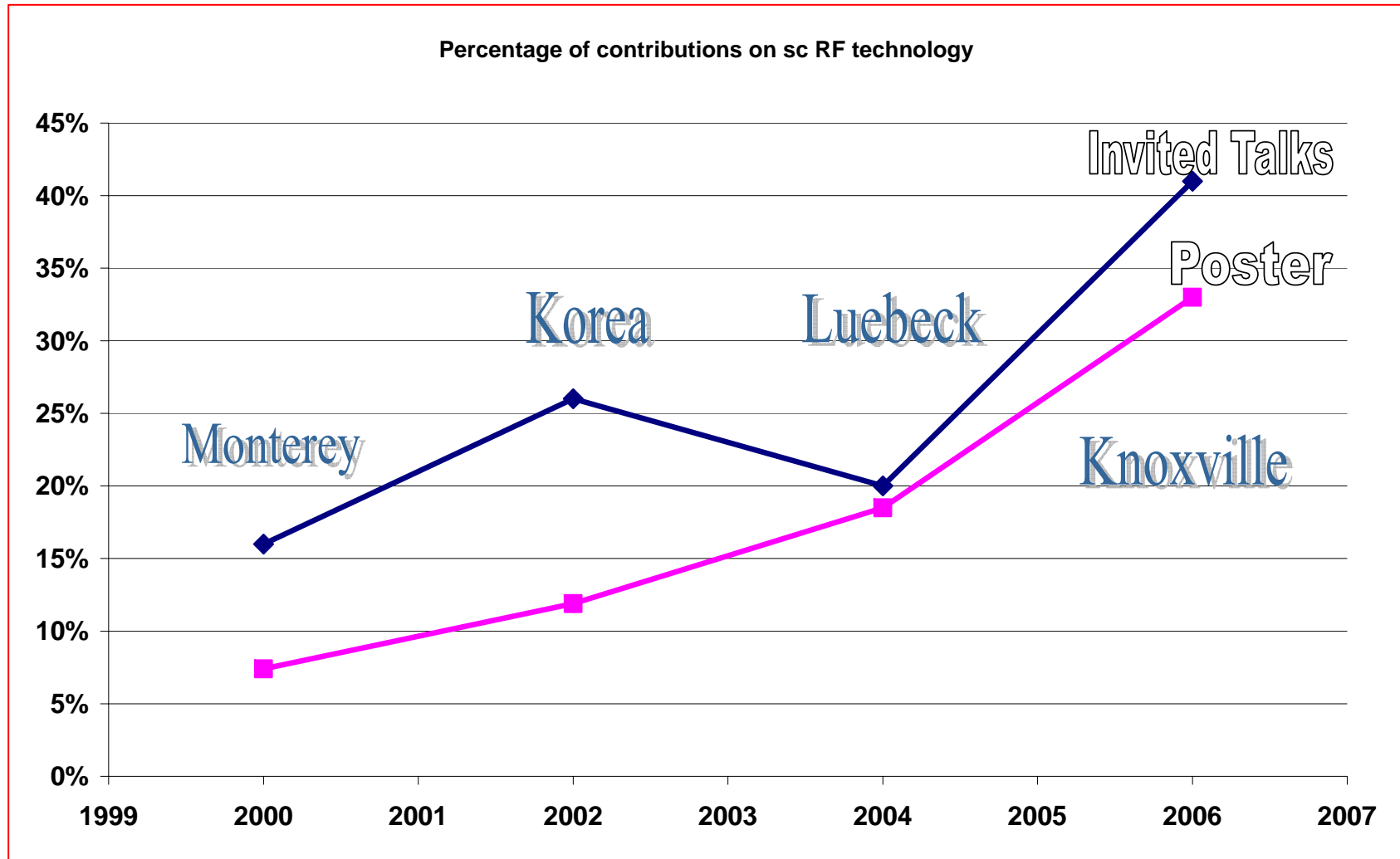
- Clear message from Parameter Group:
- No irreversible de-scoping
- Keep an eye on energy up-grade

- FALC = **Funding Agencies for a Linear Collider**
- Informal group of particle physics funding agencies from several countries
- Subgroup: FALC Resources Group (FALC-RG)
- Good coordination essential between FALC and ICFA
- Links between FALC, ICFA and ILCSC through their respective chairs

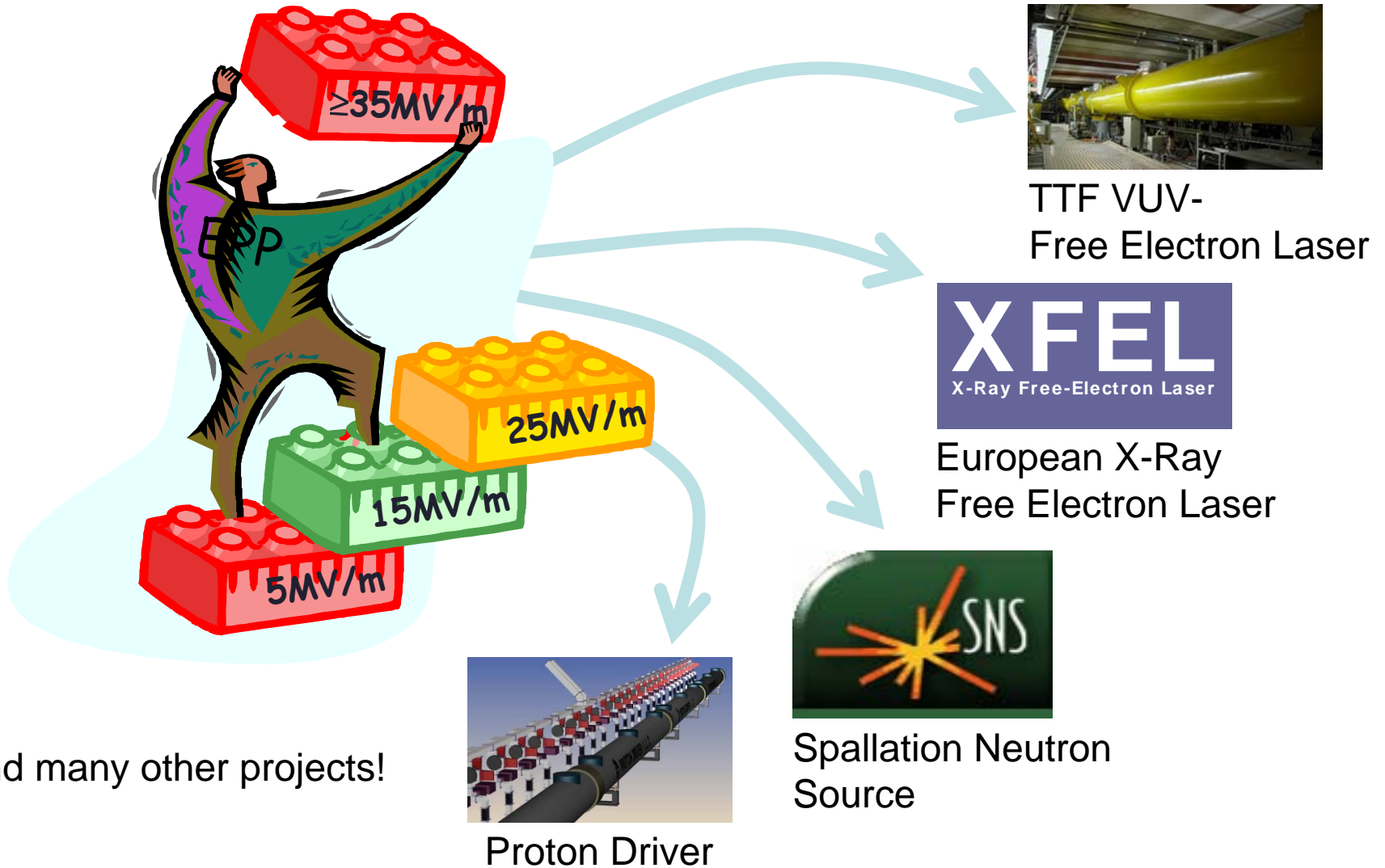
- FALC at its most recent meeting decided to extend its scope:

- FALC agreed that to make progress towards a construction decision for a linear collider, it was necessary to consider the wider picture of particle physics research, understanding the priorities and constraints in each region.
- It was agreed that the **remit** of the Group **should be broadened** to include global coordination of, and information exchange on, the R&D programmes for upgrades of LHC, the present (ILC) and future (CLIC) linear colliders and the worldwide neutrino programme (such as proton driver, superbeam and neutrino factory).
- The Group agreed that although the acronym FALC should not be changed, it should be taken in future to represent '**Funding Agencies for Large Colliders**'.

Value for Science and Technology

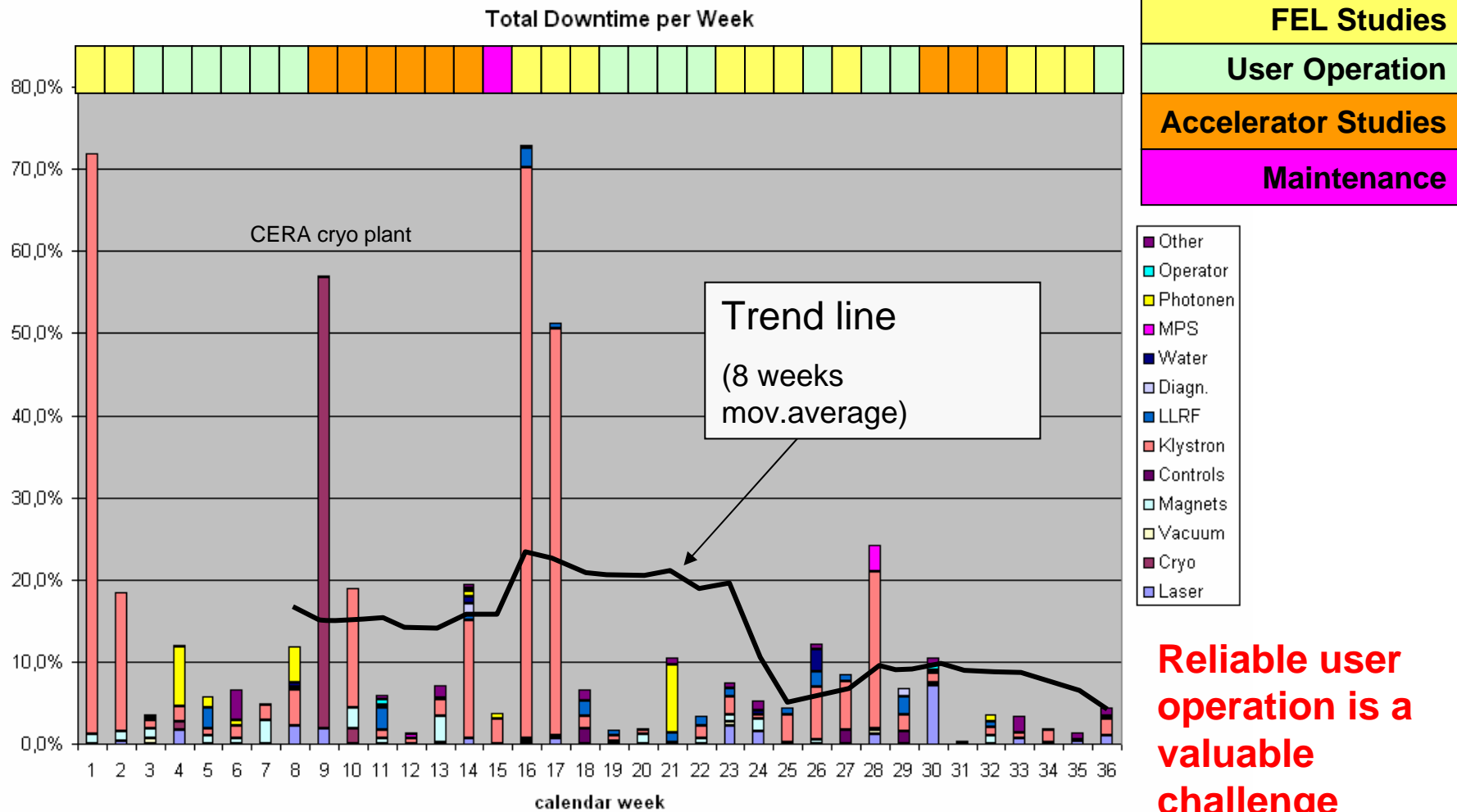


ILC and other Projects



- S0, S1: cavities
collaboration with TTC
- S2: test facilities
- S3: Damping rings

Trend lines of Down Time TTF/FLASH



- 4 detector concepts being pursued
- Global joint work on detector components
 - calorimeter
 - tracking
- Issues under discussion
 - When to move to collaborations
 - International vs regional review of R&D



International Committee

Issues under Discussion

- Resources
- How to organise/coordinate future work (GDE/experiments)
- Transition from GDE to ILC-organisation
- Site selection

- Common fund
- Regional resources (money/FTEs)
- Synergy with other projects
- How to avoid unnecessary duplication



International Committee

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1. GDE report and discussion on costs (B. Barish)
2. ILCSC actions needed to increase GDE influence over R&D funds
3. Discussion of ILCSC involvement in cost validation process
4. 2nd MAC report (F. Willeke)
5. Discussion of GDE comments on MAC reports
6. Parameters subcommittee report (R. Heuer)
7. Discussion on transition from RDR to TDR phase
8. Is there a need for MAC (or successor) after RDR?
9. FALC-RG report (R. Wade)
10. WWS report (J. Brau)
11. ILCSC guidance on ILC experiment selection (J. Brau)
12. Common fund proposal
13. Regional reports
14. Future ILCSC meetings
15. Any other business

- As oversight body of GDE, ILCSC will evaluate the RDR. This evaluation process will need a few months after the RDR report is issued.
- The Machine Advisory Committee (MAC) will evaluate the RDR from technical view point and report to ILCSC.
- ILCSC will ask the GDE to provide a proposal and schedule how to move forward from the RDR to the EDR, including the design of accelerators, cost estimate, organizational structure, world-wide cooperation, coordination of world-wide R&D activities, and relation with the physics community.
- ILCSC will then evaluate the proposal by the GDE

- Based on this evaluation, ILCSC will recommend to ICFA on how to move from RDR to EDR phase and report to FALC. The proposal should include:
 - a) Definition of the scope of the EDR and the action necessary to reach this scope
 - b) Organizational structure
 - c) Legal framework (e.g. MoU) for the RDR to EDR phase
- A first discussion concerning the next steps will take place at Valencia, the GDE proposal should be presented at Beijing ILCSC meeting. If necessary the discussion should be continued at one more ILCSC meeting held sometime late spring 2007.

- **EPP2010**
 - Revealing the Hidden Nature of Space and Time:
Charting the Course for Elementary Particle Physics
-> leading to P5 recommendation
- **CERN Council Strategy Group**
 - Unanimous approval of European strategy

Both strongly support the full exploitation of LHC and give strong support to the International Linear Collider

- Japan
 - > ILC identified as highest priority for particle physics
- Europe: Strategy Forum on Research Infrastructure
 - > Road map contains ILC (implications for funding, e.g. SCRF test facility)
- American Physical Society Council
 - > Resolution



- EPP2010: “The United States should remain globally competitive in elementary particle physics by playing a leading role in the worldwide effort to aggressively study Terascale physics.”
- To achieve that end in the context of successful international collaborations on large scientific facilities, the American Physical Society, consistent with the recommendations in *EPP-2010*:
- Urges the Administration, acting through the Department of Energy and the National Science Foundation; and Congress, acting through the authorization and appropriations committees, to provide the American share of the “risk capital” for research and development (recommended in the National Academy report) leading to an engineering design and cost basis for the International Linear Collider project; and
- Further urges the Administration and Congress, to offer to site such a project in the United States, if the outcome of the research and development effort is satisfactory.

- GDE has made enormous progress
- **Reference** Design Report will be delivered in Beijing in February 07
- Key issue is cost/performance balance
- Similar efforts for detectors are also converging
- For accelerator and detectors increasingly coordinated programmes are moving forward

- WWS and ILCSC are advising and monitoring the process
- Funding agencies are following closely
- Broad support for ILC in the regional road maps

**International Linear Collider Workshop
LCWS 2007**

ILC-GDE



LCWS 2007

DESY, Hamburg, Mai 30 – June 5, 2007

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