Very Large Hadron Collider

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Yours is the first Subpanel with access to several new, key pieces of information:

1) The cost of all lepton colliders is well above $5B/TeV.

http://www-project.slac.stanford.edu/lc/local/Reviews/Lehman99/Lehman1999.htm
http://tesla.desy.de/new_pages/TDR_CD/PartII/accel.html

2) There will be no pre-LHC construction start of any US project.

$\Rightarrow$ All projects must “wait for LHC results”

3) A staged VLHC is on the table,

with an initial cost about the same as e+e- and a vastly superior physics reach.

The VLHC Design Study Has Been Successful

- Real contribution from 92 authors.
- Includes all major HEP labs.
- No technical problems uncovered during writing or review.
- Cost basis deemed “conservative” by reviewers.

- The VLHC design study is a milestone which demonstrates that the Stage-1 R&D has produced a magnet design which can be built and operated for 1/3 the cost of standard superconducting magnets.
- Tunneling R&D is next.

The Importance of Technical Details

- Everyone in the field should read the **VLHC Design Study**, and the **TESLA Design Report**, and the **NLC Lehman Review** materials, cover to cover, to get a clear understanding of the true technical status of each of the projects.

LINKS:
http://tdserver1.fnal.gov/tddoc/DesignStudyReport/upload/PDF/
http://tesla.desy.de/new_pages/TDR_CD/PartII/accel.html
http://www-project.slac.stanford.edu/lc/local/Reviews/Lehman99/Lehman1999.htm

- HEP needs a better method of obtaining cost estimates for input to strategic planning.

Why Hadron Colliders?
(Historical Perspective)

- In last 20 years, *all* fundamental particles which have been discovered (b-quark,Top quark,W,Z,ν_τ)
  have been on *hadron* machines.

- Prior to this, discoveries were made with Van de Graaffs, Betatrons, Cockroft-Waltons, e^+e^- colliders, etc.

  – These continue to do great physics,
    but they are *not* discovery machines.
  – Reason: Beam Energy per Dollar.

Fundamental Physics

The Superconducting Hadron Collider is unrivaled as a cost-effective means of probing small distances.

Based on three ~ loss-free processes:

1. Superconducting current transport.
2. DC Magnetization of Iron.
3. Recirculating protons in a magnetic guide field.

The VLHC is the only machine under discussion which does not throw away the entire beam energy each machine pulse.

AC Wall Power

VLHC-1 **0.6 MW / TeV**

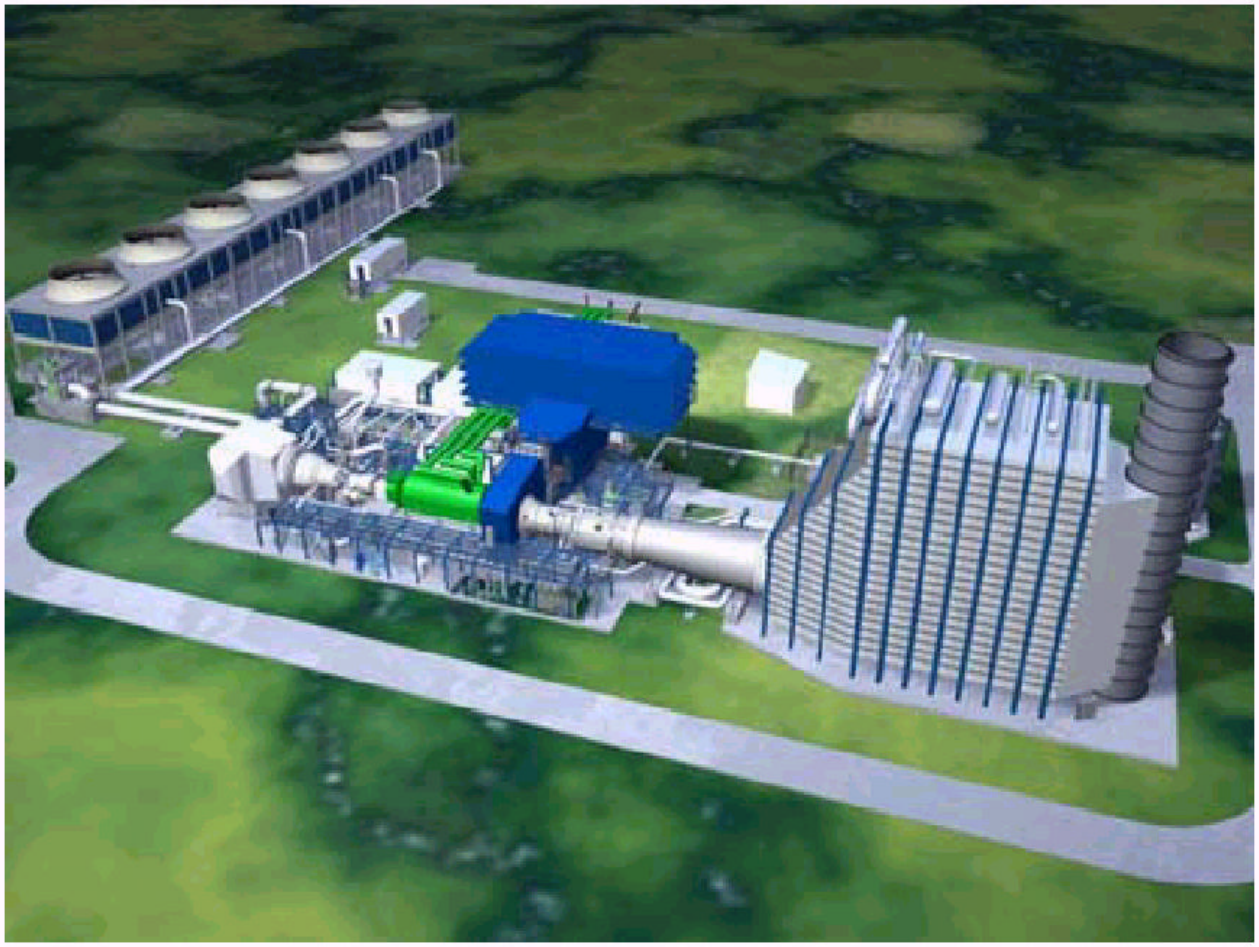
(Total power for 40 TeV is ~25MW, similar to Tevatron Fixed Target)

Lepton Colliders: **200+ MW / TeV**

Is this just a small technical detail?

Power requirements are discussed at:
http://www-project.slac.stanford.edu/lc/local/MAC/MAY2001/Talks/MAC%20CC%20051801.pdf

NLC Combined Cycle Turbine Project 200 Mw



The Most Important Question in Experimental High-Energy Physics :

is, was, and will always be:

"what unsuspected structure might exist at the next energy scale?"

There is only one Technically Defensible Path to the Energy Frontier: the VLHC.

- There is something magic about designing and building the highest energy accelerator on earth.
- Fermilab has done this before.
- Twice.
- Your highest priority is to ensure that nothing is done to prevent this from happening again.