Research and Development Opportunities for the Linear Collider

- Some observations
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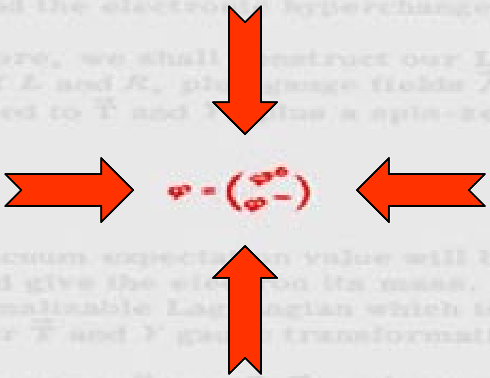
- Two comments



Some observations...

…from January, 2002 Linear Collider workshop in Chicago:

- "Collective thinking" about siting and design feels more realistic than at 1996 Snowmass. Now:
  - one (at most) international machine
  - design choice should be a separate issue from site choice
  - project cost estimates must be exquisitely accurate.
- A large body of work already exists concerning:
  - measurements to be made over a wide range of physics scenarios
  - accelerator and detector performance specs required by physics
- US R&D so far has concentrated on accelerator design and simulation of detectors; hardware R&D is taking place abroad.

…some observations...

•University-based participants were interested, but were unclear how to start LC-related efforts at their home institutions.

•The technical challenges to be faced in building and instrumenting an LC comprise the contents of the coolest box of toys in the entire world.

This seems like an opportunity.

It is interesting to contemplate going about things differently: to move a project forward during its initial stages through grass-roots interest (by empowering the autonomous participants, rather than through a sharply defined, rigidly constrained, centrally managed effort).

…some observations.

Once-upon-a-time:

- individual physicists played a larger role in determining the direction of their own projects
- our research environment was more fluid, more responsive.

A possibility: smaller groups (*e.g.* university-based groups) join together to invent a way to go about LC studies with help from centers of logistical support (*e.g.* Fermilab).

Goals of today's workshop

•Set before participants a sketch of the current state of LC accelerator and detector designs and concepts

•Describe in some detail the shapes of ignorance: areas in which R&D is needed before we can design/build an accelerator and detector

•Provide an opportunity for participants to see what aspects of an LC accelerator/detector R&D effort would be of interest to their home groups

•Begin discussions about models for how to proceed with university-based R&D efforts

•Generate more grass-roots interest, empowerment, autonomy,...

Suggestions for reasonable ground rules...

1. Stay clear of political issues. Discussions should be:
   - site-neutral when appropriate
   - inclusive of studies needed for both TESLA and NLC/JLC.
2. Think across traditional system boundaries:
   - required performance will couple many accelerator and detector systems' properties
   - cool projects abound in domains you might not have thought to consider (*e.g.* the accelerator!)
   - interesting possibilities for collaboration with colleagues in other domains (condensed matter, EE,...) exist.

…suggestions for reasonable ground rules.

3. Have confidence in your common sense and intelligence
   - we are all able to judge what is likely to interest us and what we should avoid
   - it's OK to start off clueless: we'll figure things out as we go.
   - it must always be an acceptable mode of behavior to speak plainly and freely

Overall organization of the workshop

1. Accelerator and detector overview talks will be used to frame more detailed talks about accelerator and detector system R&D opportunities

2. Separate presentations and discussions concerning (yes, there are other systems):

- accelerator and IR issues
- detector systems:
  - vertexing, tracking
  - calorimetry
  - muon system.

- desired performance
- current state-of-the-art
- R&D already underway
- what we don't know yet

3. Discussions concerning a possible "roadmap" for pursuing LC R&D using FNAL as a resource base:

- possibilities for consortia for federal (+ state??) support
- what to do next? (workshops? meetings? milestones?)

A comment: the resolution of complicated issues

The mechanisms through which we choose the accelerator technology and site are not yet fully defined. These are difficult issues to resolve. However...

The way of the world (particularly evident during the last 20 years):

- interested parties, through honorable, fair, and persistent action ultimately succeed in achieving their desired goal.
- when major (social) change occurs, it takes place very rapidly- one must be prepared to act quickly.
- examples (especially in the political sphere) abound, *e.g.* the creation of democratic governments in Spain, South Africa, the Czech Republic, Hungary, Poland,...

We can figure this out, even though it seems fiercely complicated now.

Another comment: Diogenes and his lamp

If we are less than scrupulously honest everything will blow up in our faces. As politicians go, we are good physicists.

...But sometimes everything I write
with the threadbare art of my eye
seems a snapshot,
lurid, rapid, garish, grouped,
heightened from life,
yet paralyzed by fact.
All's misalliance.
Yet why not say what happened?
Pray for the grace of accuracy...

-*Epilogue*, Robert Lowell (1917 - 1977)