A US Strategy Towards a Future Lepton Collider

Adolphsen, Breidenbach, Dorfan, Himel, Jaros, MacFarlane, Markiewicz, Paterson, Phinney, Raubenehimer, Seryi

Context:

- The physics imperative for a Lepton Collider operating at the energy frontier remains as compelling as ever.

- The only near-term (site selection by 2015) Lepton Collider option is ILC; the only mid-term (site selection by 2022) options are ILC and X-band linear colliders; longer-term (site selection ~2030 or beyond) options include muon-colliders as well as linear colliders based on plasma and dielectric acceleration concepts—all of these concepts have significant potential for cost reduction or performance improvements
  - Site selection implies a funding model has been accepted with details likely TBD

- There will be a convergence of information on the 2012 timescale
  - ILC TDP with improved cost-estimate
  - Project-X CDR with cost and schedule
  - CLIC (X-band) CDR with cost estimate
  - Muon collider ZDR with cost and study of experimental program
  - Initial data from CERN LHC pointing towards energy-scale
  - Data from neutrino reactor experiments to help define Project-X

Strategy:

- For near and mid- term options, only consider participation in an international collaboration with a total US share of ~20% of the construction cost which would be primarily in the form of in-kind contributions
  - Given the US governmental stance, it is not reasonable to consider other options at this point. Making an explicit statement of the US share may allow reconsideration of US participation. If the US funding climate changes, it would be relatively easy to re-open consideration of a US site.

- Implement a three pronged R&D strategy through 2012
  - Continue strong engagement on ILC through TDP in 2012
    1. ILC is the only near-term option. This must be supported until the timescale for an LC is better understood.
  - Support development of X-band technology with a goal of understanding the performance and cost by 2012
    1. Work with CERN on the CLIC design in a partnership based on GDE and/or bilateral MOU's.
    2. Develop a klystron-based X-band design for comparison.
  - Study the physics capabilities of the long-term options and support the long-term accelerator R&D on muon, plasma and dielectric collider options

- Extend ongoing R&D on Lepton Collider options beyond 2012 in 10-year funding plan
  - Develop mechanism to allocate funding to best enable a future Lepton Collider
  - Construction of a collider in the near or mid-term would likely require funding beyond that presently in the OHEP plan

- Establish a decision point following a 2012 summer Snowmass meeting where, based on consideration of physics capability, technology, and the international fiscal climate, the Lepton Collider program would be focused on:
  - ILC construction project aimed at ~2015 construction start
  - OR ILC or X-band design aimed at ~2022 construction
  - AND a program of prioritized long-term R&D on other Lepton Collider options