NLC - The Next Linear Collider Project

NLC Collaboration Meeting
Overview

D. L. Burke
NLC Project Director

NLC Collaboration Meeting
Fermilab
February 27 – March 2, 2001
Met concurrently with the Machine Advisory Committee.

The MAC report –

• "Overall prioritization of the R&D effort is on track."

• "Collaboration with Fermilab is developing in a positive manner."

• "The NLC collaboration now combines the effort of many groups and institutions. While the inclusion of these varied contributions greatly benefits the collaboration, it brings its own set of challenges in coordinating, integrating, and optimizing the use of this scattered set of resources."

"It is advisable to establish and publish new collider configuration parameters as soon as possible …"

"The committee recommends that a prioritized R&D plan, containing achievement goals and schedule, be established, and see to it that the goals are met on schedule."

D. L. Burke

NLC Report
Met with Physics/Detector Group Leaders (January 5)

Their input on machine parameters and configuration.

NLC 2001 Configuration Check-Off (February 1-2)

Parameters and configuration for Snowmass.

→ Nan Phinney presentation.

Winter 2001 Collaboration Meeting
Goals

Review the NLC 2001 Configuration and the key issues in the design and development of the collider and its components.

Review the present status of NLC R&D, and discuss near-term Collaboration goals and plans.

Establish a Collaboration vision of R&D and design needed to be ready to begin construction of the collider.

The format of the meeting will be entirely plenary to allow all members of the Collaboration to participate in the discussion of each part of the project.
Substantial extrapolations from experience with the SLC:

Positron source (and polarized electrons).
- Brute-force solutions for e\(^+\) production are ugly, but will work.
- New ideas being explored, and polarized e\(^+\) remain an option for study.

Emittance control.
- Damping rings based on technology used at existing rings, and beam dynamics are studied at ATF and ALS.
- Elegant (and tested) structure design and manufacture provide margin now being turned into higher luminosity.

Beam collimation.
- Recent experimental results and collimation lattice designs mitigate difficulty, but wakefields are still a concern; new final-focus optics look very good, and a prototype “consumable” collimator is in fabrication.

Ground motion/IP control.
- Fast IP feedback promises to increase “target” size by an order of magnitude, and stabilization techniques (inertial and optical) are being prototyped.

These items remain in the front line of the R&D program, but are not pacing readiness of the technology, nor the R&D budget and schedule.
Pacing Technical Issues

Two technical issues pace the project:

The structure accelerating gradient limitations that are much in the news.

High-power rf production and handling that remains the single biggest draw on the R&D budget, and the item pacing the schedule.

We need to focus the long-range vision of the Collaboration on these issues.

D. L. Burke

NLC Report
Main Linac R&D Strawperson Flowchart (A)

Klystrons
- XP-3 Tests
- Industrial XP-3
- XP-4 Tests
- XP-4 Fabrication & Industrial Production

Modulators
- 4-Dog Tests
- Solid State 8-Pack

DLDS
- ETF Engineering Tests
- NLCTA 800 MW Test
- 2-Mode Arm

Structures
- High Grad R&D
- High Gradient Girder
- Fabrication Facility
- Industrial Production

NLCTA 2-Mode/8-Pack Test

D. L. Burke

NLC Report
Main Linac R&D Strawperson Flowchart (B)

Klystrons → Industrial Production

Modulators

NLCTA 2-Mode/8-Pack Test → ORION User Facility

DLDS

Structures

Industrial Production

ETF Power Tests

DFM 2-Mode System

Injector Prep and Test

ETF Beam Tests

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NLC Report
Snowmass and Beyond

Snowmass 2001 and HEPAP discussions …

- Must establish the physics case for a linear collider.
  - We are coordinating machine configuration with the linear collider physics and detector working groups.

- The NLC Machine Collaboration will present a coherent picture of the X-Band collider:
  - Machine design and performance expectations.
  - Analysis of costs and schedules.
  - R&D left to do to settle key issues.

There will be more than one possible technology for the machine.

- DESY will submit the TESLA TDR to the German government in March.
- A C-Band alternative will exist in Japan.

These machines would all technically do the job at 500 GeV, but with differing risks, and differing connections to the future.

- The ILC-TRC (Loew Committee) has recently been reinitiated by ICFA to update information on all machines. This is seen as a first step toward an ICFA sponsored comparison of the technologies.
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<td>January 5</td>
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| February 1 | NLC 2001 Configuration Check-Off (SLAC)  
              Configuration for Snowmass |
| February 27 | Collaboration Meeting (FNAL)  
                 NLC 2001 Configuration  
                 Review of R&D Status and Plans  
                 Long-Range Goals and Plans |
| March 19  | Physics and Detectors Groups (Johns Hopkins) |
| March 23  | TESLA TDR (DESY) |
| March 26  | HEACC/ATF Collaboration (Tsukuba) |
| April 4   | Half-Day NLC Review with DOE (SLAC) |
| May 16    | Machine Advisory Committee (LBNL)  
              Status for Snowmass |
| June 18   | PAC (Chicago) |
| June 30   | Snowmass |