NEXT LINEAR COLLIDER
R&D PROGRAM
AT FERMILAB

Tom Dombeck

NLC Collaboration Meeting
January 31, 2000
FNAL NLC Accelerator Physics

Presently being investigated:

- LIAR emittance calculations/simulations
- Rematching of failed trim supplies for Main Linac quadrupoles
- Study of ‘BNS’ damping of long-range wakefield
- Development of faster computational methods for computing wake fields, analyzing structure mode frequencies
- How "straight" must the Main Linac be? (Terrain following, geodetic curvature)

Possible near future:

- Verification of baseline construction tolerances
- Study different transverse mode distributions – evaluate frequency and alignment tolerances
- Study wakefields due to higher dipole and longitudinal bands
- Re-match to increase bandwidth / decrease magnet/power supply variation
- Study effectiveness of alignment algorithms versus quadrupole variation
- Study effectiveness of alignment as a function of BPM and mover failure
- Study effectiveness of beam bumps with realistic energy and betatron phase errors – can these be used to ease mover/diagnostic requirements
ACCELERATOR PHYSICS

Presentations:

- Improved Computer Techniques for Wakefield Calculations (Francois Ostiguy).

- BNS-Like Damping Scheme for Multi-Bunches (Court Bohn).
Fermilab Structures Group

Summary

- Structures Group

  - Goal: Present Industrialization Plan to Lehman Review in 1/03
  - Nearer-Term Goal: Develop Fabrication R&D Plan

Presentations:

  - KEK Visit (Go hear Tug’s talk)
  - Vendor plan (Go hear Carson’s talk)
  - First stab at a schedule for X-Band
  - No credible HDS competition with present Fermilab resources
NLC RF Timing
distribution
Test at Fermilab

Main Injector
Spare
Fiber Optic Link 3.5
kM per revolution

High Voltage
Drive

Dual Optical Trombone

Optical Receiver

Optical Transmitter

Optical Receiver

Stepping Motor
Drive

Dual Coax Trombone

357 MHz
OSC

Phase Lock
Oscillator

Phase Lock
Oscillator

Phase Lock
Oscillator

∑

X-Band

PD

PD

LPF

LPF

Feedback
Control

Data Logger

Temperature Controlled

Ralph J. Pasquinelli
1/13/00
- 12.7 mm bore
- 8 kg at pole tip
- 50% tuning range
NEXT LINEAR COLLIDER - VICINITY MAP

1. PERRY ROAD ALIGNMENT (EAST/WEST)
2. TRANSMISSION LINE ALIGNMENT (EAST/WEST)
3. ROUTE 30 ALIGNMENT (EAST/WEST)
4. NORTH-SOUTH ALIGNMENT
5. FERMILAB TIONAL ACCELERATOR LABORATORY

NLC - JANUARY 2000 - FERMILAB TIONAL ACCELERATOR LABORATORY - FACILITIES ENGINEERING SERVICES SECTION
FNAL/NLC R&D PROGRAM IN THE OUT YEARS

- **Size of Program**
  - Goal is to Double Effort in FY01 to $4M.
  - Then to Double Effort Again in FY02 to $8M.

- **Technical Areas of Focus**
  - Accelerator Physics.
  - Rf-Structures, Add Work on Heavily or Moderately Damped Structures.
  - Rf-Timing Synchronization.
  - Permanent Magnet Quadrupoles.
  - Civil Construction.
  - Add Other Areas of Interest, Such as Robotics and Wireless Communications.
  - Construction of the NLC Demonstration Beamline.
FNAL/NLC R&D PROGRAM

• Goals:
  • FNAL will take responsibility for Main Linac Components Downstream of the rf-System (White Paper).
  • FNAL Will Assist in the Cost Reduction Analysis (White Paper).
  • Develop Illinois Sites for the NLC (White Paper).
  • MOU with SLAC Signed in January, 2000.
  • Clearly FY00 is a Learning Year.
  • Determine by End of FY00 Specific FNAL Contributions to the NLC Effort.
  • Determine How the FNAL Effort in the Collaboration Will Grow.

• Local Mechanisms to Review FNAL Program
  • Accelerator Advisory Committee:
    Balakin [Serpk.], Delahaye [CERN], Dugan [Cornell], Harrison [BNL], Leemann [TJNAF], Shintake [KEK], Seeman [SLAC], Siemann [SLAC], Willeke [DESY], and Wurtele [LBL].
  • Steering Committee:
    Czarapata, Dombeck, Finley, Holmes, Holtkamp, Kuchler, Limon, Marriner, Pasquinelli, and Syphers.
  • Physics Study Group:
    Derwent, Kronfeld, Lammel, Para, Tkaczyk, Van Kooten [Ind. U], and Yeh.
FNAL/NLC R&D PROGRAM IN FY00

• Size of Program
  • Thirteen FTE's.
  • $460k in M&S.
  • Spending Authority of $1.7M.

• Technical Areas of Focus (At This Time)
  • Accelerator Physics.
  • Rf-Structures.
  • Rf-Timing Synchronization.
  • Permanent Magnet Quadrupoles.
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