

Beam Instrumentation Tests for the Linear Collider

SLAC EPAC Meeting

Nov. 14, 2003

M. Woods, SLAC

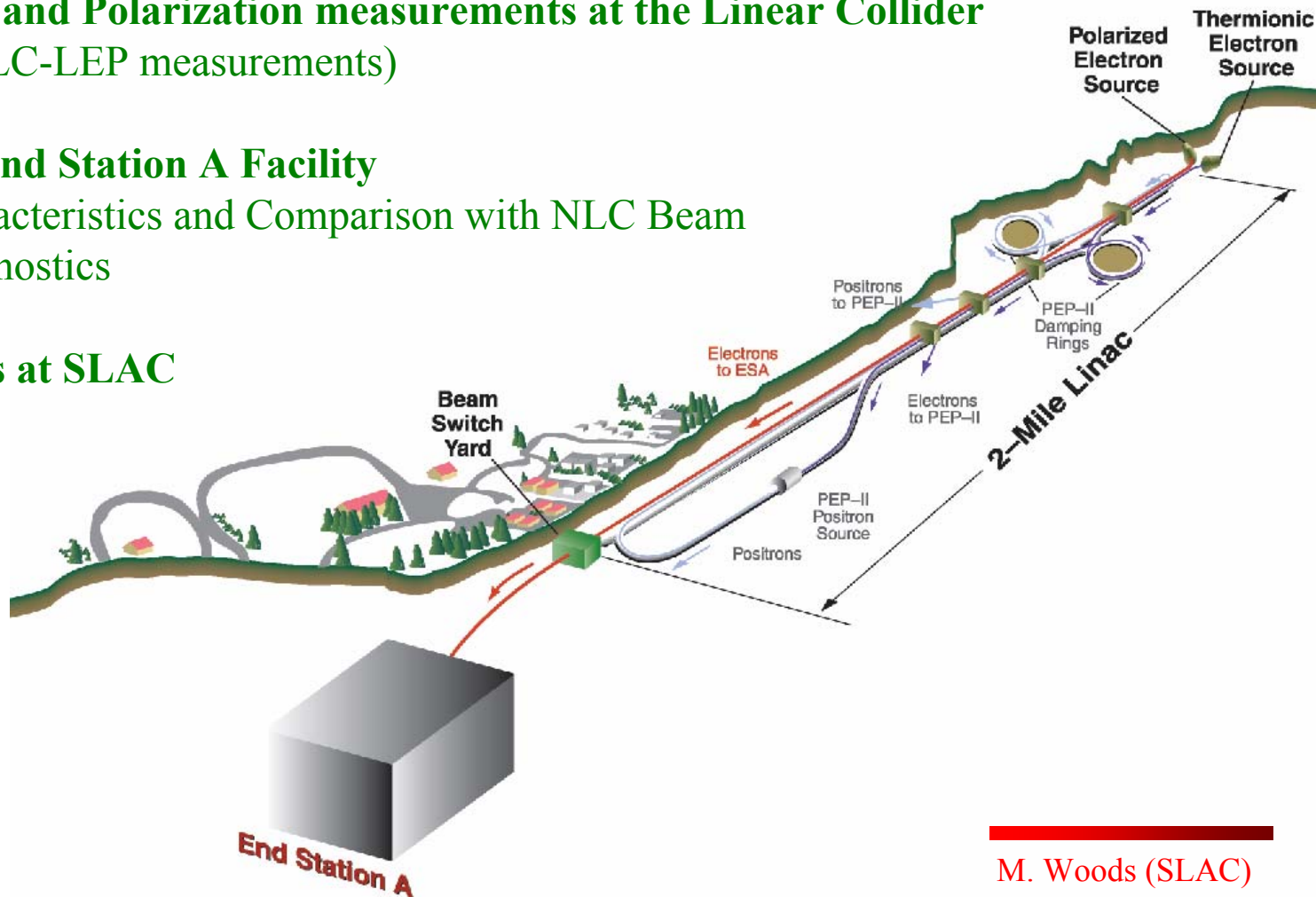
Luminosity, Energy and Polarization measurements at the Linear Collider
(LC-LEP measurements)

SLAC A-Line and End Station A Facility

Beam Characteristics and Comparison with NLC Beam
Beam Diagnostics

LC-LEP Beam Tests at SLAC

Request to EPAC



Beam Instrumentation Tests for the Linear Collider using the SLAC A-Line and End Station A

Y. Kolomensky

University of California, Berkeley

SLAC-LOI-2003.2

J. Hauptman, O. Atramentov

Iowa State University

E. Gulmez,† E. Norbeck, Y. Onel, A. Penzo*

University of Iowa

D. J. Miller

University College London

R. Arnold, S. Hertzbach, S. Rock

University of Massachusetts

M. Hildreth

University of Notre Dame

E. Torrence

University of Oregon

J. Clendenin, F.-J. Decker, R. Erickson, J. Frisch, L. Keller,
T. Markiewicz, T. Maruyama, K. Moffeit, M. Ross, J. Turner, M. Woods

SLAC

W. Oliver

Tufts University

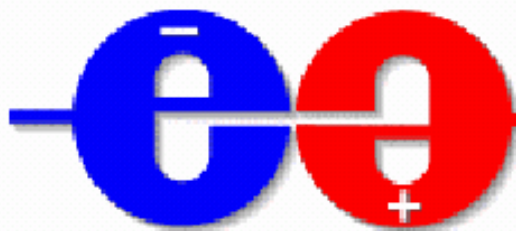
G. Bonvicini, D. Cinabro

Wayne State University

27 physicists
10 institutions

†also Bogazici University, Istanbul, Turkey

*also INFN Trieste, Italy



LCRD and UCLC

FY04 R&D Proposals to DOE and NSF

Luminosity

Fast Gas Cherenkov Calorimeter (*Iowa St.*)

Parallel Plate Avalanche, Secondary Emission Detectors (*Iowa*)

Large Angle Beamstrahlung Monitor (*Wayne St.*)

3d Si Detector for Pair Monitor (*Hawaii*)

Energy

Synchrotron Stripe Spectrometer (*Oregon, UMass*)

rf BPM Spectrometer (*Notre Dame, UC Berkeley*)

Polarization

Quartz Fiber Calorimeter; W-pair asymmetry (*Iowa*)

Background study (*Tufts*)

Quartz Fiber Detector; transverse polarization (*Tennessee*)

Requests to EPAC

- 1. Recognize importance of SLAC's Polarized Electron Source, A-Line and End Station A facilities for LC-LEP beam tests.** (Currently there are no approved physics experiments at SLAC requiring a polarized beam or a high power long-pulse beam.)
- 2. Recommend that SLAC take into consideration LC-LEP beam tests, when modifying the A-Line and ESA beamlines, or the Polarized Source.** (Also need compatibility with Linac modifications for LCLS.)
- 3. Encourage the development of (full technical) proposals for LC-LEP beam tests.**
- 4. Recommend that SLAC allow for a 1-week beam test in FY05 and 1-2 week beam tests in FY06 and FY07 in the long-range accelerator planning.**

Q6: How would you prioritize the list of tests you foresee?

1. BPM tests for IP and Energy BPMs.
2. Synchrotron stripe diagnostics for measuring energy, energy spread and the disrupted (brem) spectrum.
3. Pair detectors.
4. Test A-Line spin precession for use as energy measurement.
5. Test components of energy spectrometers.
6. Test components of polarimeter.
7. Complete energy spectrometer test.
8. Complete polarimeter test.

Q5: Where will you capitalize on existing infrastructure and where do you need new instrumentation and from whom?

Will use existing:

- energy, position and angle rf BPMs
- SLM (synchrotron light monitor)
- ESA DAQ and cable plant
- shielding
- target station for insertable targets
- Moller polarimeter
- large aperture dipoles and quads

New/upgraded instrumentation

- upgrade existing SLM
- new electronics for rf BPMs to facilitate temporal measurements
- new detectors (pairs, synchrotron stripes)
- pulsed undulators for stripe magnets?

Source of upgrades:

- currently 9 university groups are collaborating with funding from DOE/NSF
- expect additional participation from UK and other groups abroad
- SLAC

Response from SLAC Directorate was very positive

“The EPAC very much welcomed your suggestion for a facility at SLAC to test LC instrumentation. They give you their "full encouragement" to move forward with a proposal to better define the program. They encourage you to draw in and garner resources from both the US community and the international community working on the LC.”

What's Next?

- **Proposed Model for how this would work:**
 - A-Line and ESA beam are a facility for LC beam tests
 - individual groups develop T-XXX beam test requests. They would then be grouped together into an experimental run of say 2 weeks.
 - different groups would share a common DAQ and share all the data. But individual groups would be responsible for analyzing/reporting/publishing their own work in small groups. Occasionally we would have reports/publications on the whole facility.
- **Develop proposal for next EPAC meeting in ~ May 2004**
 - Individual groups to develop detailed T-XXX requests to flesh out how beamlines are to be configured; what beam parameters are required; what the universities/user groups will provide; what SLAC needs to provide
 - Need to group together 2 or 3 of the key initial measurements to be performed and use these to develop a detailed proposal for the EPAC, including estimate of budget and resources required and when to do the first beam test
 - Woods will co-ordinate soliciting T-XXX proposals from individual groups and developing the Proposal for the EPAC