Physics & Detector Studies for Future $e^+e^-$ Colliders

Where do we go from here?

C. Bettan
SLD Collaboration Mtg
Oct 5, 2001
Physics with High Energy e⁺e⁻ Colliders

A series of Workshops to study the physics potential of High Energy e⁺e⁻ Colliders, held in preparation for the 1996 Snowmass Study.

- Organizational Meeting at Yale, Feb 11, 1995
- Set up Physics Working groups
- Series of Workshops
  1. Estes Park, Colorado, June 23-25, 1995
  2. Fermilab, Nov 16-18, 1995
  3. SLAC, Feb 29-March 2, 1996
  4. Brookhaven Natl Lab, May 6-8, 1996

Snowmass Study, June 24-July 12, 96
SNOWMASS 2001

- This meeting (July 2001) went a long way towards forming a consensus in the U.S. particle physics community for the e⁺e⁻ collider. SLD-ers played an important role in this (John Jaros et al).


- Strong consensus already exists in Europe & Asia.

- WHERE DO WE GO FROM HERE with the Physics & Detector Study?
Recent American Regional 6+e Meetings

Boulder                  June 1998
Keystone                Sept. 1998
Berkeley             March 2000
Johns Hopkins        March 2001

* Snowmass           July 2001
International etc. Meetings

Saariselka, Finland 1991
Hawaii, USA 1993
Haricke, Japan 1995
Barcelona, Spain April 1998
Fermilab, USA Oct. 2000
Future Meetings

Regional Meetings

- Krakow Sept 14-18, 2001
- Beijing Oct 31 - Nov 2, 2001
- Univ. of Chicago January 7-9, 2002
- 2nd American Mtg May - June 2002

International Meeting

- Cheju Island, Korea Aug 26 - 30, 2002
Physics & Detector R&D Program

- We are in the 3rd year of our R&D Program
  - Concentrated on Physics Studies and Detector Simulation
  - Supported PostDocs at Universities
  - About 500K$/year
  - Charlie Prescott chaired Selection Committee

Where do we go from here?

- Continue Physics & Detector Simulations
- Start some Hardware R&D
- Will talk to Lab Directors and DOE to substantially increase funding
NSF $40K
Praagh/DOD $100K
SLAC/DOD $20K

Grantees. Total funding approximate.

The first round of proposals were due by March 15, 1999. There were funding requests from 20 groups, of which we were able to fund 11.

Year I of this Program

To provide financial support for these studies, DOE through SLAC and Fermilab, and NSF were made funds available for this program.

Studies will include detector component R&D and some prototype of concepts.

Multiple, physics processes. Performance studies of a wide range of detector designs will be expected. Eventually, the outcome of the studies will be on detector simulation in the context of the problem.

If successful, these studies will move through phases as shown below.

Conceptual Design Report (CDR).

The duration of these studies is intended to be three to four years, to correspond to the period during which the machine designers develop a complete set of experiments on such a collider, whenever the technical, geographic location is.

1. To study relevant physics processes with a focus on providing guidance on the parameters needed for both the collider and the detectors.

2. To study simulation studies to investigate strategic issues and make design in a detector design with respect to the physics and the detectors.

3. To provide the framework of collaboration to the form for discussions with the international user community interested in participation and the machine environment.

The goals of the study are:

We have initiated a program to provide financial support for the study of the physics and detectors for future high energy e+e- colliders.

Physics Studies

Announcement for Linear Collider Detector Simulation and
continued funding

Proposals were not able to fund last year. These groups may wish to submit the same proposal as last year or change theme if they wish.

May 1, 2001 - Proposals due

The deadline for the third round of proposals will be:

May 1, 2000 - Proposals due

The procedures for proposals worked well last year, so we will use the same procedures again this year (see Procedures for Proposals and Criteria for Proposals). The success of Proposals for Proposals is dependent on the quality of the proposals.

The NSF promised to try to double their level of support over the first year, depending on the quality of the proposals.

Research/DOE $50K
STAC/DOE $30K

We have received promises from the labs to support the second year of the program at the level of

July 2000 - July 2001

Year 2 of the Program

The second year of the program would be continued to provide a second year of support for these post docs. These proposals included plans to support a second year of support for these post docs. Almost all of the allocated funds were for half-time support of post docs for Physics and Deceleration Simulation Studies.
Design L - Quadrant View

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For a postscript version, please click here.

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Table 15.2: Linac Collider Detector Budgets (WBS to subsystem level) in M$ / FY01

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<thead>
<tr>
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<th>Total</th>
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<td>Detector</td>
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<td>L1 Trigger</td>
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<td>L2 Trigger</td>
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<td>L3 Calorimeter</td>
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<td>L3 EM Detector</td>
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<td>L3 Electromagnet</td>
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<td>L3 Magnet &amp; Support</td>
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<td>L7 Installation</td>
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<td>L8 Management</td>
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<td>L9 Continuity</td>
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Detectors for the Linear Collider
Worldwide Study of the Physics and Detectors for Future Linear e⁺e⁻ Colliders

For comments on this web site, please contact the L.C. Webmaster at Yale University Physics Department.

http://lewwws.physics.yale.edu/lc
Organizing Committee

Of the

Worldwide Study of Physics and Detectors

For Future Linear $e^+e^-$ Colliders

Co-chairs

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution/Location</th>
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<tbody>
<tr>
<td>Charles Baltay</td>
<td>Yale University</td>
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<tr>
<td>Sachio Komamiya</td>
<td>University of Tokyo</td>
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<tr>
<td>Dave Miller</td>
<td>UC London</td>
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<tr>
<td>Alan Astbury</td>
<td>TRIUMF (Canada)</td>
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<tr>
<td>Jonathan Bagger</td>
<td>Johns Hopkins (USA)</td>
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<tr>
<td>Paul Grannis</td>
<td>SUNY, Stonybrook (USA)</td>
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<td>Steve Olsen</td>
<td>U. of Hawaii (USA)</td>
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<td>Charles Prescott</td>
<td>SLAC (USA)</td>
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<tr>
<td>Shinhong Kim</td>
<td>Tsukuba U. (Japan)</td>
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<td>Sun Kee Kim</td>
<td>U. of Seoul (Korea)</td>
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<td>Takayuki Matsui</td>
<td>KEK (Japan)</td>
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<td>G. P. Yeh</td>
<td>Taiwan</td>
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<td>Tao Huang</td>
<td>U. of Beijing (China)</td>
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<td>Michael Danilov</td>
<td>ITEP (Russia)</td>
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<tr>
<td>Rolf Heuer</td>
<td>CERN/DESY (Germany)</td>
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<tr>
<td>Marcello Piccolo</td>
<td>Frascati (Italy)</td>
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<td>Francois Richard</td>
<td>Orsay (France)</td>
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<tr>
<td>Ron Settles</td>
<td>Munich (Germany)</td>
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World Wide e+- Study

Steering Committee met in Rome July 26, 2001

Agreed on two activities for the near future:

1. Commissioned an International R&D Group to write an R&D Report

   - Rolf Heuer, Chris Dammarell, Ron Settles
   - Jim Brau, Gene Fisk, Keith Riles
   - 3 Asian members to be named

   - First meeting at Krakow Mtg (almost)

   - Purpose of Report

   - Summarize R&D going on at the present on Linear Collider Detectors worldwide

   - Outline R&D needed in the near future

   - Report by early 2002
2. Agreed to write an International volume on Physics and Detectors for Future Linear e+e- Colliders.

The World Book

- Regional Documents Exist:
  - TESLA Document March 2001
  - THE ORANGE Book June 2001

- Purpose of the World Book
  - Summarize the best of the Regional Documents
  - Include new developments between the Regional Documents and the Korean meeting Aug 2002
  - Show international consensus for the physics of e+e- Colliders
  - Increase interregional cooperation

- Time scale - have 1st Draft to focus discussion at the Korean Mtg Aug 2002

- Choose Editorial Committee at Regional Krakow, Beijing, & U of Chicago Mtgs
American Working Group Interim Organizers

Paul Grannis & Charles Baltay, Coordinators

1. Detector & Physics Simulations
   Mike Peskin, Tim Barklow, Richard Dubois
2. Vertex Detector
   Jim Brau, Tim Bolton
3. Tracking
   Keith Riles, Dean Karlen, Chris Hearty
4. Particle I.D.
   Hitoshi Yamamoto, Richard Stroynowski
5. Calorimetry
   Frank Porter, Ray Frey
6. Muon Detector
   Dave Koltick, Gene Fisk
7. Data Acquisition/Electronics
   Tony Barker, Bob Jacobsen
8. Higgs
   Rick Van Kooten, Bill Marciano
9. SUSY
   Teruki Kamon, Bob Hollebeek, H. Murayama, U. Nauenberg
10. Other New Particles
    Slawek Tkaczyk, Joanne Hewett
11. Top Physics
    Dave Gerdes, Andreas Kronfeld
12. QCD, Two Photon
    Bruce Schumm, Lance Dixon
13. Electroweak, Strong Gauge Interactions
    Tim Barklow, Mike Peskin
14. e-e-, eγ, γγ Options
    Karl Van Bibber, Clem Heusch, Les Rosenberg
15. Interaction Regions, Backgrounds
    Tom Markiewicz, Stan Hertzbach

First name on each line agreed to serve as the International Contact person.
Future of the e+e- Physics

Detector Studies

1. The World Wide Study at the Rome meeting (July 26, 2001) agreed to continue for a few more years

2. Suggestion - it is time to reexamine and re-organize the American Regional effort

- The present leadership and "interim organizers" should declare their job done and step down by the summer of 2002

- First discussion of new organization at the January U of Chicago Meeting

- Try to decide on new organization at the May-June Meeting