

Charge to the Workshop (and News)

Jim Brau

January 9, 2003

- ALCPG Organization
- Recent activities and news
- Future plans



American Linear Collider
Physics Group

Jim Brau, Arlington, January 9, 2003

Charge to the Workshop

- Review our recent progress
- Organize our plans for future work





Organization of the Physics and Detectors Studies

- Mark Oreglia and I are co-chairing ALCPG Executive Ctte:
 - Ed Blucher (Chicago) Dave Gerdes (Michigan)
 - Lawrence Gibbons (Cornell) Dean Karlen (Victoria)
 - Young-Kee Kim (Berkeley) Jeff Richman (UCSB)
 - Rick Van Kooten (Indiana) Hitoshi Murayama (Berkeley)
- Executive committee providing overall advice, and support for general studies
- Working Groups organized around physics and detector topics





<http://blueox.uoregon.edu/~lc/alcpg>

Detector and Physics Simulations:

Higgs:

Vertex Detector:

SUSY:

Tracking:

New Physics at the TeV Scale and Beyond:

Particle I.D.:

Radiative Corrections (Loopverein):

Calorimetry:

Top Physics, QCD, and Two Photon:

Muon Detector:

Precision Electroweak:

DACq, Magnet, and Infrastructure:

gamma-gamma, e-gamma Options:

Interaction Regions, Backgrounds:

e-e-:

IP Beam Instrumentation:

Liaison to accel. R&D

UCLC and LCRD

LHC/LC Study Group

Global Detector Network

Testbeams



Working Group Leaders

<http://blueox.uoregon.edu/~lc/alcpg>

Detector and Physics Simulations:

N. Graf/M. Peskin

Vertex Detector:

J. Brau /N. Roe

Tracking:

B. Schumm/D. Karlen/K. Riles

Particle I.D.:

B. Wilson

Calorimetry:

R. Frey/A. Turcot/D. Chakraborty

Muon Detector:

G. Fisk

DACq, Magnet, and Infrastructure:

(inactive)

Interaction Regions, Backgrounds:

T. Markiewicz/S. Hertzbach

IP Beam Instrumentation:

M. Woods /E. Torrence/D. Cinabro

LHC/LC Study Group

- chaired by H. Schellman/F. Paige

Co-chairs: Jim Brau and Mark Oreglia

Higgs:

R. Van Kooten/M. Carena/H. Haber

SUSY:

U. Nauenberg/J. Feng /F. Paige

New Physics at the TeV Scale and Beyond:

J. Hewett/D. Strom/S. Tkaczyk

Radiative Corrections (Loopverein):

U. Baur/S. Dawson/D. Wackerroth

Top Physics, QCD, and Two Photon:

Lynne Orr/Dave Gerdes

Precision Electroweak:

Graham Wilson/Bill Marciano

gamma-gamma, e-gamma Options:

Jeff Gronberg/Mayda Velasco

e-e-:

Clem Heusch

Liaison to accel. R&D

T. Himel, D. Finley, J. Rogers

Global Detector Network

M. Hildreth/R. Van Kooten

UCLC and LCRD

D. Amidei, G. Dugan,
G. Gollin, J. Jaros,
A. Kronfeld, U. Mallik,
R. Patterson, J. Rogers

Testbeams

G. Fisk

Meetings and Workshops since Spring 2002

- Regional R&D Meetings

| | | |
|------------------|------------------|---------------|
| Fermilab (Apr 5) | Cornell (Apr 19) | SLAC (May 31) |
|------------------|------------------|---------------|

- LoopVerein BNL May 9-10

- IP Beam Inst. SLAC June 26

- ALCPG Santa Cruz June 27-29**



- LCDsoft NIU Nov 7-9

- γ collider

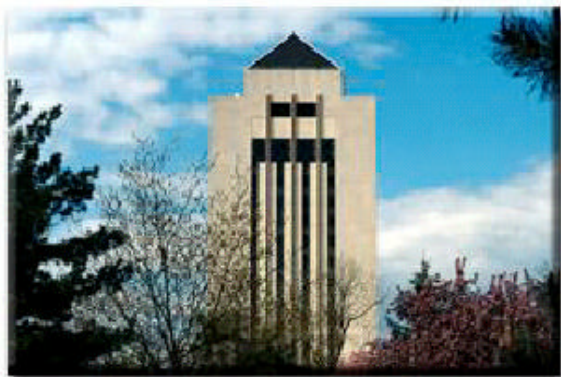
| | | |
|----------|------|-----------|
| workshop | SLAC | Nov 21-22 |
|----------|------|-----------|

- LHC/LC Fermilab Dec 12-13

- ALCPG UT-Arlington Jan 9-11**



LCDsoft



LCDsoft



Workshop on simulation, energy-flow algorithms, and software for the Linear Collider jointly hosted by the [calorimetry](#) and [software/simulations](#) working groups of the [ALCPG](#).

November 7-9, 2002, [Northern Illinois University/NICADD](#), DeKalb, IL, 60115, USA



Linear Collider R&D Proposals

- Last spring, following the release of the HEPAP report, the US community began developing plans for an invigorated R&D program and proposals to the funding agencies
- Organizational meetings were held at Fermilab, Cornell, and SLAC
 - ALCPG working groups led discussions on R&D opportunities
 - eventually the DOE groups consolidated into the LCRD and the NSF groups into the UCLC
- The US Linear Collider Steering Group developed a plan on how to deal with these proposals:
 - create a review committee
 - have the proposals reviewed at the project level
- The funding agencies responded to the ground-swell of interest within the community and developed a plan for the scope of the program

Linear Collider Accelerator R&D

- Many in the American university community expressed their interest in linear collider accelerator R&D
- In response to this, the LC accelerator physicists prepared a list of R&D projects and the community developed proposals to address some

<http://www-conf.slac.stanford.edu/lcprojectlist/projectlist/intro.htm>

- 33 accelerator project proposals were submitted as part of the final University Program proposal on October 24

The Internal Review and Proposal Development

- At the Santa Cruz ALCPG meeting in June there was much discussion on how to proceed to proposals
- Coming out of that meeting, there was an agreement from both the NSF(UCLC) and DOE(LCRD) groups to
 - submit Expressions of Interest by August 1
 - Expressions of Interest were reviewed by the ALCPG working group leaders by August 6, providing criticism and recommended revisions
 - Proposals were collected by September 3
- The LCRD and the UCLC joined into a single national coordinated document to the US LC Steering Group
 - LCRD: D. Amidei, G. Gollin, J. Jaros, A. Kronfeld, U. Mallik
 - UCLC: R. Patterson, J. Rogers, G. Dugan



US R&D Proposals

- The single, combined proposal which was developed over the summer became:
 - A University Program of Accelerator and Detector Research for the Linear Collider*
 - about 2 M\$ first year (increasing in subsequent years)
 - very strong accelerator R&D component
 - (roughly 1/2 of total funding)
- **International Detector R&D Committee** report provided guidance for detector projects
 - <http://blueox.uoregon.edu/~lc/randd.html>



LC R&D Review Committees

established by USLCSG

- **Detector Committee**

- Howard Gordon, Brookhaven (chair)
- Rolf Heuer, U. Hamburg
- Steve Olsen, U. Hawaii
- Mike Roney, U. Victoria
- Sally Seidel, U. New Mexico
- Hitoshi Yamamoto, Tohoku U.

- **Accelerator Committee**

- Norbert Holtkamp, ORNL (chair)
- Phil Burrows, Oxford
- Jean Delaysen, JLab
- Tom Himel, SLAC
- Hugh Montgomery, Fermilab
- Katsunobu Oide, KEK

Both committees met at Fermilab Sep 9-10 in separate sessions to review the respective proposals.



The Charge

(for the Detector Review Team)

The success of the Linear Collider physics program depends on optimizing the accelerator technology, and capitalizing with optimal detectors on the opportunity afforded by machine performance. While much progress in detector development has been made in recent years, especially through R&D for the LHC, different optimizations are needed for the Linear Collider experiments. There is time now to develop these technologies, and to discover and pursue new ideas which can further enhance the physics reach.

With this in mind, the Linear Collider R&D Review Committee is charged to

- * Prioritize the elements of the proposals in the light of the R&D needs of the worldwide linear collider effort. Considerations entering into the prioritization should include the relevance and importance of the work to the perceived needs of the Linear Collider detectors, the lead-time requirements for the proposed R&D, and the experience and track record of the proposers. Novel ideas which have potential to impact the detector designs significantly should be identified with favor.
- * Co-ordinate the elements of the proposals by identifying areas of overlap, within a single consortium proposal, between the proposals, and within the international R&D program. Suggest possible realignments of the efforts which would eliminate unnecessary redundancy.

The committee should refer to the document "Linear Collider Detector R&D" by the international linear collider detector R&D committee chaired by R. Heuer.

Further Guidance

(for the Detector Review Team)

There is additional guidance (besides the charge) from the Steering Group on what they would like coming from this review.

They would like you to provide:

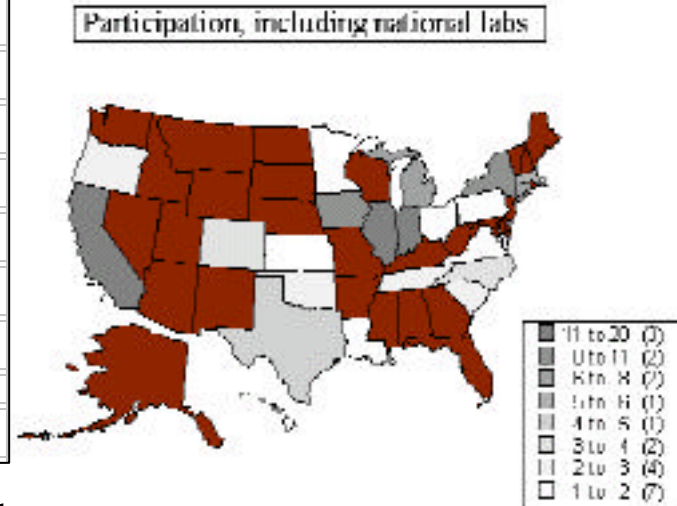
- 1.) a **rating** for each proposal (e.g. excellent, good, satisfactory, or poor) based on factors such as clarity of goals, feasibility, strength of the participants, etc;
- 2.) a categorization of the **relevance** of each proposal (e.g. critical R&D, important R&D, useful R&D, or irrelevant);
- 3.) and a **rank-ordering** of the proposals. This rank-ordering likely will be a grouping of the proposals into tiers (e.g. first priority, second priority, defer, or drop). You may need to indicate why you recommend to drop a proposal, but everyone recognizes you will not have time to write much verbiage.

Please keep an eye on the total cost of the proposals. The budgets are not certain, but the guidance is that the Funding Agencies will try to provide a growing total of approximately 1M\$ in FY03, 2M\$ in FY04, and 3M\$ in FY05 for university-based detector R&D. You will not need to worry about whether the funds are DOE or NSF. So for example, the first tier would be a mixture of "excellent" and "good" proposals that sum to approximately 1M\$ in FY03 and are aimed at "critical", "important", or "useful" R&D goals. Since the funding is uncertain, the second tier will also be important, and should not consist of just every proposal that does not make it into the first tier.



A University Program of Accelerator and Detector Research for the Linear Collider

| 2002 Proposal | Proposed Budget | No. projects |
|----------------------------------|--------------------|--------------|
| Accelerator Physics | \$1,003,783 | 33 |
| Luminosity, Energy, Polarization | \$171,541 | 9 |
| Vertex Detector | \$119,100 | 3 |
| Tracking | \$395,662 | 11 |
| Calorimetry | \$514,540 | 12 |
| Muon system and Particle ID | \$148,899 | 3 |
| TOTAL | \$2,353,525 | 71 |



http://www.hep.uiuc.edu/LCRD/html_files/proposal.html

Proposal submitted to DOE and NSF October 24
We are eager to hear of action from the agencies:
Saturday afternoon reports from agencies

In addition strong R&D effort continues in Canada

IEEE Nuclear Science Symposium Portland, Oregon Oct 19-24, 2003

- The IEEE is a good venue to report our R&D
- Conference series with long tradition for reports on high energy physics instrumentation
- papers published in IEEE Trans. on Nucl. Science



- Abstract and summaries for October meeting due May 16, 2003
<http://www.nss-mic.org/2003/nsshome2003.html>



Test Beams

- The Detector R&D will require test beams as we move ahead
- The Working Groups are discussing the needs and available beams for detector tests
- This is an issue of interest to the world-wide community
- There will be a general discussion of this topic on Friday at 5 pm, led by Gene Fisk and the WG leaders



LC Scope

What are the requirements of the LC to do the physics?

- Two activities in progress
 - (1) WW Study Organizing Committee
 - draft document of Grannis, Komamiya, Matsui, Richard (to be signed by WW community)
 - http://sbhep1.physics.sunysb.edu/~grannis/wwlc_report.html
 - this page is linked to the ALCPG web page
 - David Miller will lead a discussion of this on Friday at 4 pm



LC Scope

- Two activities in progress
 - (2) The ALCPG Executive Committee is preparing a document detailing the required parameters of the linear collider
 - *Design Considerations for an International Linear Collider*
 - Ed. board: Mark Oreglia (chair), Jim Brau, Lawrence Gibbons, Young-Kee Kim, Hitoshi Murayama
- This was requested by the USLCSG
- More detailed with respect to parameters than the WW study
- Mark Oreglia will discuss this more on Saturday afternoon





Design Considerations for an International Linear Collider

OUTLINE

Physics Goals

Initial Machine Energy and Luminosity

Beam Polarization

Interaction Point Configuration

crossing angle, number of collision halls

How Machine Parameters Impact Detector Function

beam bunch structure and timing

beamstrahlung

Running at the Z Resonance

Energy Upgrade

Collision Options

Study requested by USLCSG

Draft available soon

See Mark's talk Saturday

The LHC/LC Study Group

- ECFA/DESY Study established study group
- The aim of the LHC / LC Study Group is to investigate how analyses at the LHC could profit from results obtained at a LC and vice versa. It is furthermore studied how informations obtained at both machines can most effectively be put together in order to explore the mechanism of electroweak symmetry breaking, the underlying structure of SUSY theories, etc.
- First meeting at the ECFA/DESY LC Workshop, St. Malo, 12 - 15 April, 2002
- American working group led by Heidi Schellman & Frank Paige
- Meeting in N. American: December 12-13, Fermilab

The LHC/LC Study Group

- The Fermilab meeting covered a broad range of topics
 - Higgs, SUSY, Exotics, and the Tevatron
- Plan:
 - prepare a draft document by late spring/early summer
 - use as input to Les Houches Workshop
 - Third Les Houches workshop on Physics at TeV scale colliders
 - May 26 - June 6
- Frank Paige will speak on ***LC Physics in the LHC Era*** in the next talk



Monthly Electronic Continental Meetings

- We plan to begin a monthly series of continent-wide electronic meetings in February
 - committee: D. Amidei, G. Gollin, N. Graf, R. Patterson, J. Brau, M. Oreglia
 - the December LHC/LC Workshop at Fermilab served as a warm-up

Telephone-links for audio

Electronic files of the transparencies posted on the web

VRVS used for video contact

- send suggestions for topics and speakers to committee above



ALCPG Documentation System

- Instituting a repository for ALCPG notes and other LC-related documentation.
 - ALCPG contacts: Norman Graf and Jeff Richman
- Backend database provides versioning support and searching capabilities.
- Full-featured web interface for insertion and retrieval.
- Customizable to allow for future extension.
- Institutional support for database and web interface.



ALCPG Documentation System

- Currently defining the archive structure.
 - Emphasis on formal writeups of physics analyses, algorithms, detector R&D.
 - Also contain canonical figures & plots.
- Expect main path for authors to be through the working groups (for minimal QA).
- Schedule for delivery has slipped, expect to have first version testable by end of month.



US LC Steering Group

- J. Bagger, J. Brau, D. Burke, S. Dawson, J. Dorfan (chair), G. Dugan, J. Friedman, J. Gates, S. Holmes, Y-K. Kim, D. Marlow, M. Oreglia, M. Tigner, M. Witherell, H. Lynch (exec. secretary)

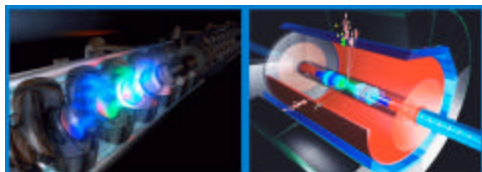
CHARTER (1st paragraph)

- The U.S. Linear Collider Steering Group leads universities and national laboratories working toward U.S. participation in an international high-energy, high-luminosity, electron-positron linear collider wherever it is built and preparing elements of a bid to host the project in the U.S.
- The Steering Group has been meeting regularly and is actively working to make the LC a reality
- Jonathan Dorfan will give us a report Friday at 2, followed by a discussion/town meeting



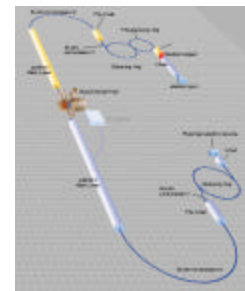
Our effort is world-wide

- Extended Joint ECFA/DESY Study on Physics and Detectors for a Linear Electron-Positron Collider



- Next workshop
 - Apr 1-4, Amsterdam

- ACFA Workshop series



- July 10-12, 2002 - 5th ACFA Workshop on Physics/Detector at the Linear Collider, Tokyo

Many of us have been participating overseas

about 20 attended each of the past two DESY/ ECFA WSs

We need to continue and strengthen this cooperation

International R&D Coordination

- **International Detector R&D Committee** report summarizes the world-wide R&D effort
 - <http://blueox.uoregon.edu/~lc/randd.html>
 - report has moved to a set of web pages
- International R&D Review meetings
 - Jan 8 - UT Arlington
 - vertex detectors and intermediate trackers
 - March 31 - Amsterdam
 - main tracker and muon detection
 - Summer - Asia
 - calorimetry and forward detectors



American Linear Collider
Physics Group

ACFA Joint Linear Collider
Physics and Detector Working Group

World-wide Linear Collider Vertex Detector Workshop January 8, 2003

Session Organizers: Chris Damerell, Akiya Miyamota, Natalie Roe, Kang Joo Sang

Time: 15:00 - 19:00, US Central Time

21:00 - 01:00, UK

22:00 - 02:00, Europe

06:00 - 10:00 January 9, Japan & Korea

All talks are 15 minutes + 5 minutes for discussion

| TIME (US Central) | TITLE OF TALK | SPEAKER |
|-------------------|---|-------------------------------------|
| 15:00 | Monolithic Active Pixel option ps pdf | Marc Winter, CERN |
| 15:20 | Monolithic Active Pixel option pdf | Renato Turchetto, Rutherford |
| 15:40 | CCD option pdf | Konstantin Stefanov, Rutherford |
| 16:00 | DEPFET option pdf | Marcel Trimpl, Bonn |
| 16:20 | SOI pixel option pdf | Halina Niemiec, Krakow |
| 16:40 | Physics Simulations pdf | Nicolo de Groot, Bristol |
| 17:00 | Break | |
| 17:20 | Oregon/Yale CCD R&D and Radiation Damage Studies pdf ps ppt | Nikolai Sinev, U. of Oregon |
| 17:40 | GEANT4 simulation of vertex detector beam background pdf | Tsukasa Aso, Toyama Nat'l College |
| 18:00 | CCD radiation damage test with 150 MeV electrons pdf | Yasuhiro Sugimoto, KEK |
| 18:20 | Silicon Fab and Beam Test Result pdf | Hwanbae Park, Kyungpook Nat'l Univ. |
| 18:40 | H -> c bbar pdf | GeumBong Yu, Korea Univ. |

About 30 participants,
10 at Arlington, the
rest calling in

Jim Brau, Arlington, January 9, 2003

International Linear Collider Steering Committee

Membership

| | |
|------------------------------|---------------------------------------|
| H. Chen (IHEP, Beijing) | J. Dorfan (SLAC) |
| B. Foster (Bristol) | C. Garcia Canal (La Plata, Argentina) |
| P. Grannis (Stony Brook, US) | S. Komamiya (Tokyo) |
| L. Maiani (CERN) | D. Miller (UCL, UK) |
| W. Namkung (POSTECH, Korea) | A. Skrinsky (BINP) |
| H. Sugawara (KEK) | M. Tigner (Cornell) – Chair |
| Y. Totsuka (Tokyo) | A. Wagner (DESY) |
| M. Witherell (Fermilab) | |

- Promoting the construction of an LC world-wide
- Maury will update us on the work of this committee Saturday afternoon
- A major development on the international scene has been the work of the Technical Review Committee (chair: G. Loew)
 - Several talks this morning will be devoted to informing us on the status of the collider technology options and the work of the TRC



Global Detector Network

- Basic Notion: Detector Control Rooms in different regions of the world
- World wide study looking into this
 - America - Mike Hildreth and Rick van Kooten
 - Europe - Vaclav Vrba and Joachim Mnich
 - Asia - *to be appointed*
- First discussion at ECFA/DESY meeting in Prague
- Here, Mike and Rick will lead a discussion on Friday at 5:30



Future Meetings of the ALCPG



American Linear Collider
Physics Group

- Plans are underway for the next ALCPG meeting
 - July 13-16 at Cornell
 - plan to have a joint meeting with LC accelerator community
- Beyond Cornell:
 - Next meeting Dec or Jan
 - We will consider all proposals:
 - Canada, Mexico, US
- Monthly continental televideo/teleconferences
 - variety of topics of general interest
 - ten per year (begin February)

Conclusions

Charge to the Workshop (and News)

- We have seen a significant spurt of activity in the community during 2002
- We expect increased support for R&D in the coming year, making possible much stronger detector hardware efforts
- We have a lot of work to do here at Arlington

