The Executive Committee for Physics and Detector R&D

Outline:
• Old and new structures; North America, Int’l
• The role of consortia
• Working Groups
• Information resources
• The GRID as a tool and a source of $ ＄
• Important Meetings
Tweaking the NAWGs

• **Charlie Baltay** and **Paul Grannis** wanted out!
  – they envisioned a new directorate for the “second-round” LC effort which would follow the HEPAP rpt

• The lab directors (Dorfan, Tigner, Witherell) chose new co-chairs and an executive ctte:
  – Jim Brau, a veteran leader of NALC and Intl activity
  – Mark Oreglia, a complete newcomer to LC (!)
    • Ed Blucher (Chicago)  Dave Gerdes (Michigan)
    • Lawrence Gibbons (Cornell)  Dean Karlen (Canada)
    • Young-Kee Kim (Berkeley)  Jeff Richman (UCSB)
    • Rick Van Kooten (Indiana)  NN : theorist
Charge for the Exec Ctte

• We are writing one; it will include:
  – Coordination of NA LC activity
    • Liaison amongst WGs, consortia, universities, labs
    • Organize/maintain information (webpage!)
    • International liaison
  – Set milestones and create deliverables
    • White paper on LC before end of LHC
    • White paper on need for Phys/Det R&D now
    • Addenda to Orange Report
  – Work with DOE/NSF to organize/pre-rvw proposals
New International Structure

- The Lab directors are establishing a North American LC Steering Group
  - (?) Dorfan chairs ctte of lab directors + rep. grp.
- ECFA-DESY is now establishing a ESG to communicate with the NASG and the Asian SG
  - Chair of ECFA + directors of DESY and CERN
- For now, we can envision ASG-ESG-NAWG cooperation and some decision making
- Ultimately, they merge into the Int’l SG
- (DESY schedule: Science Council rpt in November, governmental decision in 2003)
Our R&D Topics (Brau’s List)

**Calorimetry**

- energy flow: need detailed simulation followed by prototype beam test demo
- further develop physics cases for excellent energy flow, e.g. Higgs self-coupling, WW/ZZ at high energy, recon of top and W for anomalous couplings?, others (SUSY, BR(H>160))
- integrate E-flow with flavor tagging
- study readout differences for Tesla/NLC
- importance of K0/Lambda in energy flow calorimeter
- parametrize E-flow for fast simulation
- forward tagger requirements
- study effect of muons from collimators/beamline
- further development of simulation
  - clustering
  - tracking in calorimeter
  - digital calorimeter
- study parameter trade-offs (R seg, layers, coil location, transverse seg.)
- in terms of general performance parameters; in terms of physics outcome
Topics cont’d

Calorimetry (continued)
• refine fast-sim parameters from detailed simulation
• integrate electronics with silicon detectors in Si/W
• reduce silicon detector costs
• engineer reduced gaps
• mechanical/assembly issues
• $B = 5$ Tesla?
• can scintillating tile Ecal compete with Si/W in granularity, etc.?
• crystal EM (value/advantages/disadvantages)
• barrel/endcap transition (impact and fixes)

Tracking
• refine the understanding of backgrounds
• tolerance of trackers to backgrounds
• will large background be a problem for the TPC (field distortions, etc)
• are ionic space charge effects understood?
• study pattern recognition for silicon tracker (include vxd)
• study alignment and stability of silicon tracker
• what momentum resolution is required for physics,
  • eg. Higgs recoil, slepton mass endpoint, low and high energy
• understand tracker material budget on physics
Topics cont’d

Tracking (continued)
• physics motivation for dE/dx (what is it?)
• detailed simulation of track reconstruction, especially for a silicon option,
  complete with backgrounds and realistic inefficiencies
• include CCDs (presumably) in track reconstruction
• timing resolution
• readout differences between Tesla/NLC time structure
• role of intermediate layer
• tracking errors in energy flow (study with calorimeter)
• forward tracking role with TPC
• alignment (esp. with regard to luminosity spectrum measurement)
• develop thorough understanding of trade-offs in TPC, silicon options
• large volume drift chamber (being developed at KEK)
• development of large volume TPC (large European/US collaboration at work)
• development of silicon microstrip and silicon drift systems
  (being developed in US & Japan)
• study optimal geometry of barrel and forward system
• two track resolution requirements (esp. at high energy)
  this impacts calorimetry - how much?
• study K0 and Lambda efficiency
  impacts calorimetry?
• 2D vs. 3D silicon tracker
Topics cont’d

**Vertex Detector**
- resolve discrepancy in Higgs BR studies
- understand degradation of flavor tagging with real physics events
- compared to monojets (as seen in past studies)
- understand requirements for inner radius, and other parameters
- what impact on physics
- develop hardened CCDs
- develop CCD readout, with increased bandwidth
- develop very thin CCD layers (e.g. stretched)
- segmentation requirements (two track resolution)
- 500 GeV u,d,s jets
- pixel size

**Muons**
- requirements for purity/efficiency vs. momentum on physics channels
- understand role in energy flow (work with calorimetry)
- detailed simulation
- prototype beam tests
- mechanical design of muon system
- development of detector options, including scintillator and RPCs
**Topics cont’d**

**Beamline and other areas**
- luminosity spectrum measurement
- beam energy measurement
- polarization measurement
- positron polarization
- systematics of the Blondel scheme
- veto gamma-gamma very forward system

**General issues**
- is calibration running at Z0 peak essential/useful/useless?

- In general it would be good if more work was done exercising the simulation code that has been put together under the leadership of Norman Graf. Much work has been devoted toward developing a detailed full simulation.
Consortia versus WGs

- Consortia are wonderful for new involvement and coordination of funding and facilities
  - NSF insists on one; DOE consortia are optional
- But we are concerned about coherence
  - Ultimately the WG’s coordinate the efforts
  - We will have to see the consortia activities under the governance of the WG leadership
  - With several consortia, we need pre-review of proposals … the Exec Ctte will establish a panel
  - A SAGENAP-style panel later on? NSF/DOE like it.
Review Process for NA Proposals

- The Executive Ctte (and funding agencies) want coherence and planning in the proposals.

- A draft which was well discussed in DC looked like this:

  1. We would recommend that consortia proposals be structured so that each activity within the consortium, whether the objective of one institution, a few, or several, can be reviewed and judged on its own merits.

  2. We recommend that the Linear Collider Steering Committee establish a joint review committee to evaluate the proposals task by task in the context of the international program.
## The Current NAWGs

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<th>Current NAWGs</th>
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<tr>
<td>• Calorimetry</td>
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<td>• Vertex Detector</td>
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<td>• Tracking</td>
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<td>• Muon Detector</td>
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<td>• Particle ID  \ldots \ldots  low profile</td>
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<td>• Interaction Regions &amp; Backgrounds</td>
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<td>• Beamline/IR Instrumentation</td>
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<td>• DAQ \ldots \ldots  Low profile?</td>
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**Note:** we are preserving parity with the European WGs

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<th>New WGs</th>
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<tr>
<td>• Detector &amp; Physics Simulations</td>
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<tr>
<td>• Higgs Physics</td>
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<td>• SUSY Physics</td>
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<tr>
<td>• Alternative Theories</td>
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<td>• Radiative Corrections (Loopverein)</td>
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<td>• Top Physics</td>
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<tr>
<td>• QCD and 2-photon Physics</td>
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<tr>
<td>- Put into Top Group</td>
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<tr>
<td>• Precision EW and Strong Gauge</td>
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<tr>
<td>- Put into Alternatives WG</td>
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<tr>
<td>• $\gamma\gamma$, $\gamma e^-$, and $e^-e^-$</td>
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<tr>
<td>- Split off $e^-e^-$ into separate WG</td>
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**NEW!**

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<th>LHC/LC Committee</th>
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<td>• New committee organized by Georg Weiglein</td>
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<td>NEW!</td>
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Charge to the WGs

• We are currently drafting a set of charges:
  – Physics WGs:
    • Assess importance, priority of LC options
      – Energy reach, energy spectrum
      – Luminosity, backgrounds
      – Polarization, Gamma-gamma, e-gamma options
      – LHC complementarity, … etc
  – Detector WGS:
    • bunch structure, machine backgrounds
    • Establish R&D priorities, … etc
  – Reports, maintenance of web data, meetings
Information Resources

• The Exec Ctte sees a clear need to update the web resources
• Young-Kee and Dave Gerdes are working with Norman Graf …. Linearcollider.org
• Maintain standard analysis tools (time is right!)
• Maintain (write!!!) LC Notes
  – Link to TESLA LC-Note system
The GRID?

- It became very clear that CPU-intensive work is already underway...hardware limited
- We are a perfect candidate to develop and use the GRID being established for LHC
- This would strengthen ties to LHC knowledge, funding, and manpower
- There is funding for GRID projects
Important Meetings

• June 27-29: NALC meeting at Santa Cruz
  – This is a very important meeting … formalization of the consortia

• July 25-31: ICHEP in Amsterdam
  – The ECFA-DESY WGs will present papers here

• August 26-30: LCWS 2002 at Jeju Island, Korea
  – This is the Intl LC conference