

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
 - Liason amongst WGs, consortia, universities, labs
 - Organize/maintain information (webpage!)
 - International liason
 - 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, eg. 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

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 K_0 and Λ 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 (eg. 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 Cttee 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

- Calorimetry
- Vertex Detector
- Tracking
- Muon Detector
- Particle ID low profile
- Interaction Regions & Backgrounds
- Beamline/IR Instrumentation 
- DAQ Low profile?

Note: we are preserving parity with the European WGs

- Detector & Physics Simulations
- Higgs Physics
- SUSY Physics
- Alternative Theories
- Radiative Corrections (Loopverein)
- Top Physics
- QCD and 2-photon Physics
 - Put into Top Group
- Precision EW and Strong Gauge
 - Put into Alternatives WG
- $\gamma\gamma$, γe^- , and e^-e^-
 - Split off e^-e^- into separate WG
- LHC/LC Committee 
 - New *committee* organized by Georg Weiglein

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