UCLC Briefing to the US LC SG Accelerator Review Committee

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Motivation for UCLC

- In the wake of the endorsement of the linear collider - both nationally and internationally,
- But with as yet relatively little participation by universities,
- The UCLC was formed to help university groups engage in linear collider R&D
  - both accelerator and detector

UCLC History

- January 2002 - Chicago Linear Collider meeting
  - Jim Alexander announces the formation of a consortium of university groups interested in linear collider R&D
  - The consortium would submit a joint proposal to the NSF
- Enthusiastic response lead to the creation of a mailing list of interested groups
- LCCOM - April 19 at Cornell (Linear Collider Consortium Organizational Meeting) to identify participants and areas of interest and to help newcomers identify specific projects (parallel LCRD meetings at FNAL and SLAC)

UCLC History - continued

- LCCOM2 - June 30 at Santa Cruz
  - participants present preliminary R&D plans
  - create a schedule (driven by NSF proposal deadline)
  - Coordinate with LCRD and USLCSG a common timeline leading to this review
- August 1 - draft project descriptions are received
- August - Friendly joint review of all UCLC and LCRD proposals
  - ALCPG -> Detector proposals
  - Himel,Finley,Rogers panel -> machine proposals
- Refine and update UCLC project descriptions and then combine with LCRD EOI's to produce

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

UCLC Tallies

Num. of Accelerator Projects	14
Num. of Detector Projects	17
Total Projects	31
Num. of Groups*	37
Num. of Institutions	20

* Num of Groups = Projects x Institutions/project

Linear Collider Accelerator R&D

- Two distinct technologies developed at large laboratories - warm x-band and cold L-band
- Tantalizingly close to a real design
- But in view of the high energy and very high luminosity required, much work remains to be done including
- The 38 proposals (UCLC + LCRD)
  - Based on interests and resources of university groups
  - and guided by suggestions from the labs

Proposed R&D

- 8 Categories
  - Beam dynamics - simulations - 8
  - Sources - 3
  - RF technology - 7
  - Magnet and kicker technology - 4
  - Ground motion and vibrations suppression and compensation - 2
  - Instrumentation and electronics - 9
  - Control system - 3
  - Non $e^+ e^-$ collisions - 1

Beam Simulations and Calculations

- High luminosity requires production and preservation of very low emittance beams
- Simulation is the principle tool for evaluating effects of space charge, intrabeam scattering, electron clouds, nonlinearities, magnet and waveguide misalignment, production and transport of beam tails, etc.
- Simulation guides and lends credibility to design choices
  - Establishes requirements and effectiveness of beam instrumentation
  - Procedures for beam based correction of guide field errors and commissioning

Electron and Positron Source Technology

- Low emittance, polarized, flat beams of closely space bunches
- Temporal structure of bunched beam is very different for TESLA and NLC
- Production of polarized positron beam requires helical undulator radiation

Instrumentation and Electronics

- Preservation of low emittance depends on precise and flexible instrumentation for measuring beam size.
- Existing designs are inadequate
  - High resolution beam position monitors
  - Beam size and beam orientation monitors
  - Requirements of IR BPM very different than main linac BPM
  - Bunch length monitors
- Practical designs must be rad hard, inexpensive, serviceable

Control Systems

- Global accelerator network
- Management of large quantity of diagnostic data
- Flexibility to accommodate efficient commissioning and optimization of performance during operation

UCLC Review process

- NSF will conduct its own review of UCLC proposal
- The proposal submitted to NSF is limited to 15 pages - so it cannot include the detail before you today and it will be reviewed as one
- UCLC will use the US LC SG Review as basis for adjusting project budgets
  - So that requests are closer to NSF targets
- UCLC will submit proposal to NSF mid October

UCLC Budget Summary

Amounts are in thousands of dollars

	FY03	FY04	FY05	Total
Accelerator Requests	639	1,122	1,053	2,813
Detector Requests	725	1,500	2,044	4,268
Total Requests	1,363	2,622	3,097	7,081
Budget target	1,000	2,000	3,000	6,000

UCLC Organization

- Project manager - Gerry Dugan
- Research Coordinators -
  - Accelerator - Joe Rogers & Jesse Ernst
  - Machine detector interface - Dave Cinabro
  - Vertexing - Pat Skubic, Homer Neal
  - Tracking - Keith Riles
  - Calorimetry - Dhiman Chakraborty

Summary

- The 38 accelerator projects that have been proposed represent an important contribution to the linear collider R&D
- The participation of 29 institutions in the UCLC and LCRD indicate a strong interest within the physics community in the success of the linear collider
- Opportunity to educate students in the accelerator physics of the collider
- Develop pool of talent on which design, construction, commissioning and operation of the linear collider will ultimately depend.