UCLC Tracking Proposal Interests for the University of Michigan Group

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Overview of Interests

- Broad tracking interests driven by their relevance to key physics processes (Higgs, SUSY)
- Have worked (off and on!) in linear collider studies since 1995
- Have worked on linear collider tracking issues since 1998
- Not wedded to particular tracking technology
- Believe several viable options on the table worldwide
- Both simulations / detector R&D needed to make decisions
Prior Work in Tracking

Riles has served as co-leader of North American Linear Collider Tracking Group since Keystone meeting in 1998:

- Organization (meetings, web site, annual proposal assembly for Prescott Committee)
- Baseline detector design & evaluation
- Coordination of simulations software development
Prior Work in Tracking

Yang has worked on Linear Collider physics / tracking studies since fall 2000:

- Studying Higgs mass & cross section sensitivities with increasing sophistication / realism (see Higgs session talk from Friday)

- Studying impact of tracker performance on Higgs physics (see tracking session talk from Friday)

- Most recent finding: At $E_{CM} = 350$ GeV, present baseline tracker designs near point of diminishing returns for $\Delta M_{Higgs}$, given NLC beam energy spread
Prior Work in Tracking

Effect of various momentum resolutions on reconstructed Higgs mass resolution.

→ Nearing saturation
Prior Work in Tracking

Effect on bottom line –
Accuracy of Higgs measurement –
saturation obvious
Planned Work in Tracking

Short term:

- Wrap up Higgs studies (NLC vs TESLA beam parameters, influence of using final-state Higgs decay)

- Carry out similar study of slepton final states – impact on tracker design:
  - High momentum – same point of diminishing returns as for Higgs?
  - Low momentum – how important is extra material in Si tracker?
  - Colorado group (U. Nauenberg) has pioneered nice slepton analysis methods in SUSY working group.
  - We will coordinate / collaborate closely with Colorado to reduce effort duplication, but this topic merits a special tracker-focussed study
Planned Work in Tracking

Longer term: Tracker alignment / calibration R&D

• Work probably most relevant to silicon barrel tracker, but perhaps useful to forward disks (Si and gas barrel)
• Ultra-thin silicon detectors difficult to support rigidly without adding material back to fiducial volume
• Alternative (a la ATLAS): monitor alignment drift in real time using chirped interferometer (laser & 180° reflectors)
• Wish to study / prototype similar system
• LIGO experience / lab infrastructure should be useful
Budget

Need to do more homework:

• Had budgeted for only first year (need all three now!)
• Had budgeted for postdoc salary fraction (not allowed!)
• Need to revisit time scale for tackling alignment R&D
  (may wish to accelerate schedule and begin purchasing
  equipment and engineer/technician time)

Stay tuned