

UCLC Tracking Proposal Interests for the University of Michigan Group

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June 30, 2002

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

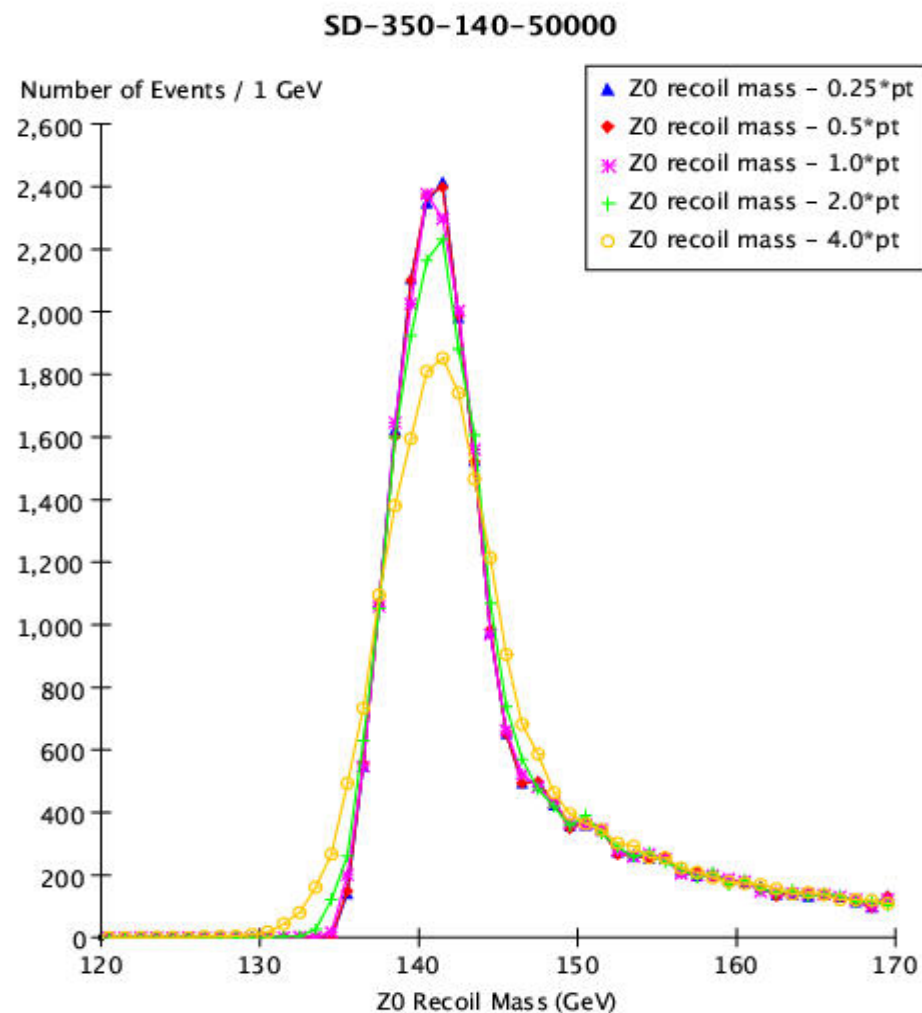
Yang has worked on Linear Collider physics / tracking studies since fall 2000:

- 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 $E_{\text{CM}} = 350$ GeV, present baseline tracker designs near point of diminishing returns for ΔM_{Higgs} , given NLC beam energy spread

Prior Work in Tracking

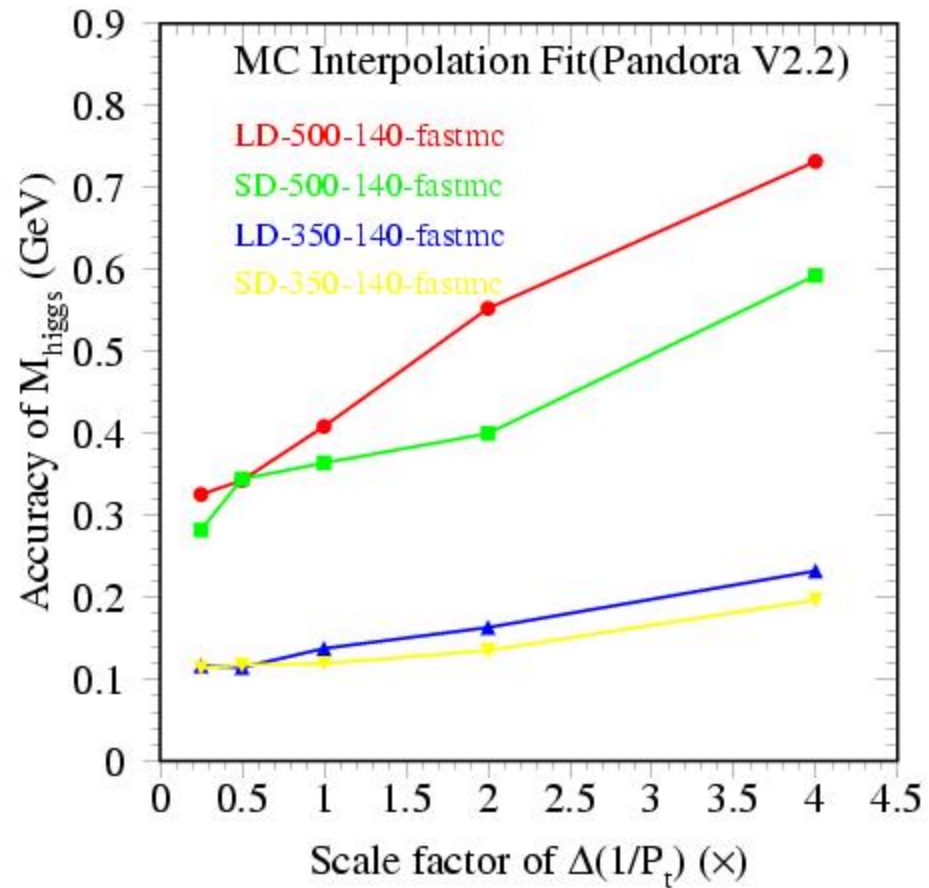
Effect of various momentum resolutions on reconstructed Higgs mass resolution.

→ 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