SUSY and Forward Tracking

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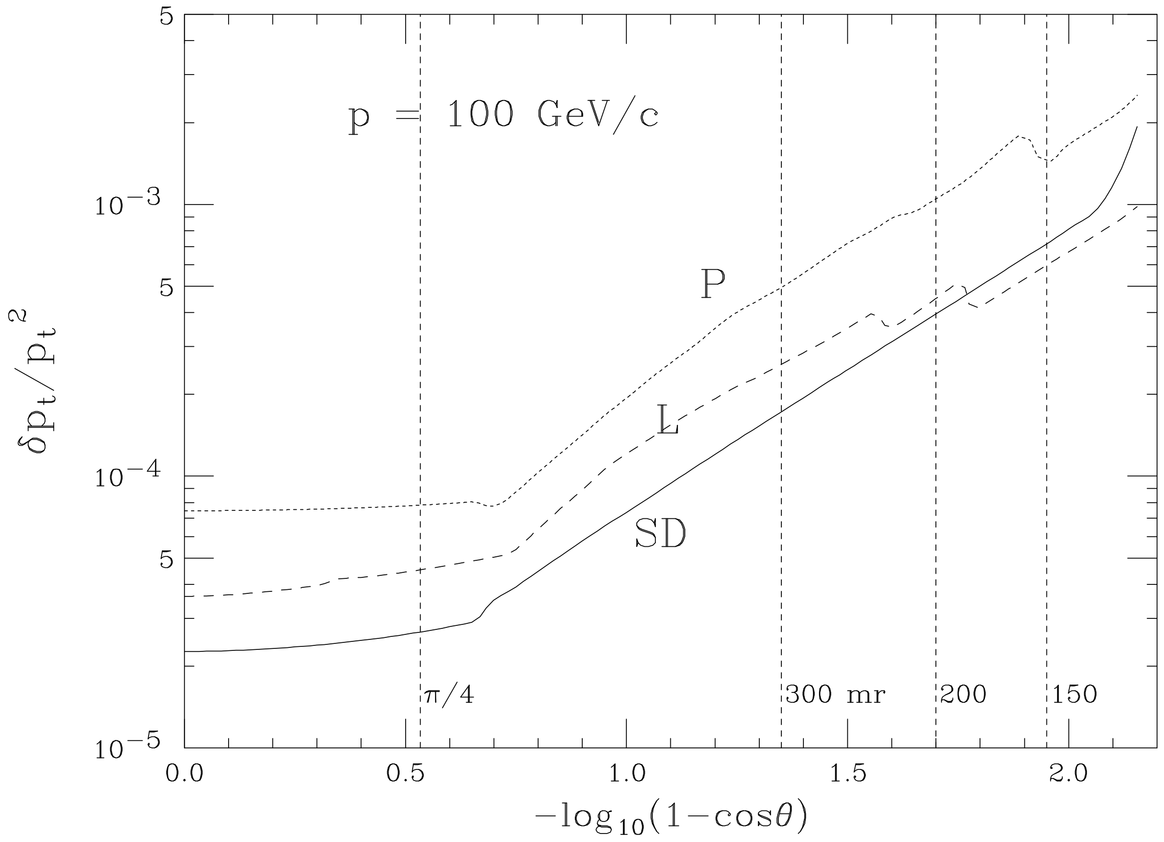
What is the issue?

Nominal resolution degrades in forward region



SUSY endpoint measurements require high precision: is there information in the forward direction?

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Compilation of SUSY particle spectra from Snowmass 2001 benchmark models

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Abstract

A comparative study of supersymmetric particle spectra calculated by the programs Isajet, Susygen and Pythia is presented for various SUSY scenarios defined at the Snowmass 2001 workshop.

At the Snowmass 2001 *'Summer Study on the Future of Particle Physics'* a concensus was reached to define a list of SUSY models as benchmarks to be investigated in future collider studies. Various scenarios, so-called 'Snowmass Points and Slopes' (SPS), were proposed[1,2] in terms of a few parameters describing 'typical' to 'extreme' R_p conserving supersymmetry breaking mechanisms of mSUGRA, GMSB and AMSB. All benchmark points respect currently existing experimental constraints.

	mSUGRA scenario	m_0	$m_{1/2}$	A_0	$\tan\beta$	sign μ
SPS 1	typical point	100	250	-100	10	$+$
SPS 2	focus point region	1450	300	0	10	$+$
SPS 3	model line into coannihilation region	90	400	0	10	$+$
SPS 4	large $\tan\beta$	400	300	0	50	$+$
SPS 5	light stop	150	300	-1000	5	$+$
SPS 6	non-unified gaugino masses $M_1 = 480,\ M_2 = M_3 = 300$	150	300	0	10	$+$
	GMSB scenario	Λ	M_{mess}	N_{mess}	$\tan\beta$	sign μ
SPS 7	NLSP $= \tilde{\tau}_1$	40,000	80,000	3	15	$+$
SPS 8	NLSP $= \tilde{\chi}_1^0$	100,000	200,000	1	15	$+$
	AMSB scenario	m_0	$m_{3/2}$		$\tan\beta$	sign μ
SPS 9	small $\Delta m(\tilde{\chi}_1^+ - \tilde{\chi}_1^0)$	400	60,000		10	$+$

masses and scales in GeV

However, at Snowmass it was recommended to take the SUSY particle spectrum as generated by the program Isajet[3] as the reference for benchmark models, instead of the few high energy

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[1] *'SUSY benchmark discussion'* at Snowmass 2001, http://lotus.phys.nwu.edu∼schmittm/snowmass

[2] M Battaglia et al, *'The Snowmass points and slopes: benchmarks for SUSY searches'*, Snowmass proceedings, in preparation

[3] H Baer et al, hep-ph/0001086, Isajet, http://paige.home.cern.ch/paige

1 SPS 1 – mSUGRA scenario

m_0	100 GeV
$m_{1/2}$	250 GeV
A_0	-100 GeV
$\tan\beta$	10
sign μ	$+$

‘typical’ scenario

$m_0 = 0.4\, m_{1/2} = -A_0$

1.1 Spectrum & parameters of ISAJET 7.58

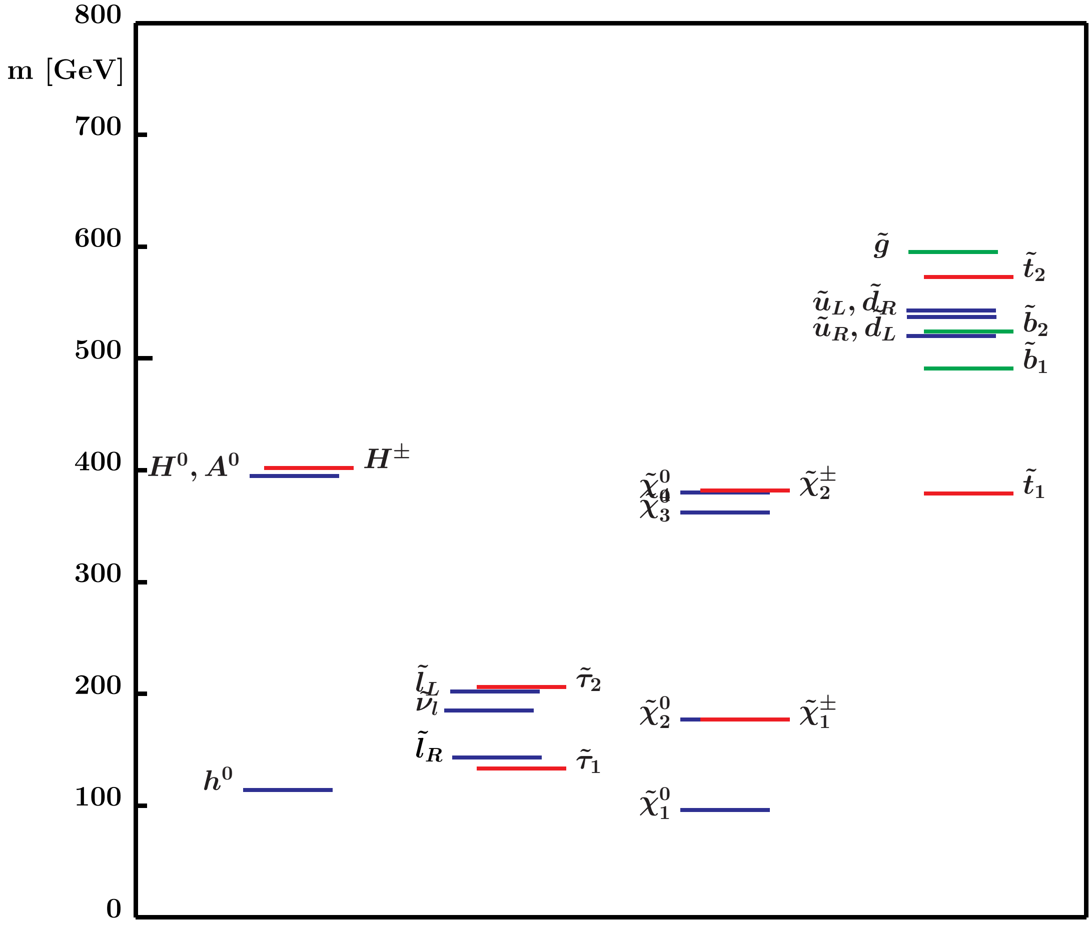
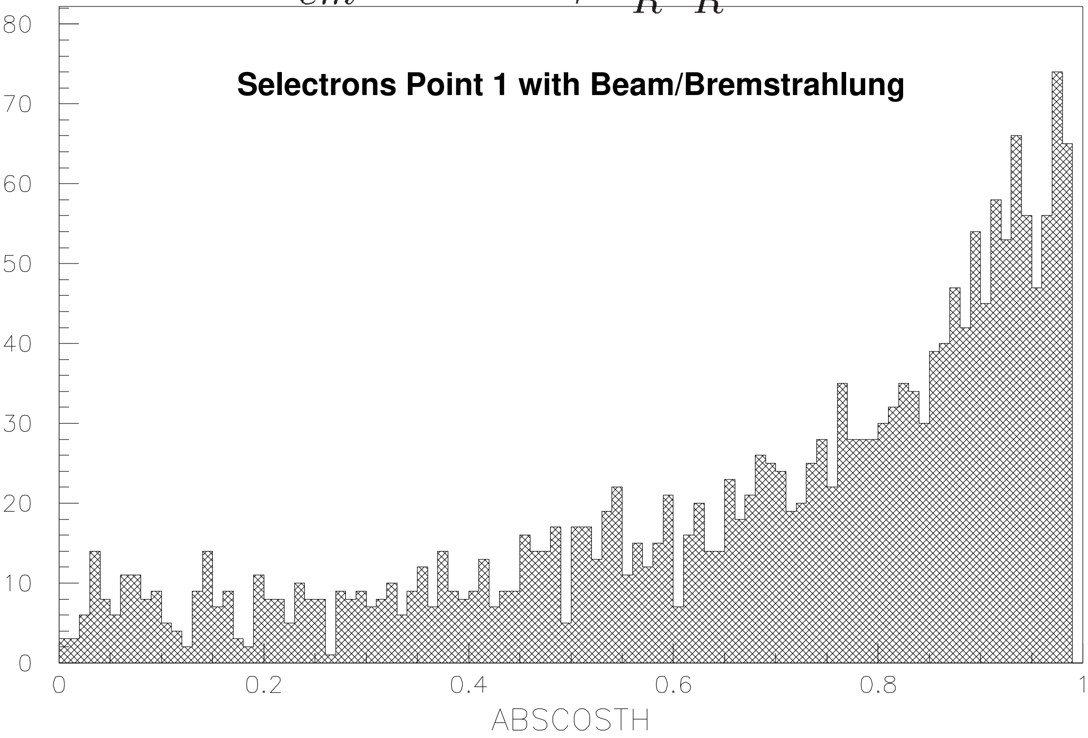
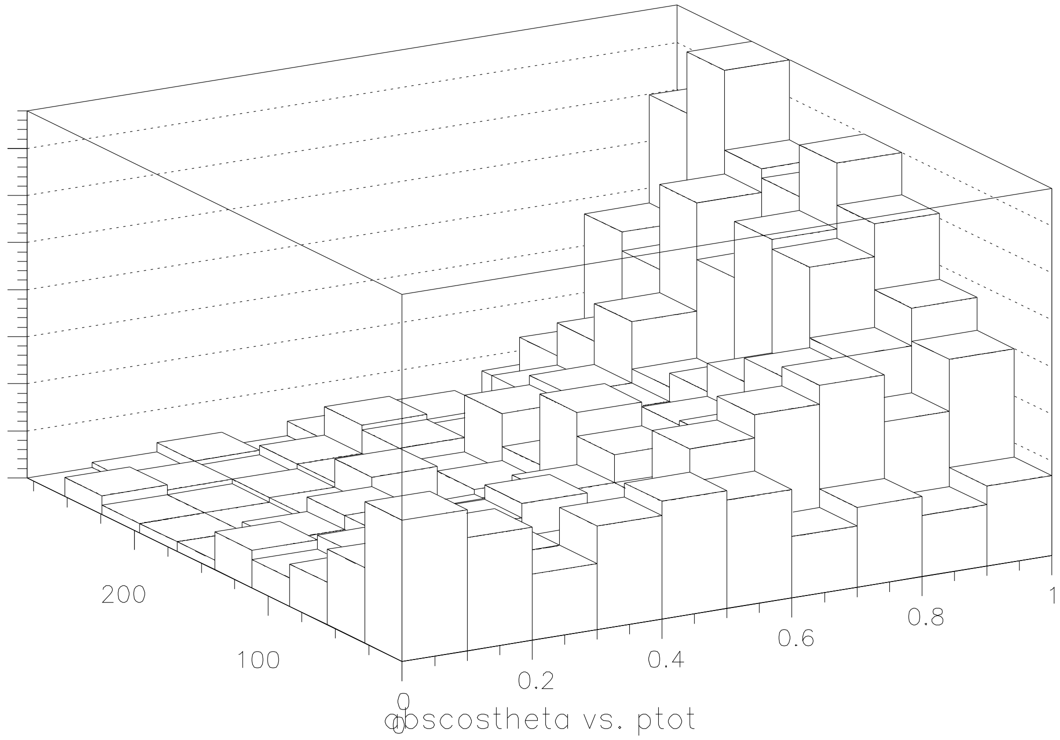


Figure 1: SPS 1 mass spectrum of ISAJET

Point 1: $E_{cm} = 1$ TeV; $\tilde{e}_R^- \tilde{e}_R^+$





Current Activity

Need to:

- Look into SM backgrounds generated by Barklow et al
- Do (fast MC) analysis to find signal in forward region
- If signal can be found, does tracking quality affect accuracy of mass measurement?
- Other signals than Point 1 selectrons?