# Compelling physics case for pol. $e^+$

– Discussion and 'work'shop session –

Polarisation Session 1

'ECFA04'@Durham, September 2nd, 2004

- 'Work' on the write-up
  $\longrightarrow$ status report
  $\longrightarrow$ what is still under work?
- Comments made so far
- Open questions + discussions

# Status of the polarisation report: version from August, 27th

## Our goal:

- Provide 'compelling physics arguments' for polarised $e^+$
- Step 2: polarised $e^+$ even for the baseline design

## What I changed since last workshop+Power meeting:

- included all new contributions (thanks a lot to everybody!)
- included your comments from the workshop as well as from the last Power meeting
- shortened some contributions, as we decided at Montpellier
- changed the structure of the report
- merged (and updated) some contributions,
- added new text by myself ...
- took relevant parts from some of your hep-papers and transformed/included it in the write-up
- transformed some plots from your papers into tables
- added/updated references etc.

# What is included so far?

## 'Physics' structure

- general remarks about couplings, eff. polarisation etc.
- Quantum numbers of selectrons
- Background example in Susy and ED
- Susy examples
- New physics in $f\bar{f}$ (incl. section on transverse pol.)
- CP observables in SM particle sector (incl. transverse pol.)
- Precision measurements: GigaZ
- Monte-Carlo Generators

## Machine+polarimetry details

- $e^-$ polarisation: SLD
- $e^+$ polarisation (laser-based, Daresbury helical design)
- NLC polarimeter
- measurement via physics processes

# What still has to be done and is planned?

## for the physics chapter:

- detailed SLD example
- influence of eff. pol. in t threshold measurement (not a true simulation!)
- Susy: gaugino/higgsino sector (parameter determination)
- Inclusion of 'tables' concerning the gain of using pol. $e^+$
- Summary

## Structure of planned tables – old scheme (example)

GMP, Steiner,0106155

| Process | Background | $P(e^+)$ Improvement Factors | |
|---|---|---|---|
| Higgs | | | |
| $e^+e^- \to H\bar{\nu}\nu$ | $WW$, $ZZ$, $Z\bar{\nu}\nu$ | Enhancing of $\frac{S}{B}$, $\frac{S}{\sqrt{B}}$ | factor 1.2–1.3 |
| $e^+e^- \to HZ$ | | better separation: $HZ \leftrightarrow H\bar{\nu}\nu$ | factor 4 with RL |
| | $W^{\pm}\ell^{\mp}\overset{(-)}{\nu}$ | suppression of single $W$ | important |

$\Rightarrow$ I would leave out 'background' column and include a 'qualitative' column ... ?

## for the machine+polarimetry chapter:

- principle of undulator based scheme
- Tesla polarimeter
- details concerning transverse polarisation: preparation and measurement

## Remarks made so far (small editorial things not listed)

### concerning the physics chapter:

- new title: 'Polarised Positrons for the (baseline) LC'
- introductory paragraphe for each section explaining physics and importance of problem and description of current situation
  $\rightarrow$ goal: make it more homogenous
- section 2.4 has to be revised
- chapter concerning light flavour separation with trans. beams: paragraphe?
- new study: $e^+e^- \rightarrow Z\gamma$, transv. pol. and CP TGCs
- general paragraphe concerning TGC=formfactor
- remove 'we' and use 'one'
- TGC not yet consistent because Nagel+Menges+Franco merged

### concerning the machine+pol chapter:

- machine+pol. only as short overview; separate future paper with technical details
  $\rightarrow$ compromise proposal: appendix?
- $e^-e^-$ mention in intro due to well-defined initial state and some overlap in hardware
- request that MDI task force address the case 'pol. e+ and e-e- already ion baseline'
- captions ok in section 3.2.3 (Duncan)?
- for tomorrow: technical details for transverse beams

# Further questions

## concerning the physics chapter:

- shouldn't we remove 'indirect' references? (general criteria?)
- executive summery needed/wanted?
- one main argument for pol $e^+$: 'Being prepared for the Unexpected'
  - clear enough?
  - shouldn't we stress 'tool for model independence' even more?
  - statistics sometimes needed for observability; why not accepted as being important?

## Please, further discussion?

- what is missing?
- what else (setrion, topic) needs to be improved?
- what else?
- in case that 'introduction paragraphes' are wanted:

  couldn't we do it just now, please?