

Extraction Line

Discussions & Considerations for Polarimetry

***Mike Woods,
summarizing email discussions and recent studies
(Woods, Moffeit, Schuler, Monig, Nosochkov)***

1. Optimizing R22 and R44 for polarimetry in extraction line;

these give the angular magnification from collider IP to Compton IP

- important for impact on BMT and spin flip depolarization msmts
- R22 most important for e+e-, since horizontal angles dominate
- if R22 close to -0.5, then polarimeter can measure very close to lum-wted polarization
- if R22 close to 0, polarimeter will only measure spin flip depol.

Recent extraction line optics from Y. Nosochkov:

i) Previous design for NLC 20-mrad extraction line:

$$R22 = -0.595, R44 = -0.443$$

ii) More recent designs for 20-mrad IR that also include energy spectrometer:

a. $L^*(ext)=4m, R22 = -0.144, R44 = -0.275$

b. $L^*(ext)=8m, R22 = -0.22, R44 = -0.31$

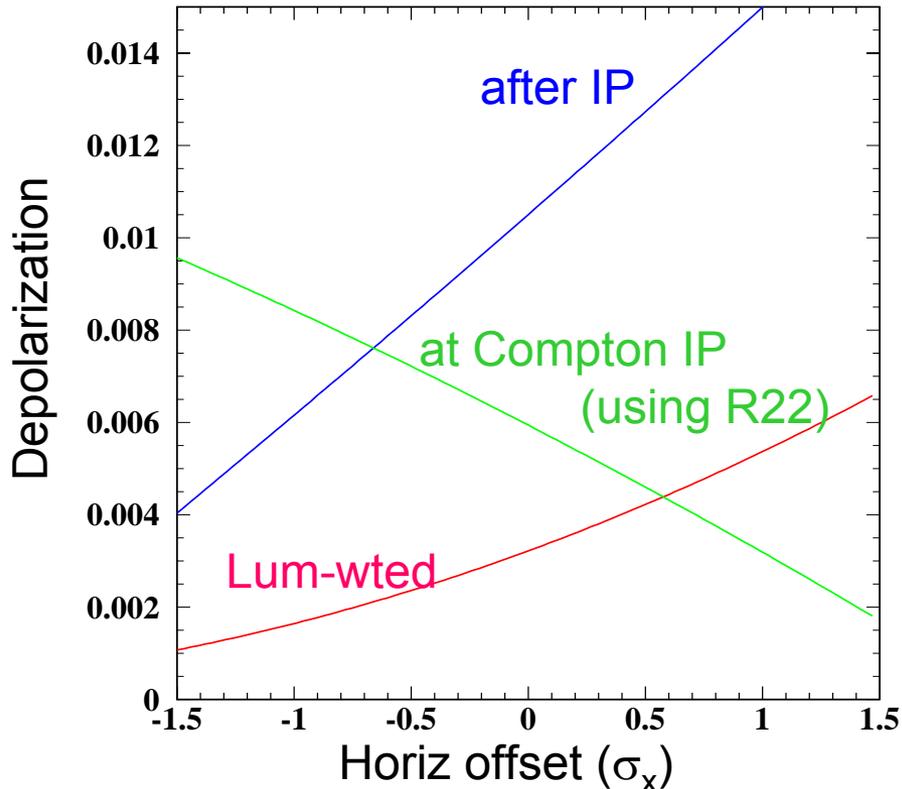
c. $L^*(ext)=15m, R22 = -0.326, R44 = -0.419$

How to optimize or constrain for polarimetry requirements?

- R22 close to -0.5 or close to 0?
- change polarity of quads so R22 larger?
- 2nd focus to decouple more polarimetry from energy spectrometer?
- zoom optics?
- determine BMT depol from determining lum-wted angular distributions?
from pair distributions? May be more robust than determining colliding beam params

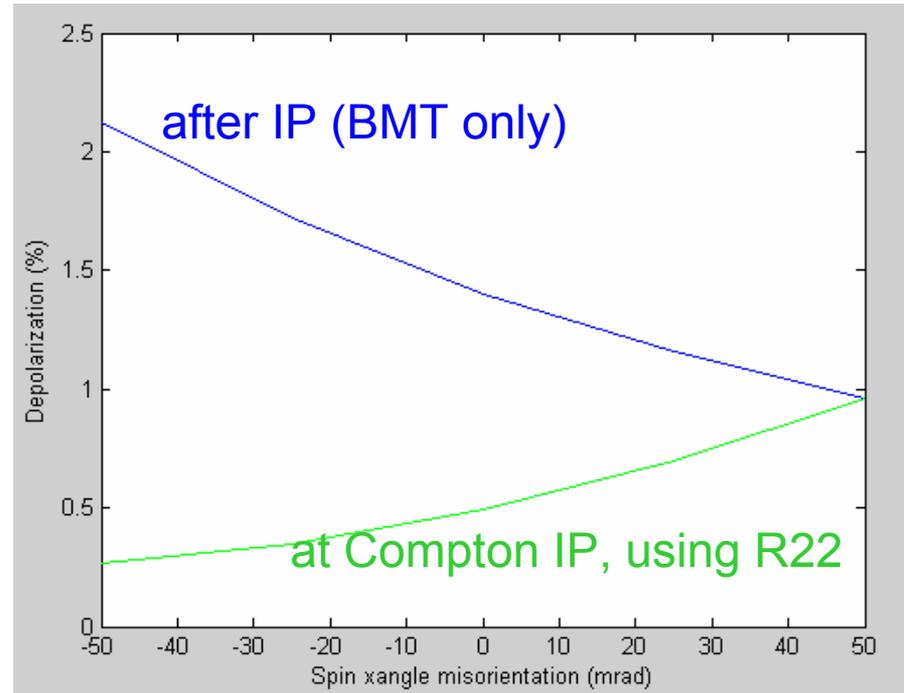
Klaus Monig has been looking at sensitivity to misalignment of longitudinal Polarization at the Collider IP for the extraction line polarimeter msmts.

Initial Results with R22 = -0.595 (from collider IP to Compton IP):



Monig (prelim.) result

- CAIN simulation, -50 mrad spin angle misalignment

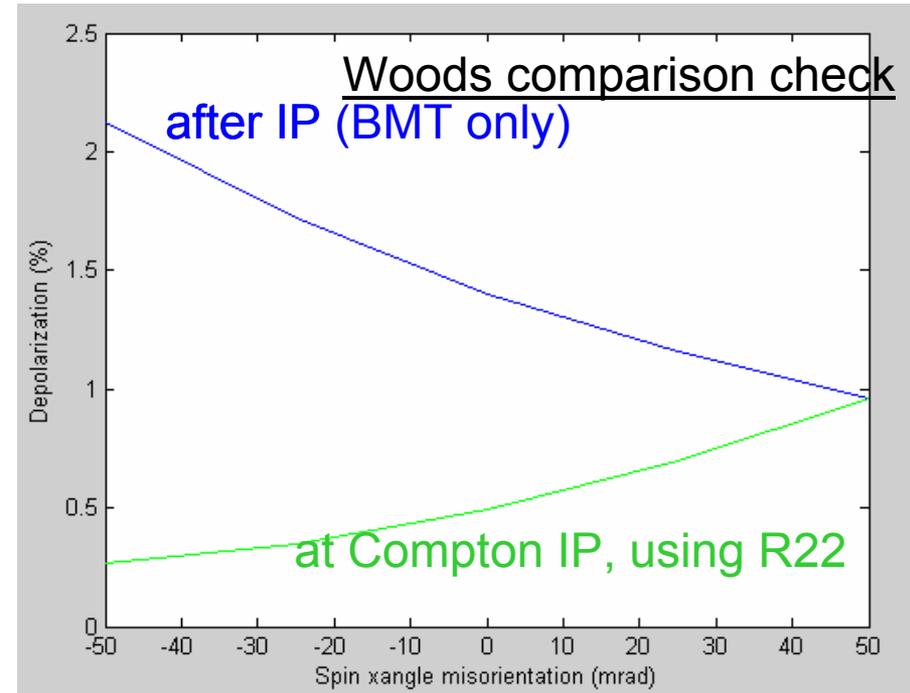
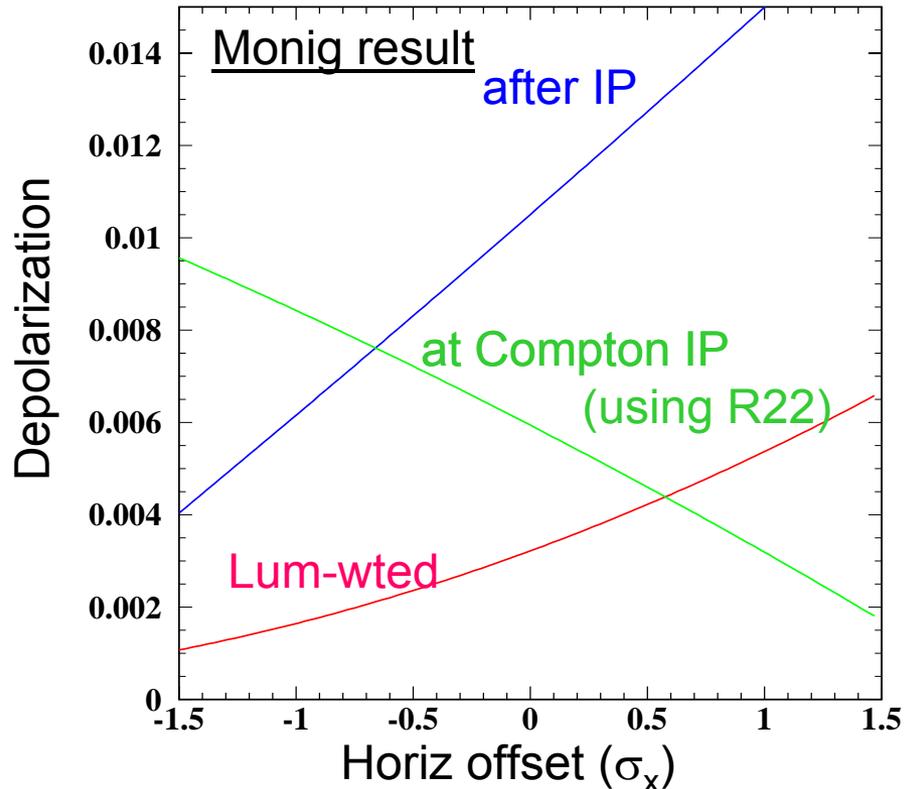


Woods comparison check

- uses one of the TESLA TRC files, Guinea PIG simulation with 500nm horizontal offset (has higher luminosity and larger disruption angles than for Monig's CAIN Study)

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Initial Results with R22 = -0.595 (from collider IP to Compton IP):



- Want to limit spin angle misalignment, horizontal offsets
- Use depol vs beam offset as diagnostic for spin misorientation at IP
- needs further study; +ve R22, R44 possible?