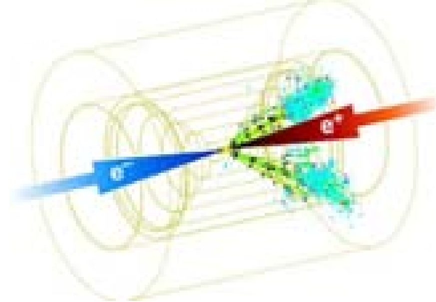
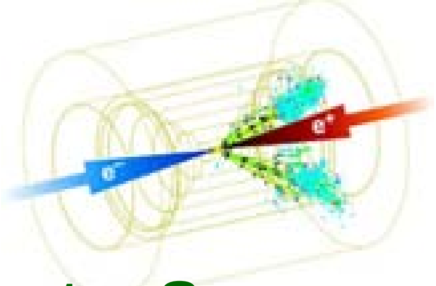


ILC Polarimetry

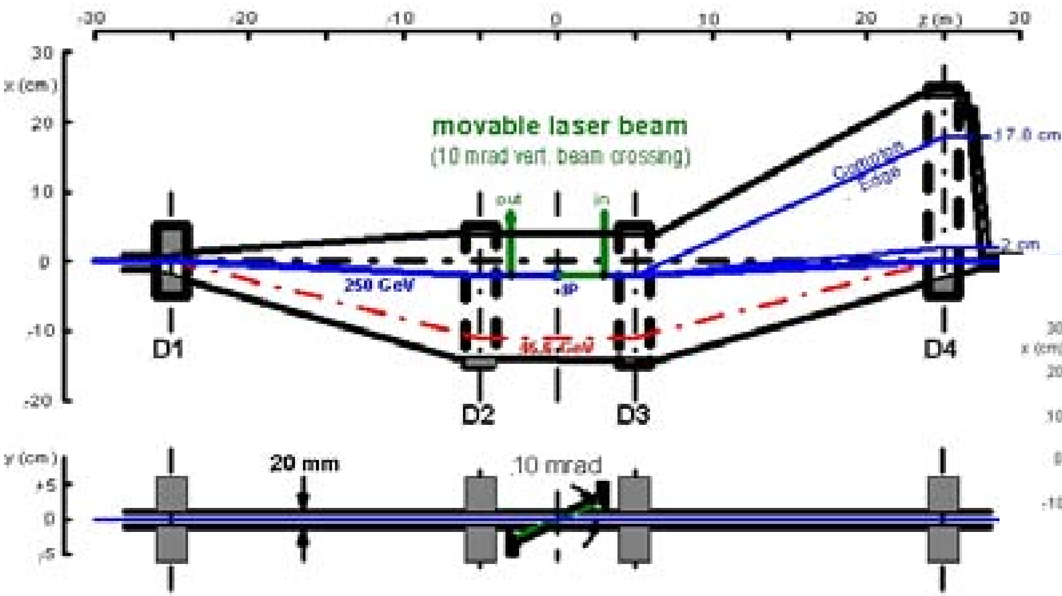
Mike Woods, *SLAC*

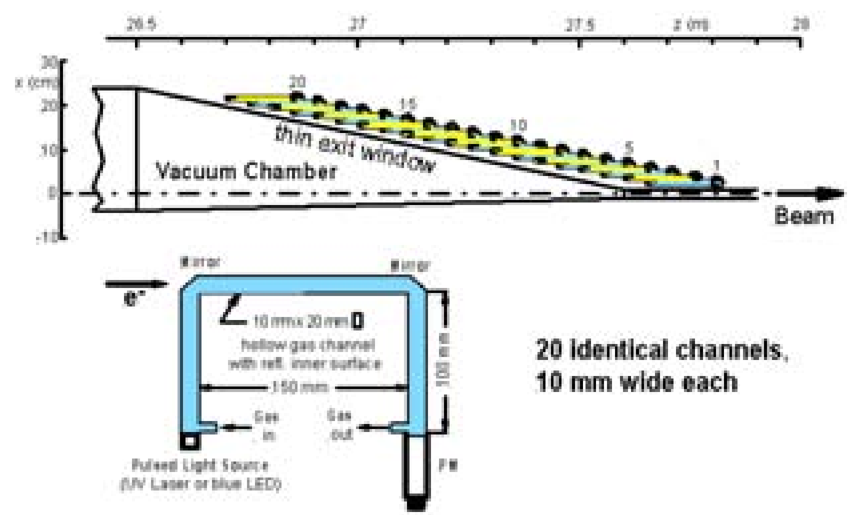


Polarimetry Summary
from MDI workshop SLAC, January 2005

- Three ways to measure polarization: upstream, downstream, data
- Issues to Understand:
    - Difference of incoming, outgoing and luminosity weighted polarization.
    - Correlations between electron and positron polarization.
    - Polarimeter corrections for data methods.
- More concrete questions:
    - Is downstream polarimetry with 2 mrad crossing angle possible?
    - If no, is upstream polarimetry enough?
    - Can we believe CAIN for depolarization?
    - Do we understand the polarization transport well enough?
    - Backgrounds.
    - Light sources for different polarimeters (backgrounds, correlations)
    - Switching between IRs, how, how often?
    - Real Designs
    - Common issues with beam energy/luminosity spectrum: correlations between beams, momentum-polarization correlations.

Upstream Polarimeter design by N. Meyners and P. Schuler, presented at LCWS05

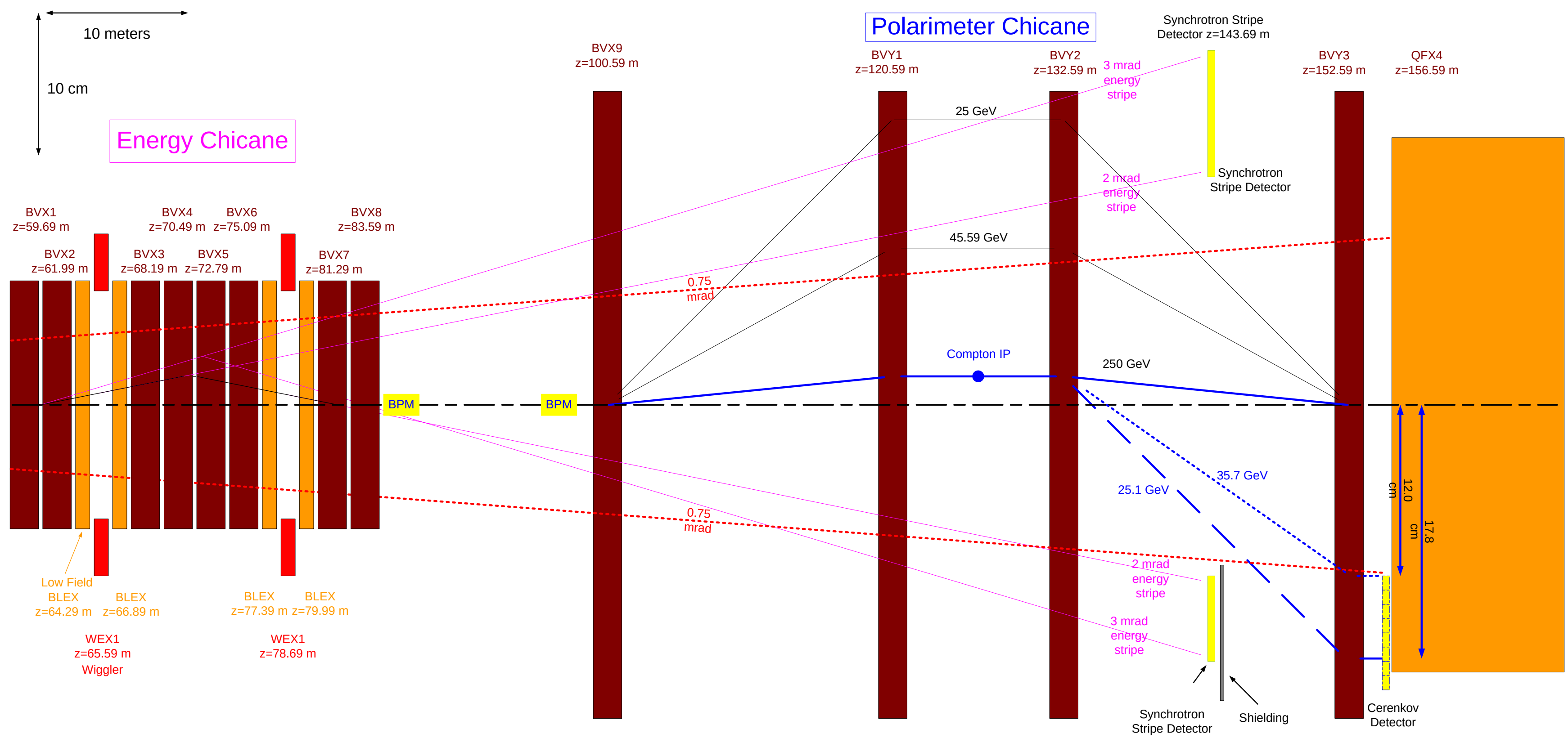




Gas Cerenkov Hodoscope Detector

World-Wide Studies of ILC Physics and Detectors

ILC-World



K Moffeit 4 Apr 05

Polarimeter design for 20-mrad Extraction Line

Eight Cerenkov Cells 1 cm wide

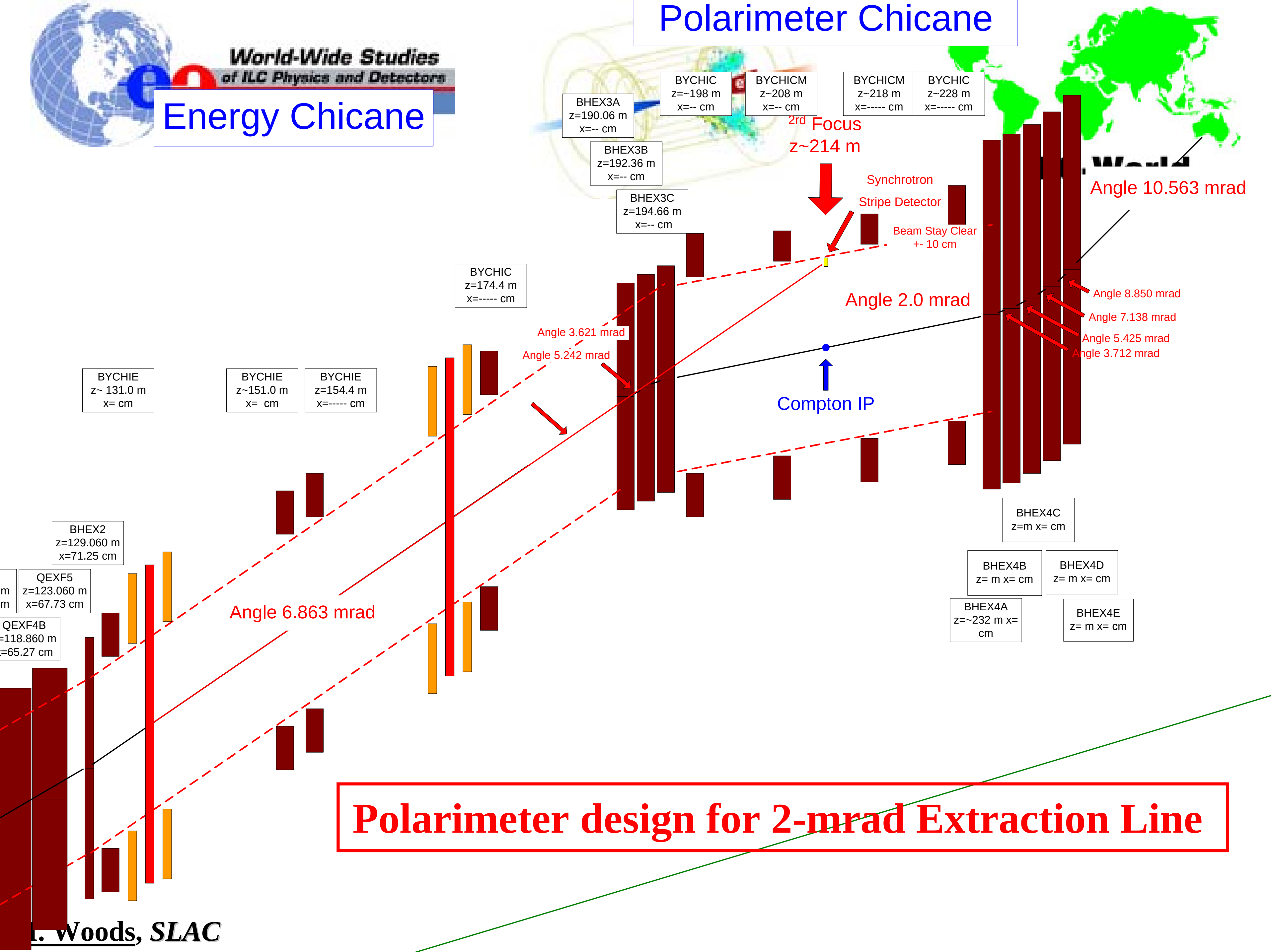
Six cover the region between

36 GeV (12 cm from beam line)

25.1 GeV (17.8 cm)

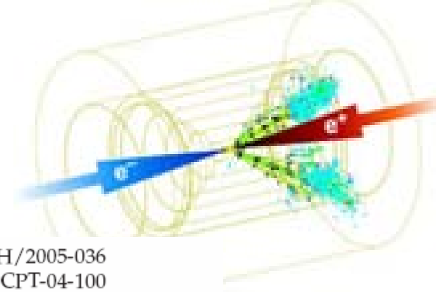
And 2 outside the kinematic limit

Polarimeter design for 2-mrad Extraction Line



M. Woods, SLAC

World-Wide Studies of ILC Physics and Detectors



ILC-World

CERN-PH-TH/2005-036
DCPT-04-100
DESY 05–059
FERMILAB-PUB-05-060-T
IPPP-04-50
KEK Preprint 2005-16
PRL-TH-05/01
SHEP-05-03
SLAC-PUB-11087

The role of polarized positrons and electrons in revealing fundamental interactions at the Linear Collider

Sections 5.5 and 5.6 are on polarimetry (Moenig, Moffeit, Schuler, Woods)

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J.E. Clendenin[7], J.
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A. Freitas[15], J. Go
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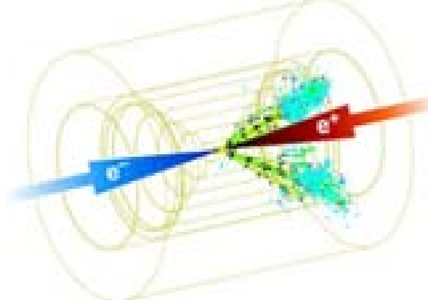
S. Kraml[1], W. M
A. Mikhailichenko
F. Nagel[23], T. Naka
N. Paver[27], R. Pitt
S. Riemann[8], S.D.
D. Scott[10], J. Shep
A. Wagner[14], G. W
F. Zomer[35]

[1] *CERN TH Division, De*

	e^+/e^- *beam*	**Upstream laser beam**	**Downstream laser beam**
Energy	250 GeV	2.3 eV	2.3 eV
Charge or energy/bunch	$2 \cdot 10^{10}$	$35\ \mu J$	100 mJ
Bunches/sec	14100	14100	5
Bunch length σ_t	1.3 ps	10 ps	1 ns
Average current(power)	$45\ \mu A$	0.5 W	0.5 W
$\sigma_x \cdot \sigma_y\ (\mu m)$	$10 \cdot 1$ upstream $30 \cdot 60$ downstream	$50 \cdot 50$	$100 \cdot 100$
		Upstream polarimeter	**Downstream polarimeter**
Beam crossing angle		10 mrad	11.5 mrad
Luminosity		$1.5 \cdot 10^{32} cm^{-2} s^{-1}$	$5 \cdot 10^{30} cm^{-2} s^{-1}$
Event rate at 25-GeV Endpoint		300,000/GeV/sec	10,000/GeV/sec
$\Delta P/P$ stat. error		$< 1\%$ / sec	$< 1\%$ / min
$\Delta P/P$ syst. error		0.25%	0.25%

Table 5.4: Compton polarimeter parameters at 250 GeV.



More questions / issues:

- detailed evaluation/comparison of polarimeter performance for 2-mrad and 20-mrad extraction line designs
  - disrupted bunch parameters at Compton IP
  - backgrounds: disrupted beam, synchrotron radiation, beamsstrahlung, rad. Bhabhas
  - collimator design
  - sensitivity to misalignments and collision offsets
  - evaluating different parameter sets
- transverse polarimetry
- $\sqrt{s}$ = 91 GeV to 1 TeV
- document reference polarimetry design by Feb 2006