Status Update on WW analysis at 1 TeV

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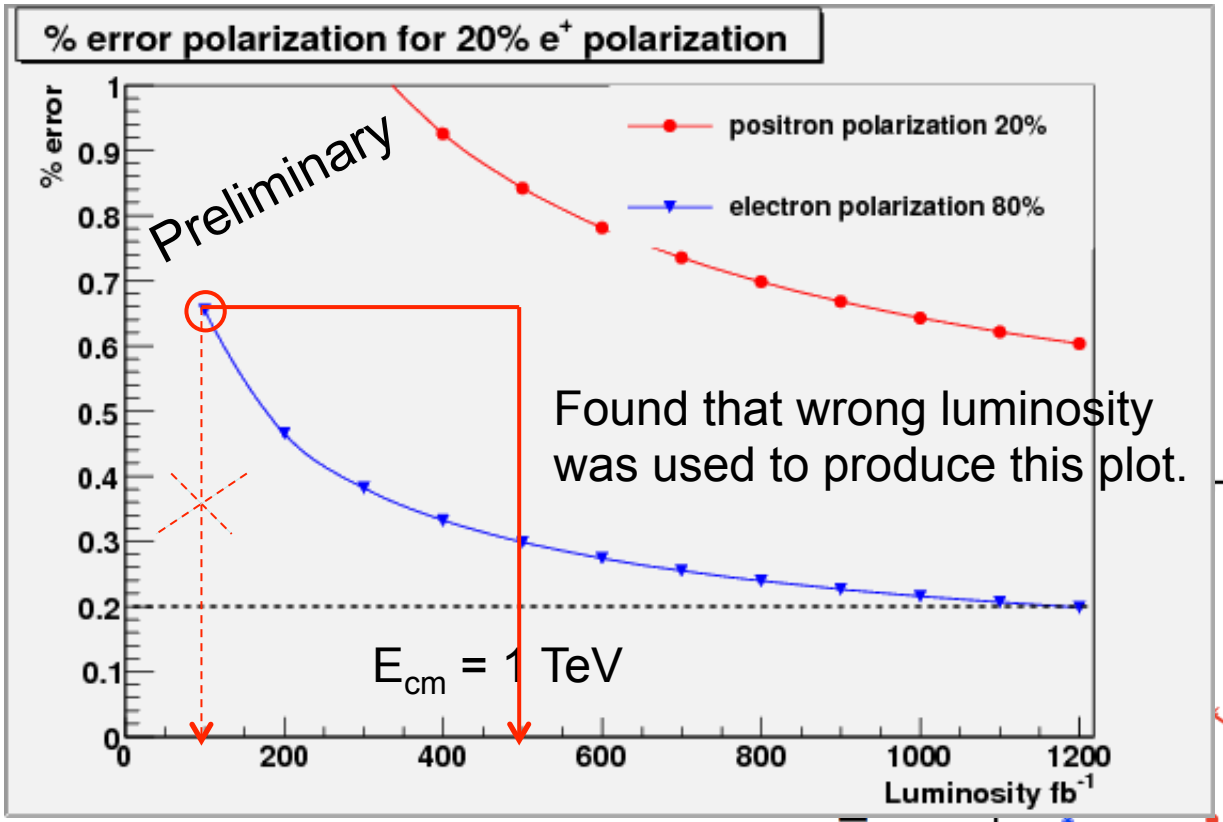
ILD Software/Analysis Meeting, 19 of December 2012

Introduction

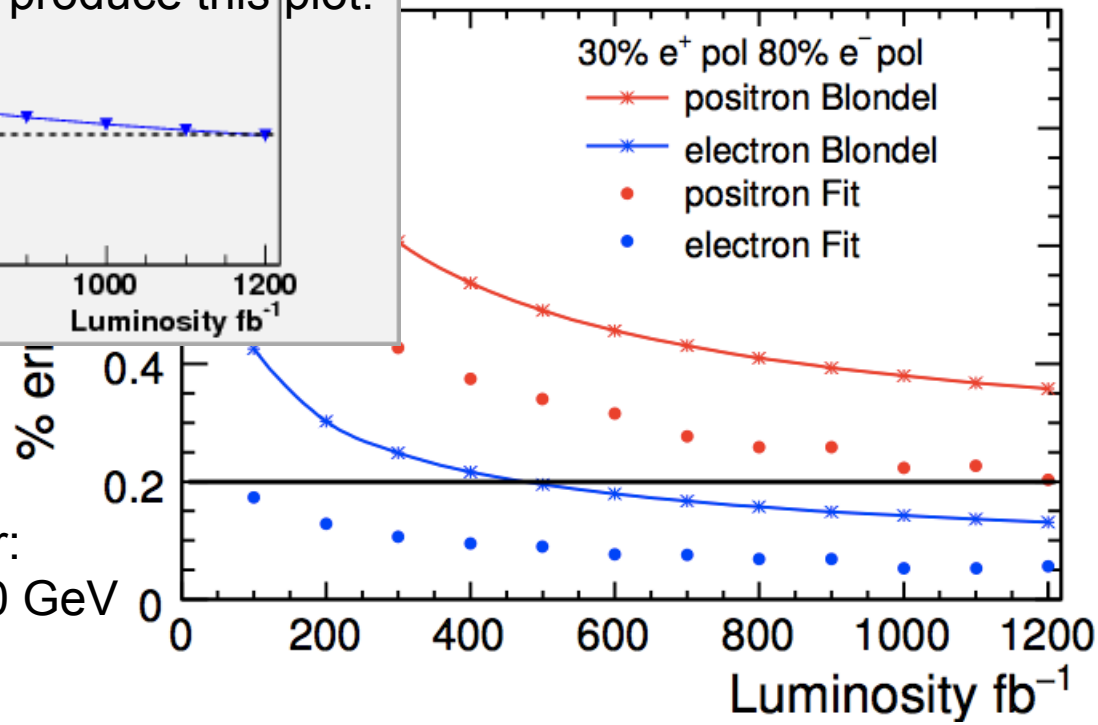
- Assess the accuracy of the beam polarization measurement using annihilation data, at E_{CM} = 1 TeV.
- Use the process: $e^+e^- \rightarrow W^+W^- \rightarrow qql\nu$, l = e,$\mu$
  - High cross section, highly dependent on polarization
- Use the official DBD samples.
- Include signal and SM processes: 2f, 4f, 6f and $\gamma\gamma$->hadrons.
- Analysis done for 100 fb^{-1} at each polarization

Polarization Measurement



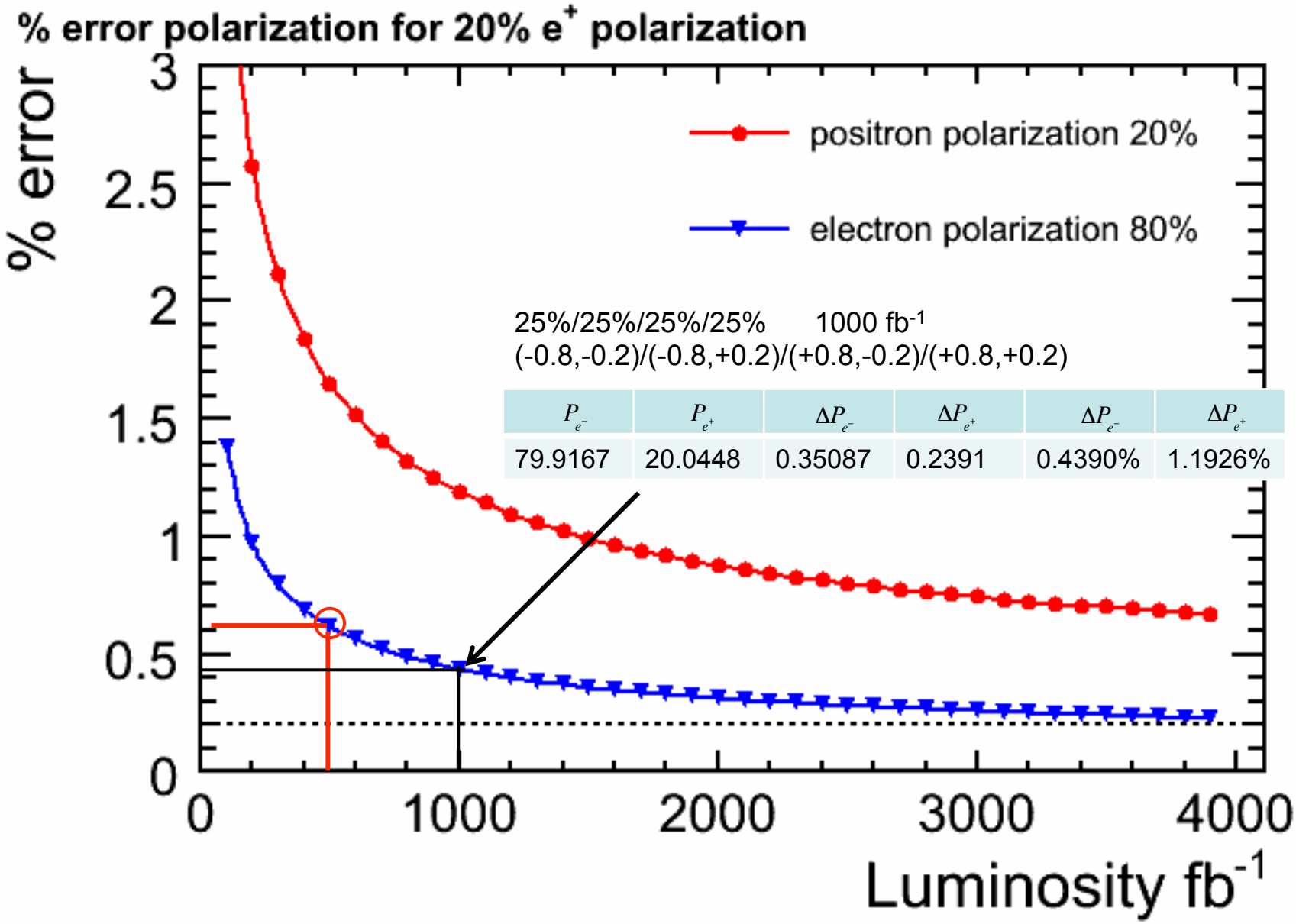
Blondel method with 400 fb^{-1} luminosity

25%/25%/25%/25%
(-0.8,-0.2)/(-0.8,+0.2)/(0.8,-0.2)/(0.8,0.2)



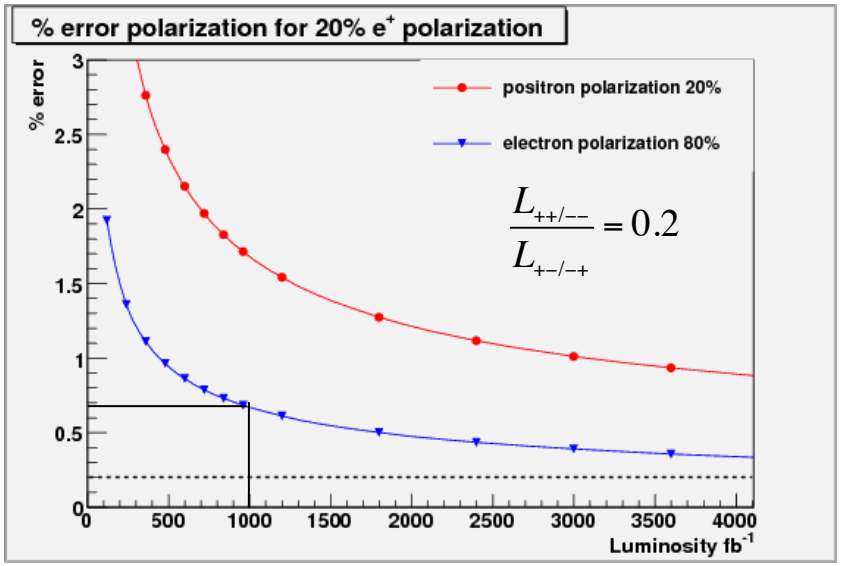
Reminder:
E_{cm} = 500 GeV

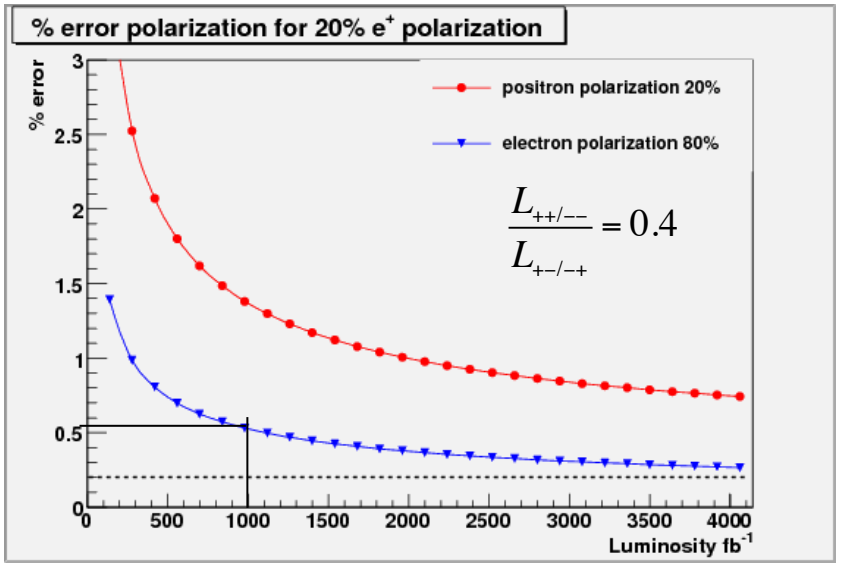
After Correction: Blondel Method

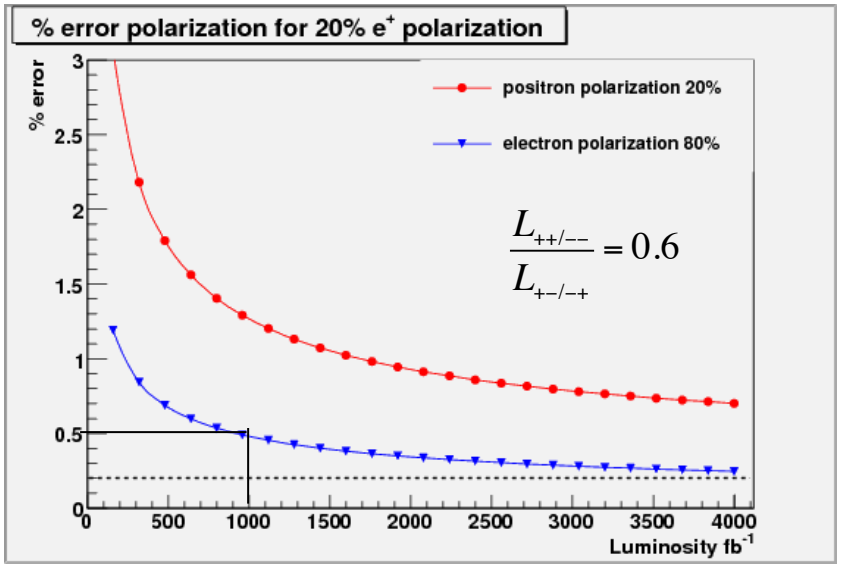


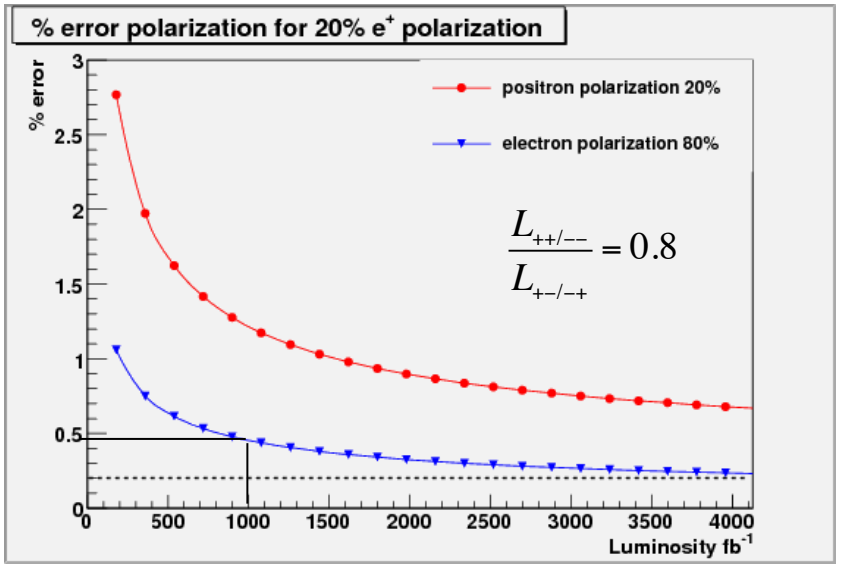
P_{e^-}	P_{e^+}	ΔP_{e^-}	ΔP_{e^+}	ΔP_{e^-}	ΔP_{e^+}
79.9167	20.0448	0.35087	0.2391	0.4390%	1.1926%

Luminosity not Equally Distributed

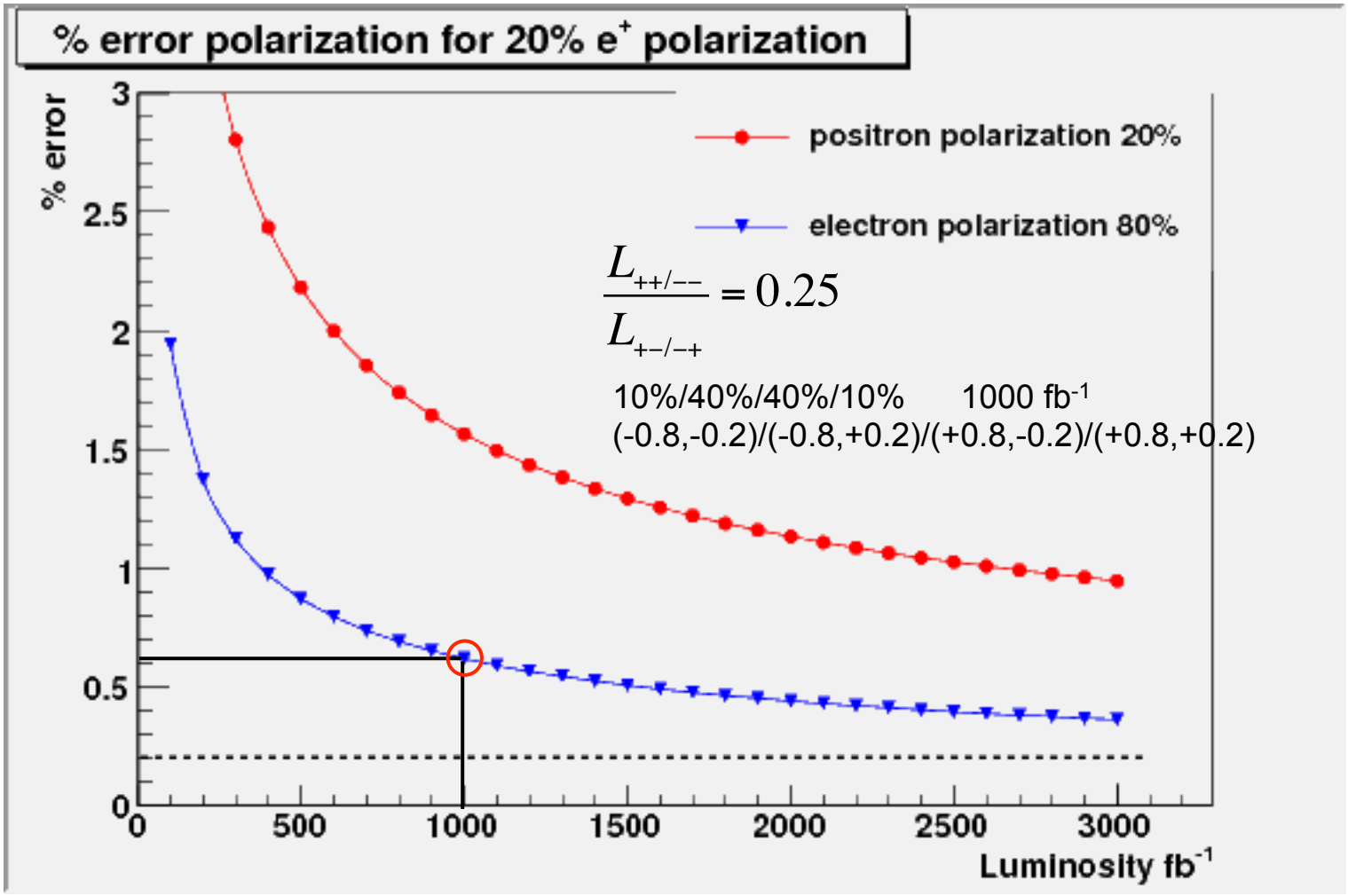








Lumi not Equal - Benchmark Point

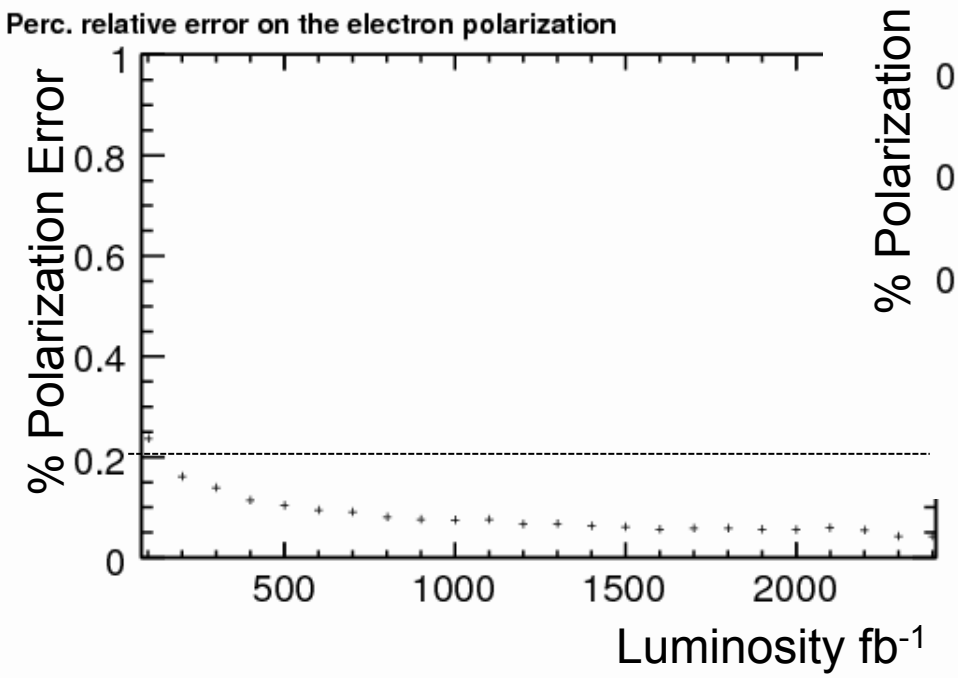


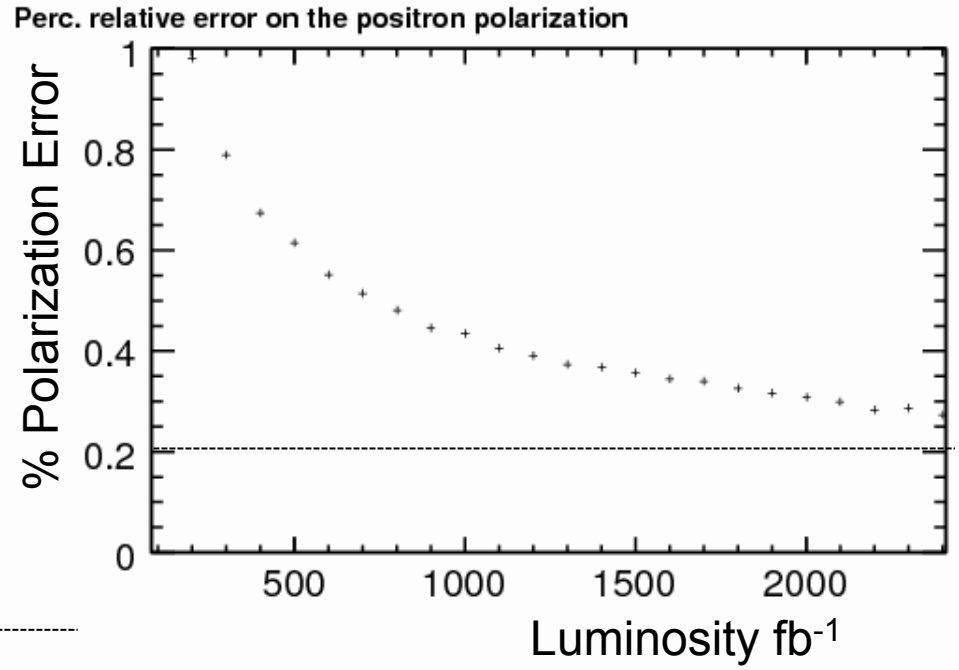
P_{e^-}	P_{e^+}	ΔP_{e^-}	ΔP_{e^+}	ΔP_{e^-}	ΔP_{e^+}
80.1012	19,8112	0.4939	0.3094	0.6166%	1.5616%

Angular Fit

First attempt:

- fit of the W production angle





Angular fit method with 1000 fb^{-1} luminosity

25%/25%/25%/25%
(-0.8,-0.2)/(-0.8,+0.2)/(+0.8,-0.2)/(+0.8,+0.2)

P_{e^-}	P_{e^+}	ΔP_{e^-}	ΔP_{e^+}	ΔP_{e^-}	ΔP_{e^+}
79.9942	19.9995	0.05959	0.08625	0.074%	0.431%

LC Note

LCNOTE 01-XXX
31th January 2013

Measurement of the beam polarization at the ILC using the WW annihilation data

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Abstract

An assesment of the achievable accuracy for the measurement of the longitudinal polarization of high energy electron and positron beams at the International Linear Collider operated at 1 TeV is presented. Two methods to measure the beam polarization from collision data are investigated: using a modified Blondel scheme with both beams polarized and using the semileptonic W-pair production process.

Outlook

- Include $\gamma\gamma$->fermions background
- Start to study the systematics for the polarization measurement
- Finalize the LC note on the polarization measurement
- Include TGC in the fit