Status Report on CP Violating TGC Coupling

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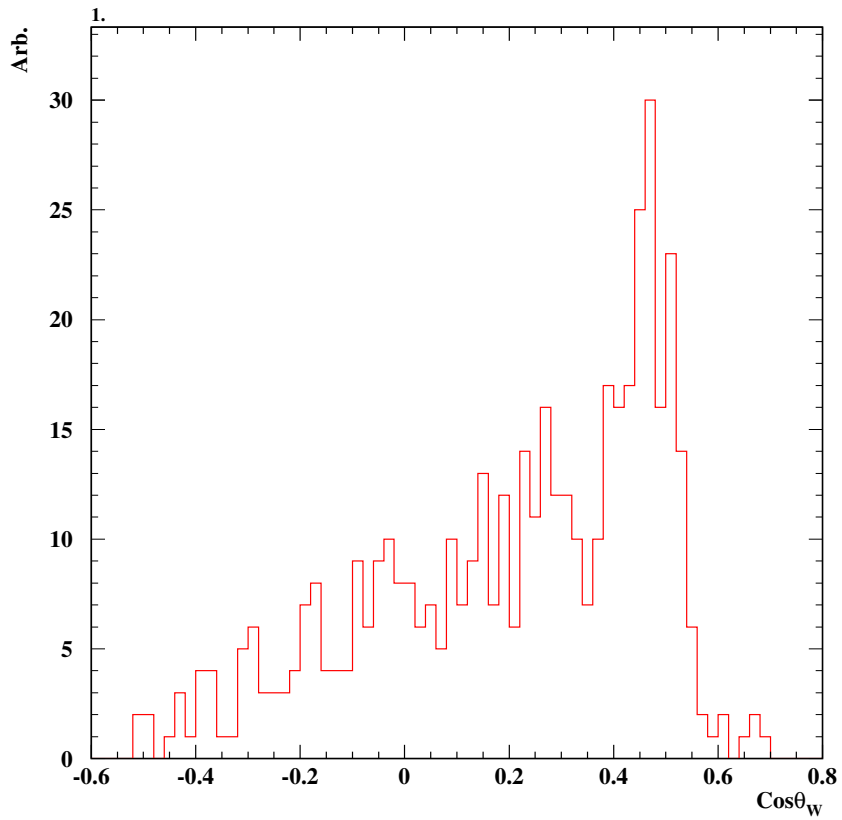
ERATO

Success at last!

I think I now understand what was going wrong.

W Production Angle

The W production angle given by ERATO looks like:



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There seem to be a cut! Why?

W Production Angle

I believe this is because we are only selecting event where:

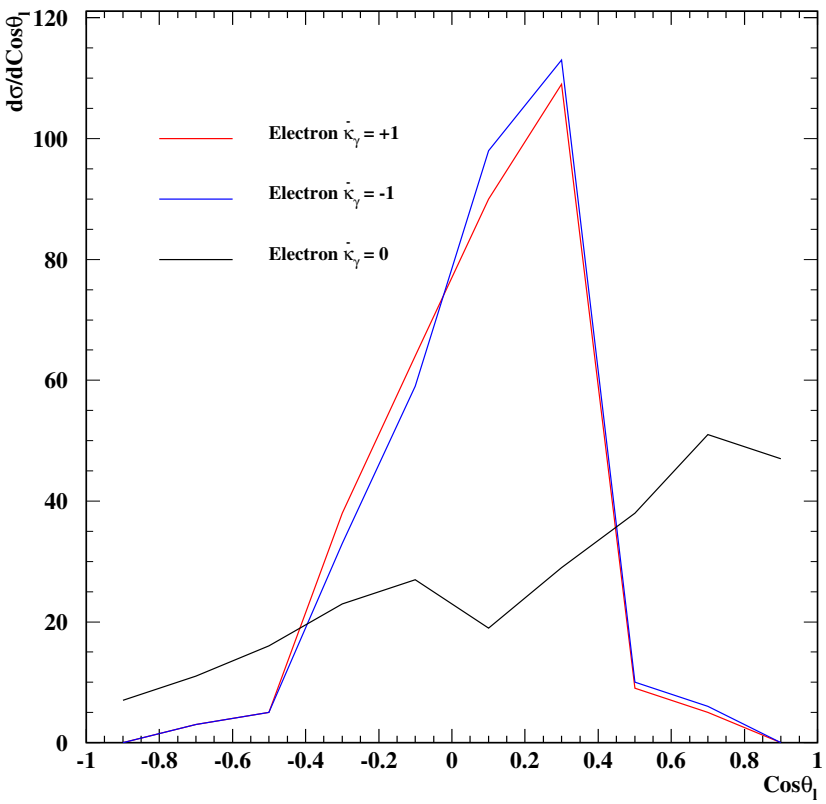
- Energy of Lepton $\geq$ 1GeV
- Lepton Angle $\leq$ 0.99999
- Jet Energy $\geq$ 3GeV
- Lepton-Jet Angle $\leq$ 0.99999
- Jet-Jet Mass^2 $\geq$ 25GeV

There are no cut directly on the W production angle. But purhaps these conspire to the select events where the W production angle is low. (I tried to get rid of all cuts the code doesn't like it, so I'll have to reduce them slowly and see what happens.)

Lepton Polar Angle Distributions

I have also solved the problem with the Lepton polar angle distributions for different anomalous couplings. The following plots show the lepton polar angle distributions for electrons/positrons with SM couplings and with CP-violating coupling ($\tilde{\kappa}_\gamma = \pm 1$ and $\tilde{\kappa}_Z = -\tilde{\kappa}_\gamma tan^2\theta_W$)

ELECTRONS



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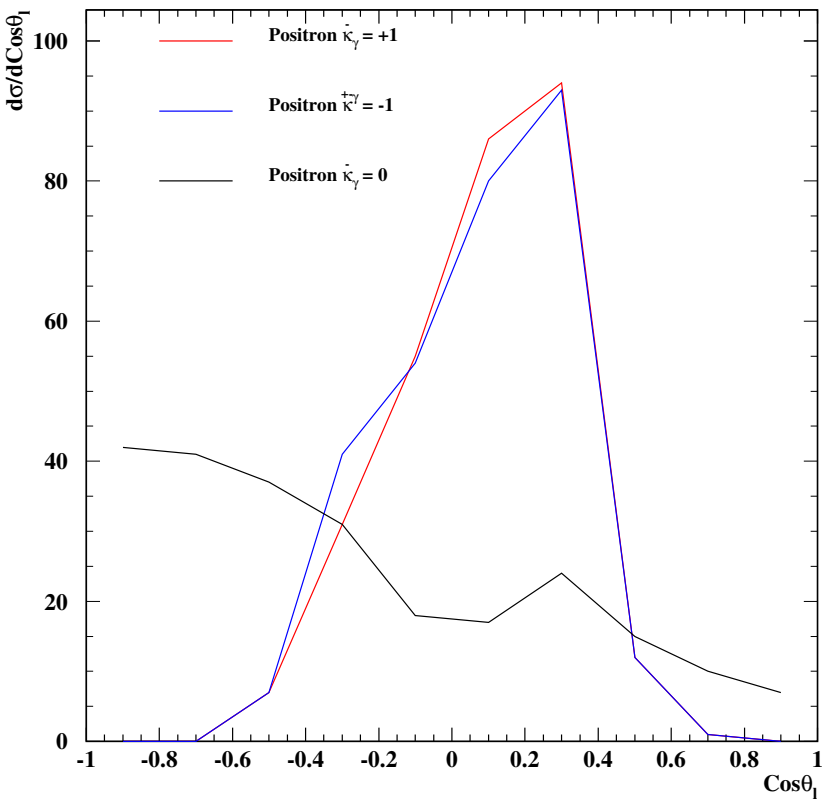
Lepton Polar Angle Distributions



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Note the CP-violating couplings change the distribution quite dramatically, as expected. But what about the

Asymmetries!

Aysmmetries

SM Asymmetry

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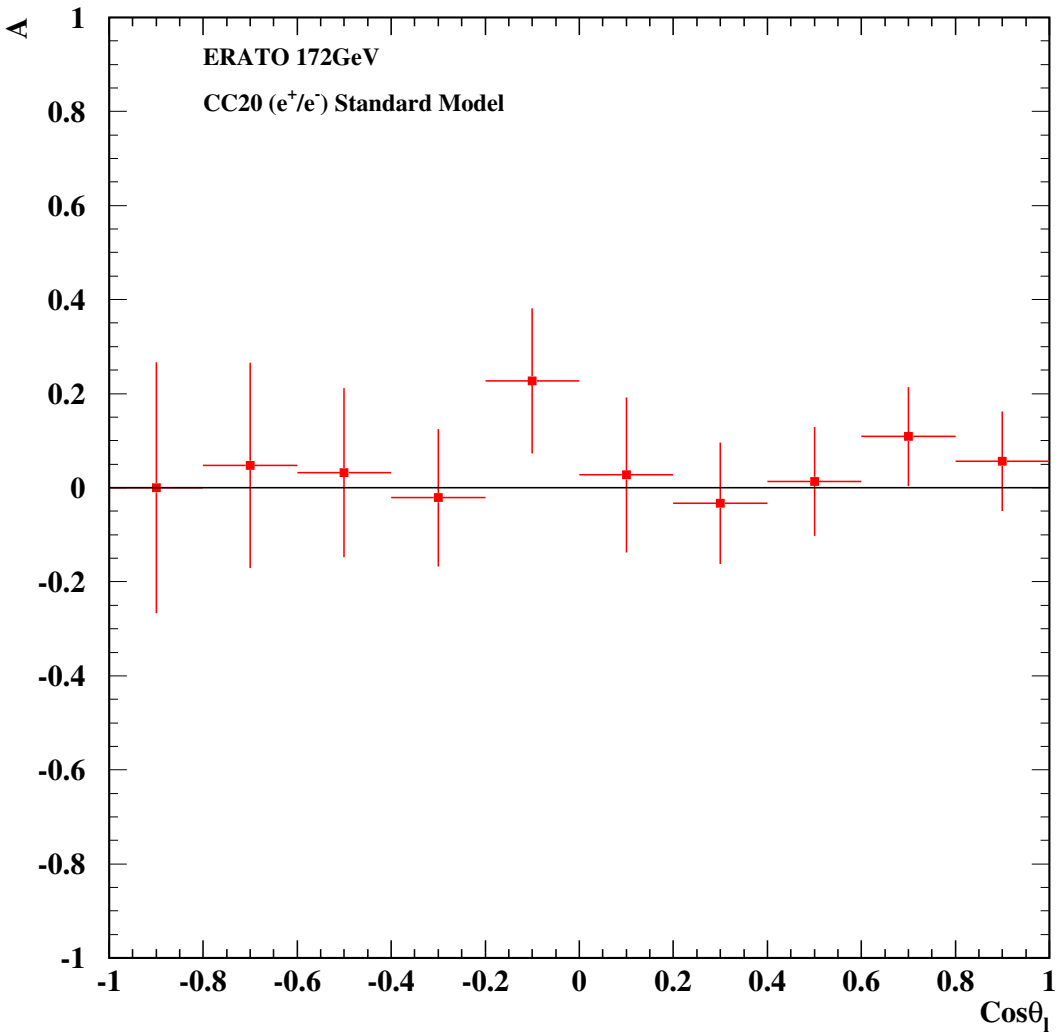

Flat as expected.

Aysmmetries

$\tilde{\kappa}_\gamma = +1$ and $\tilde{\kappa}_Z = -\tilde{\kappa}_\gamma tan^2\theta_W$ Asymmetry

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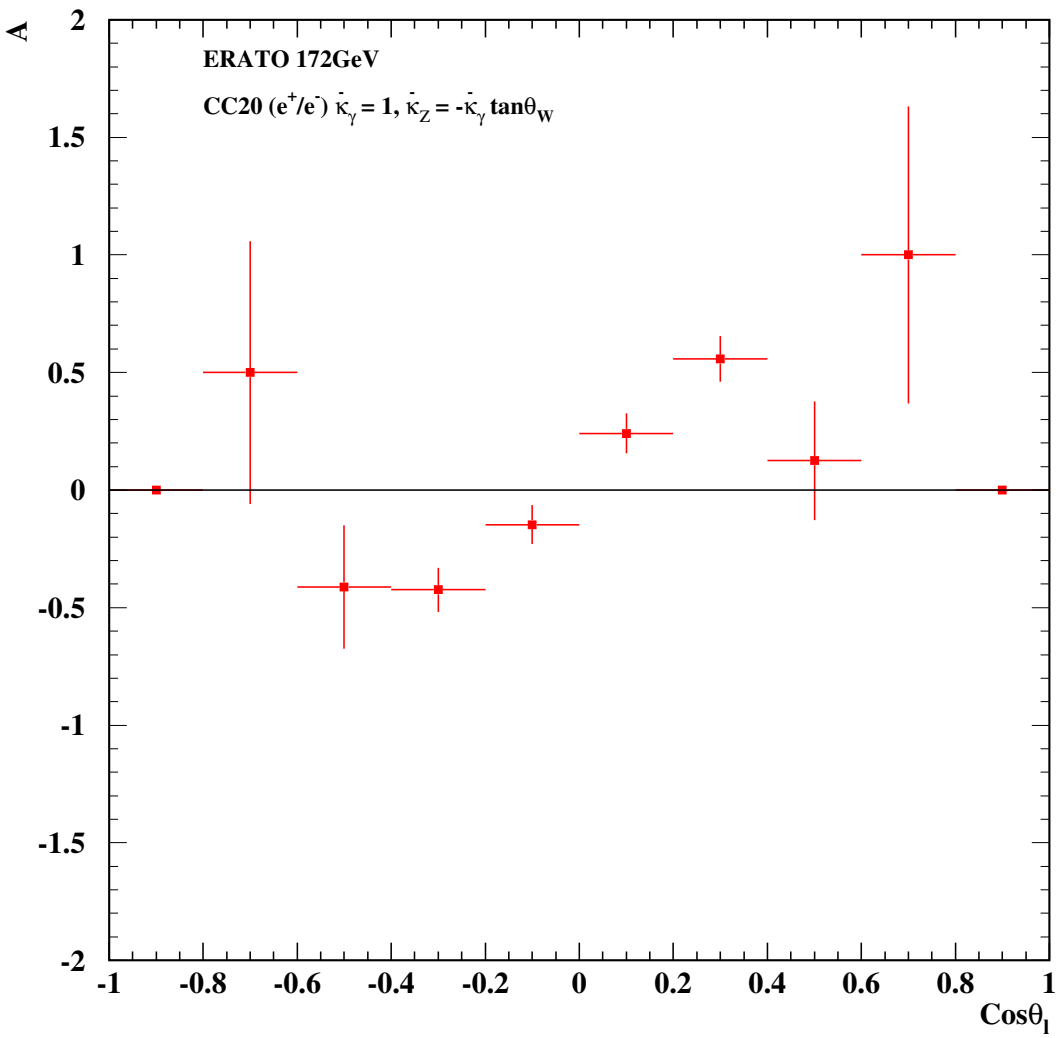

NOT FLAT

Aysmmetries

$\tilde{\kappa}_\gamma = -1$ and $\tilde{\kappa}_Z = -\tilde{\kappa}_\gamma tan^2\theta_W$ Asymmetry

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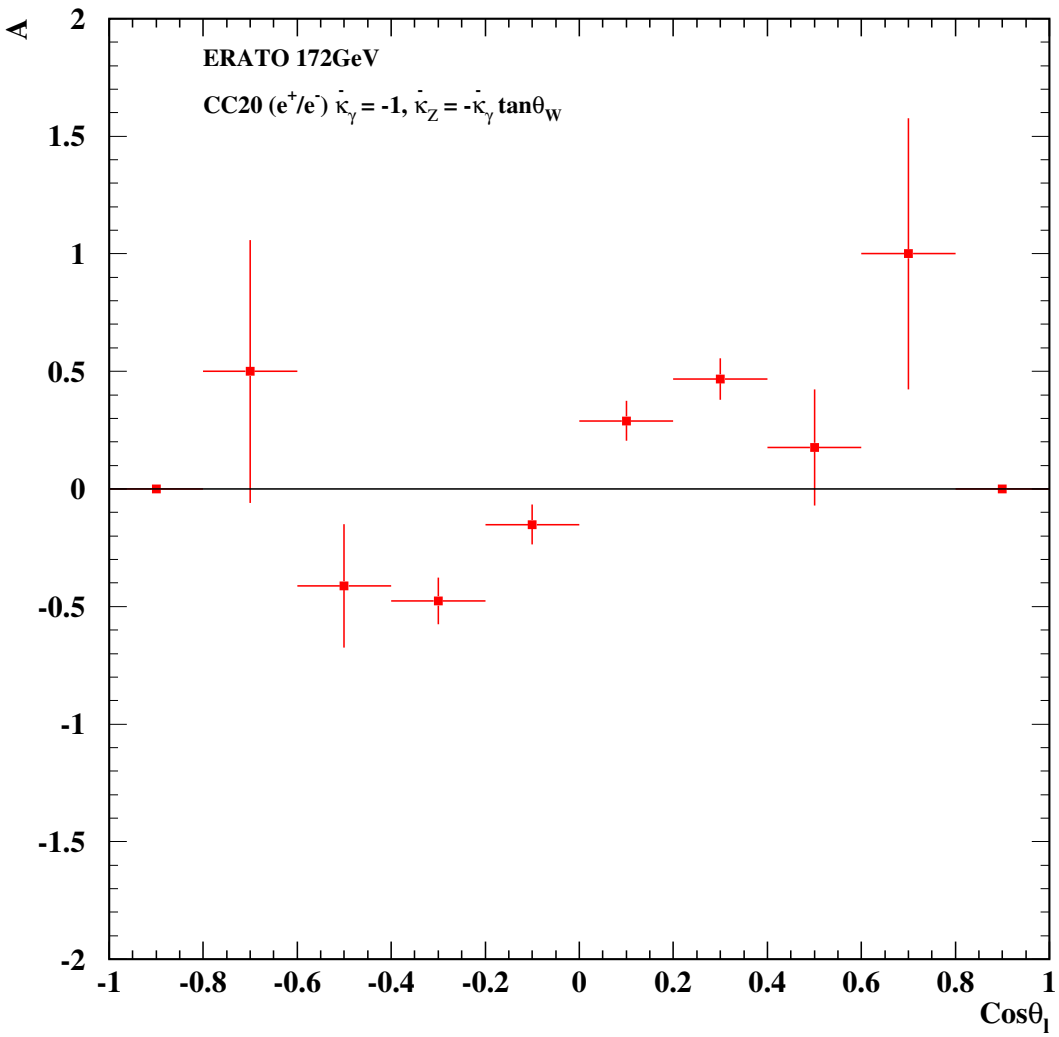

NOT FLAT (But the same as the last one!)

Summary

- I think I've got ERATO working.
- Need to understand exactly what every CP-violating parameter is. e.g in the asymmetry paper $\tilde{\kappa}_\gamma = \tilde{\kappa}_Z$ but this is not the case in ERATO.
- Find out which CP-violating parameters we are sensitive to by generating lots of events with different coupling.