TGC Measurement in $e^+e^- \to W^+W^- \to 4q$ using total σ and angular distributions

B. P. Kerševan

"Jožef Stefan" Institute

Ljubljana

DELPHI week
CERN, June 23^{rd}, 1998

Method

Motivation:

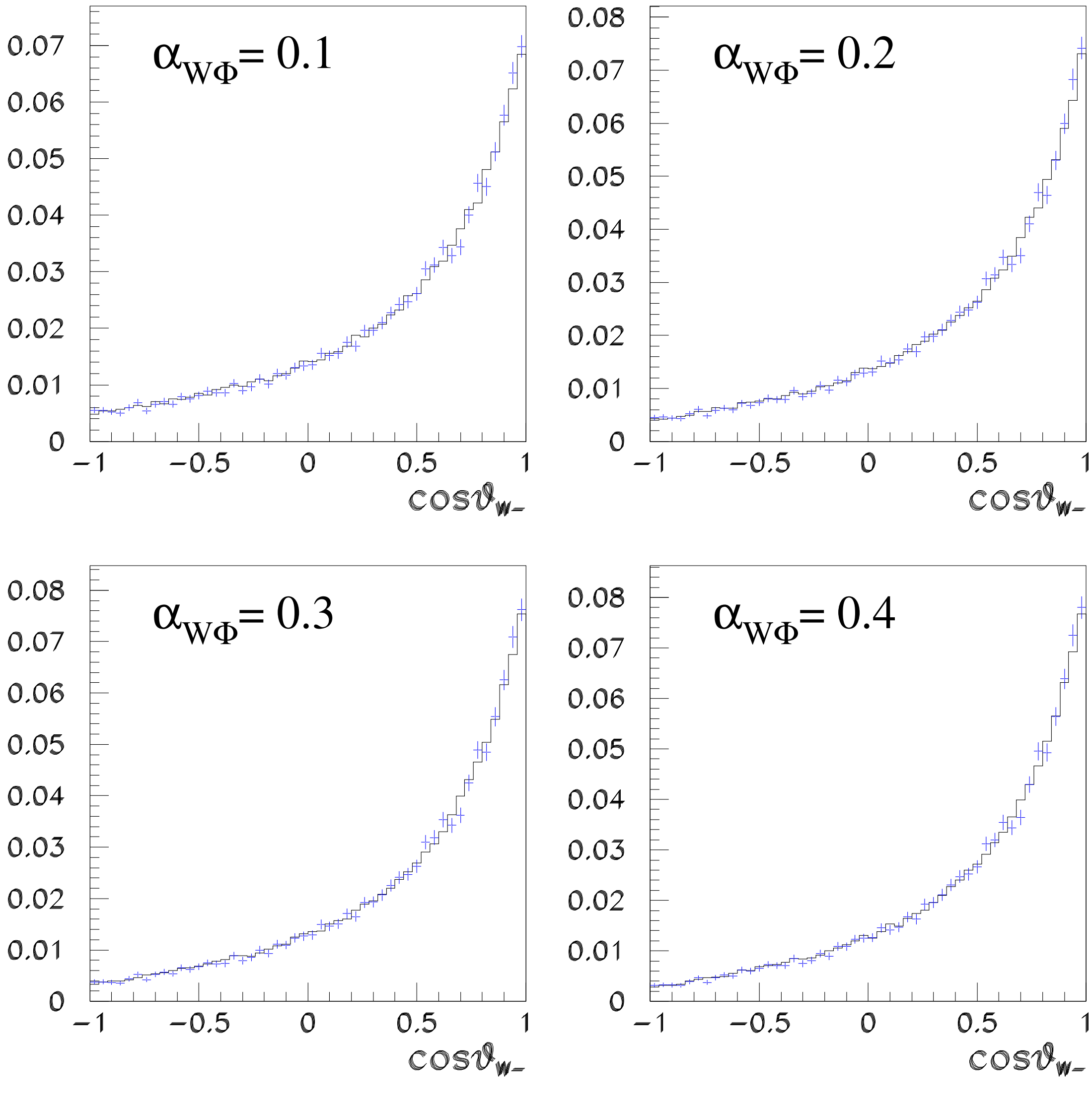
Determine the contributions from the cross-section and the angular distributions separately

Method:

- Re-weighting technique
- Event selection
- Determining TGC's from angular distributions
- Determining TGC's from the total cross-section
- Combined results
- Conclusion

Re-weighting technique

- There are no fullsim simulated data available except for the values $\alpha = \pm 1$.
- $\mathrm{EXCALIBUR}$ event generator was used to determine the dependence of the total cross-section on the TGC's
- Simulated data from PYTHIA were re-weighted with weights from generated angular distributions by$\mathrm{EXCALIBUR}$

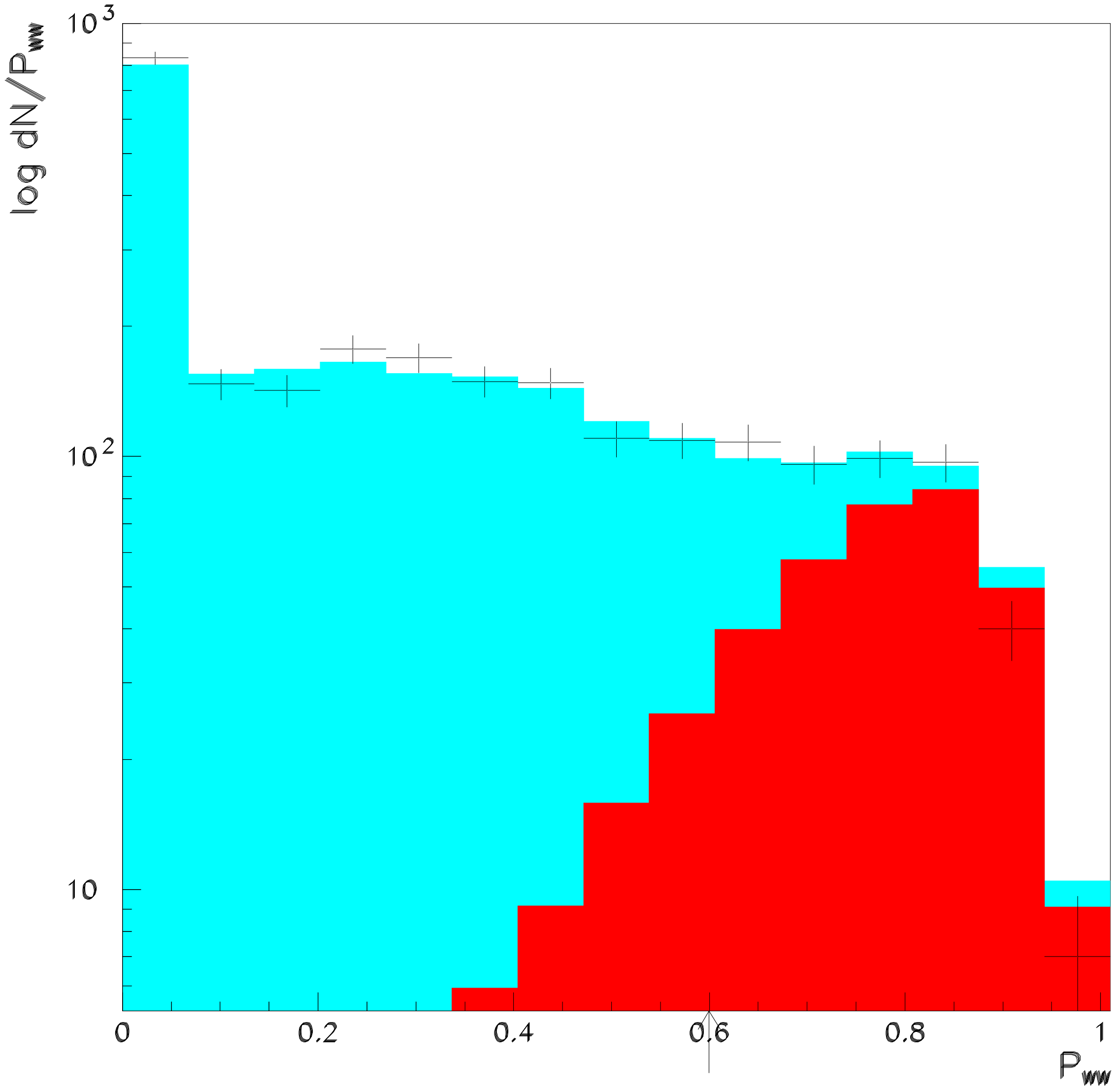


Agreement of EXCALIBUR generated distributions (histogram) with re-weighted PYTHIA (error bars)

Event Selection

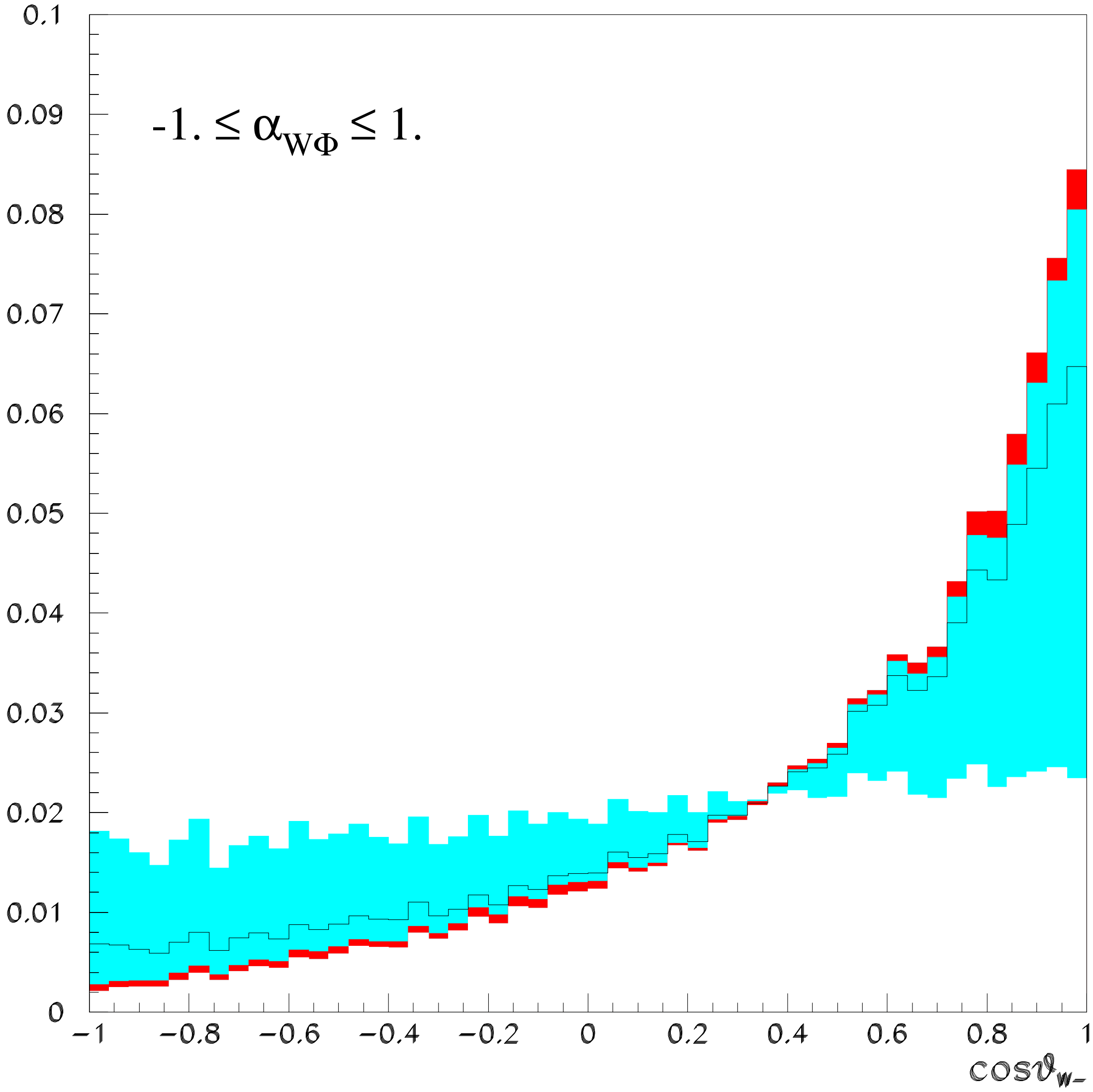
- Standard track selection
- Probabilistic approach (also used in V_{cs} measurements)
- Several kinematical distributions were combined into one final separator P_{WW}

Distribution of events according to P_{WW} separator. Distribution of the signal is drawn in red and the measured data is drawn with error bars.

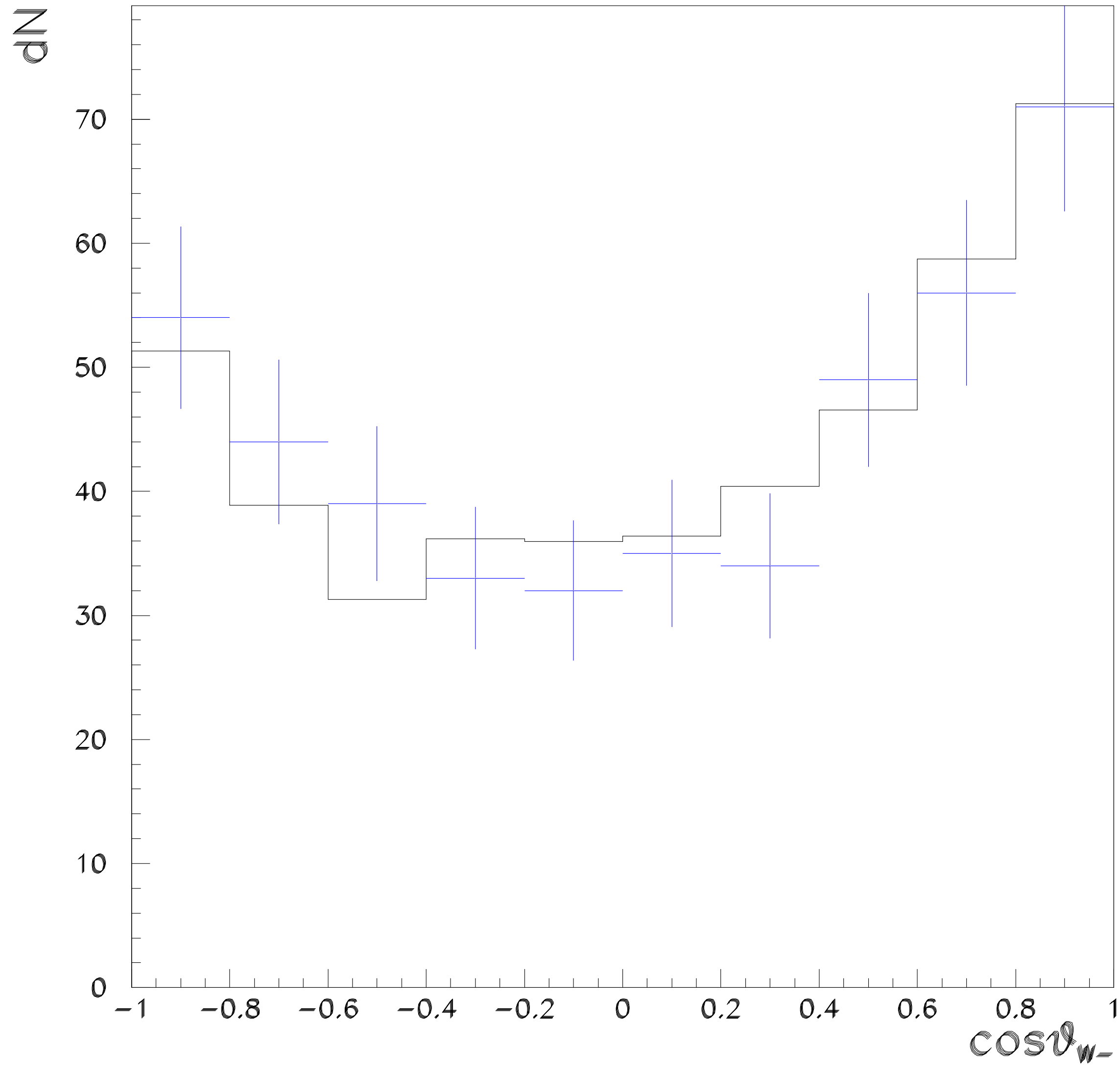


We cut at $P_{WW} = 0.6$ (arrow): η ~82%, Pur ~69%. 447 measured events survive the cut.

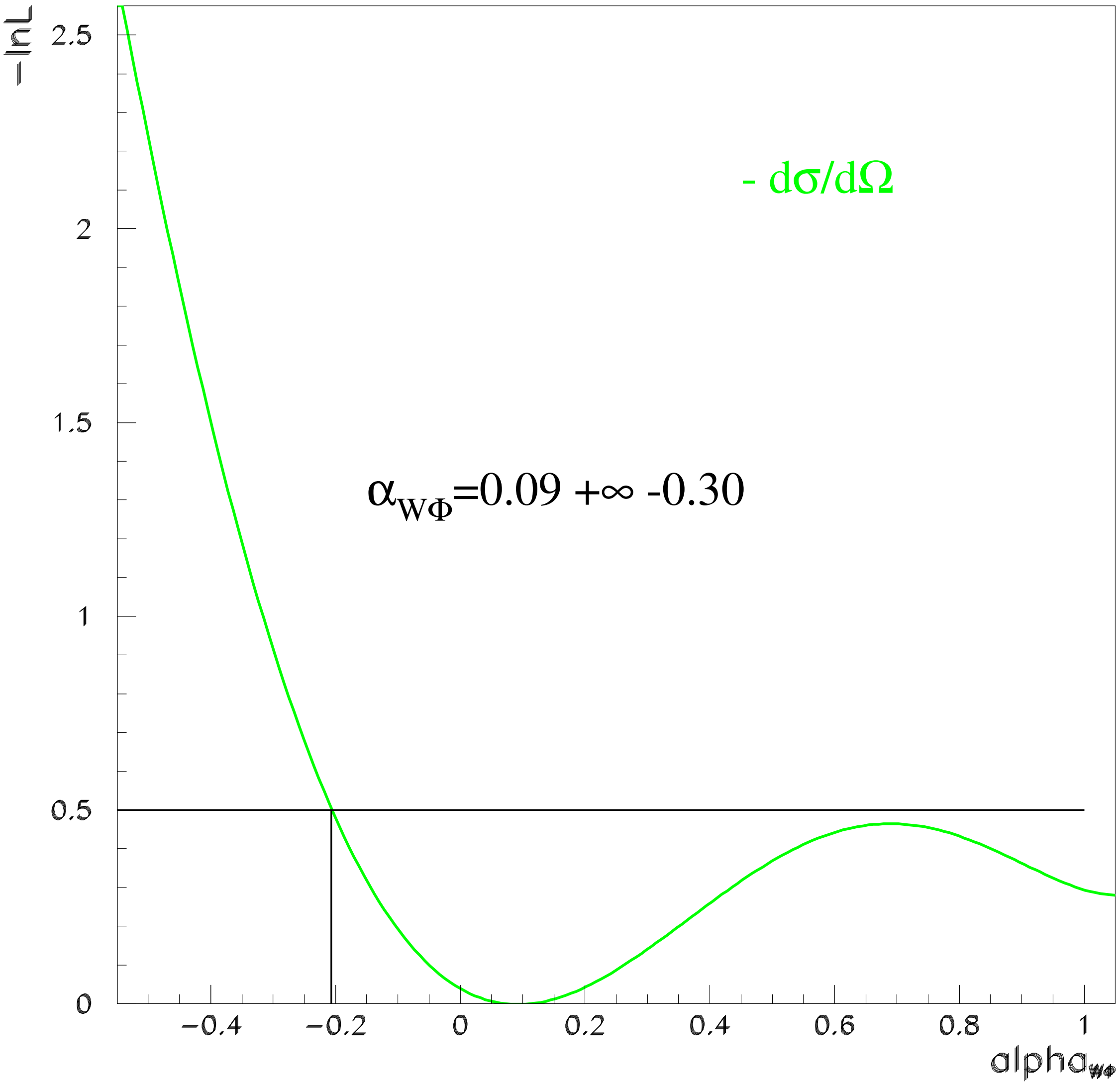
Angular distributions



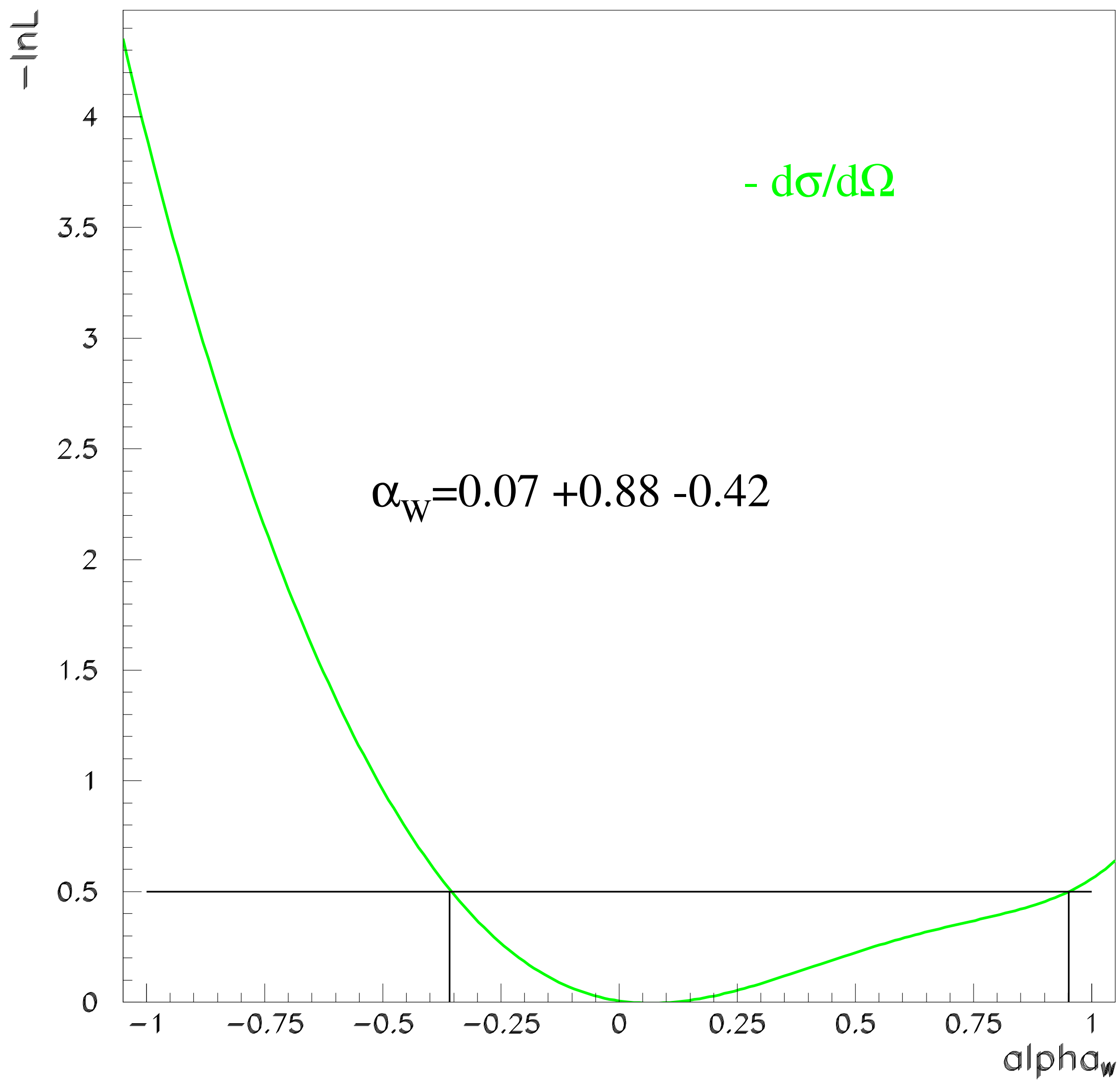
Dependence of the angular distributions on $\alpha_{W\Phi}$. The interval between 0.5 and 1 in $\alpha_{W\Phi}$ is drawn in red.



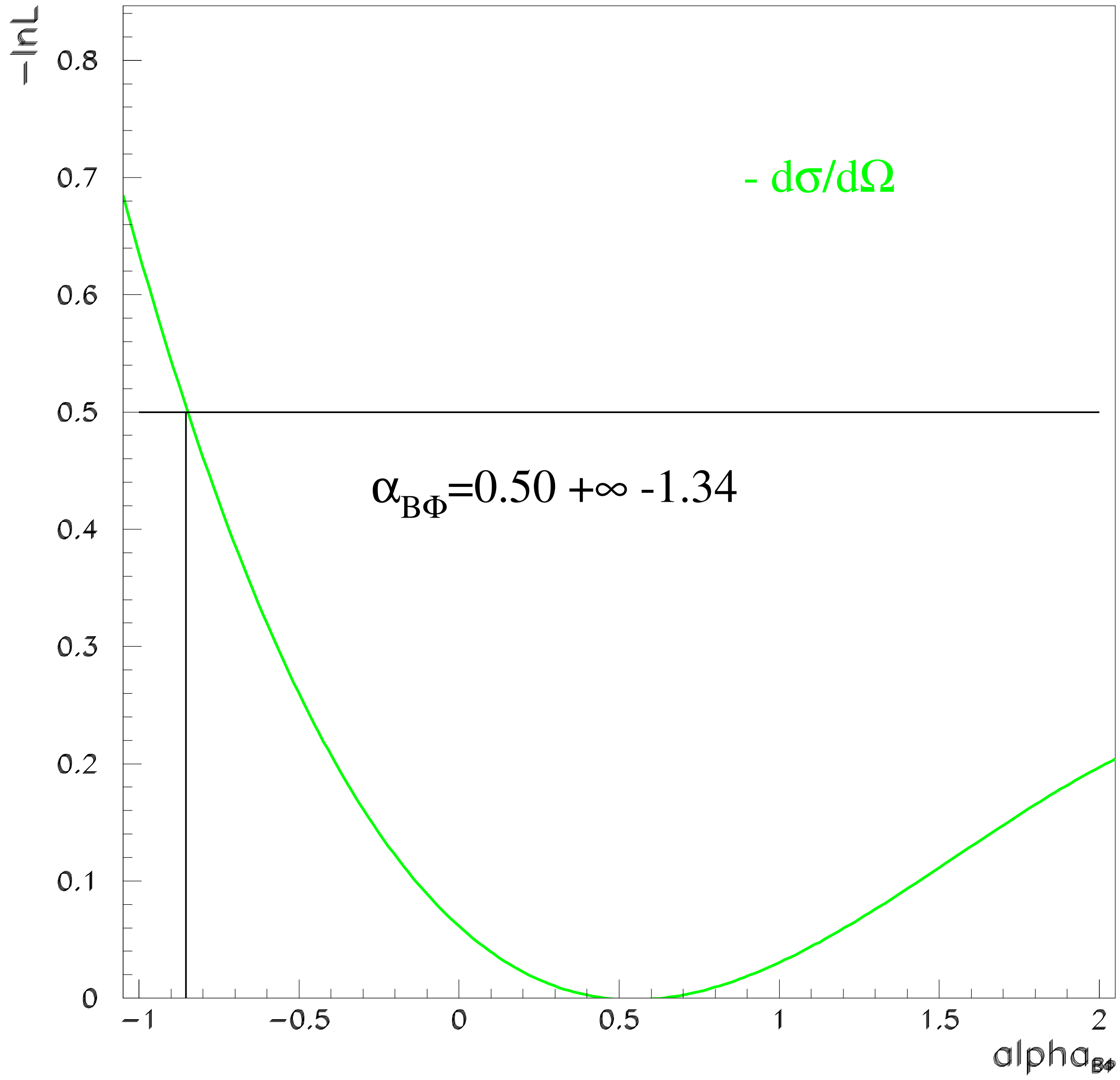
Simulated distribution for $\alpha_{W\Phi} = 0.1$ (histogram) and data (error bars).



Log likelihood for distribution dependence on $\alpha_{W\Phi}$.

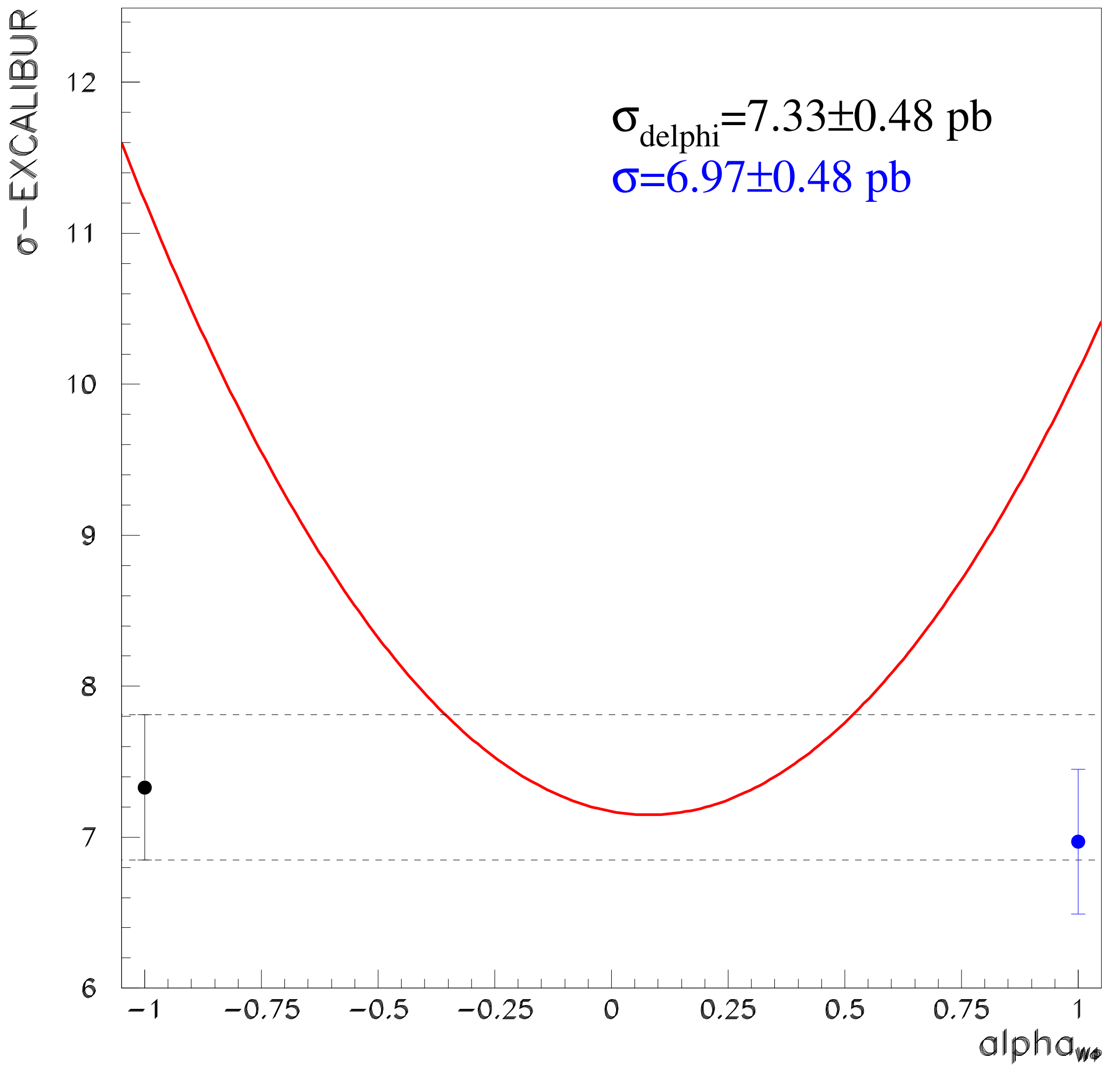


Log likelihood for distribution dependence on α_W.

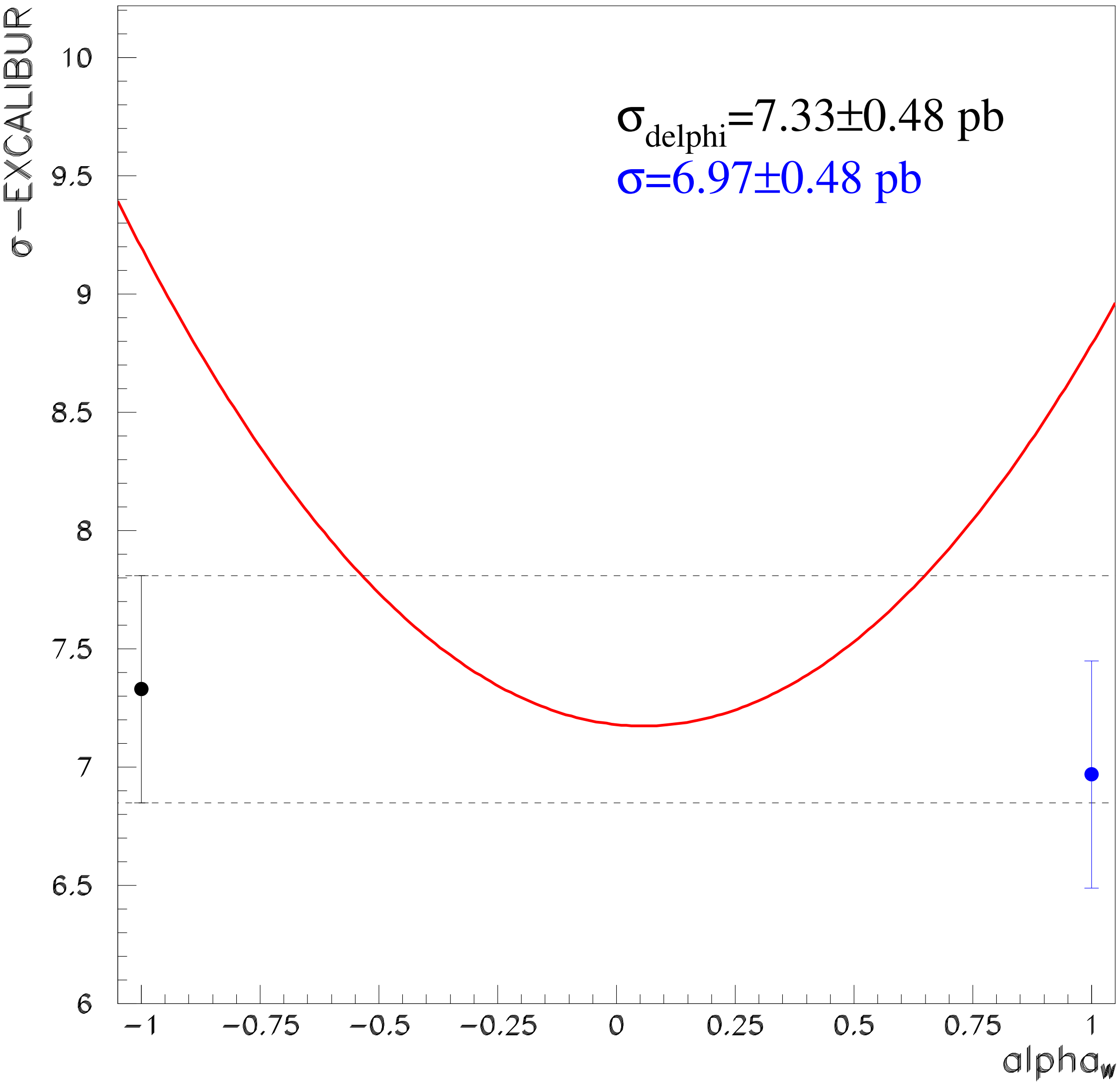


Log likelihood for distribution dependence on $\alpha_{B\Phi}$.

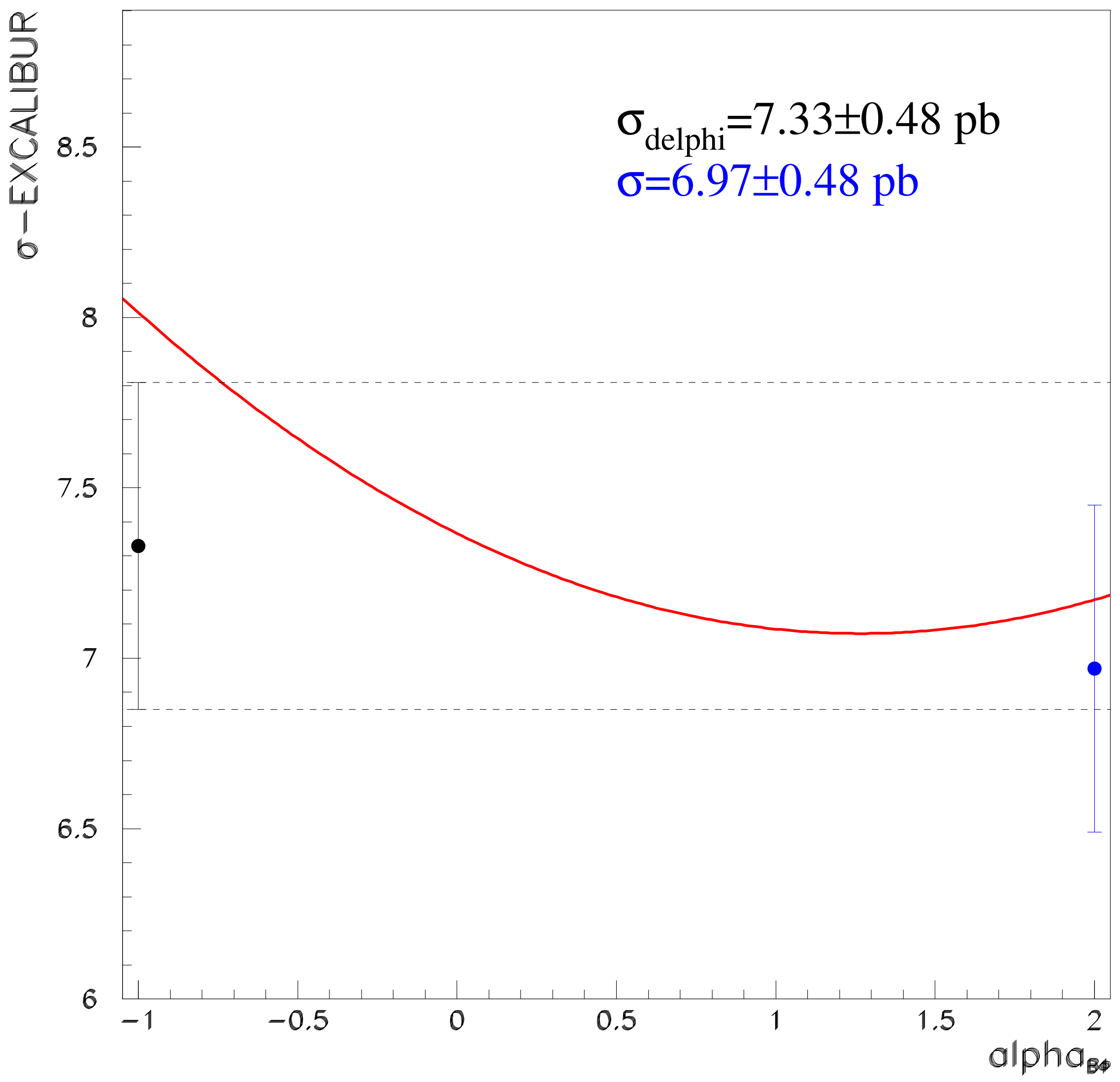
$4q$ cross-section



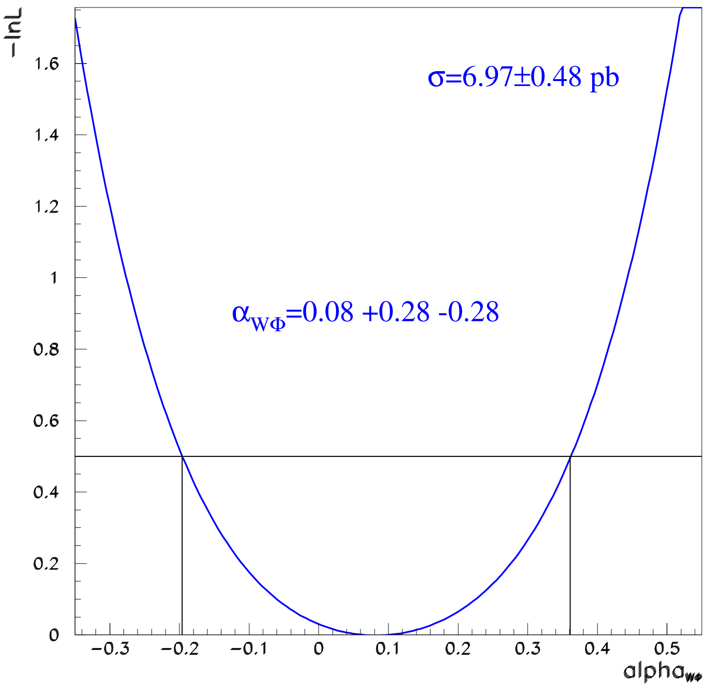
Cross-section dependence on $\alpha_{W\Phi}$.

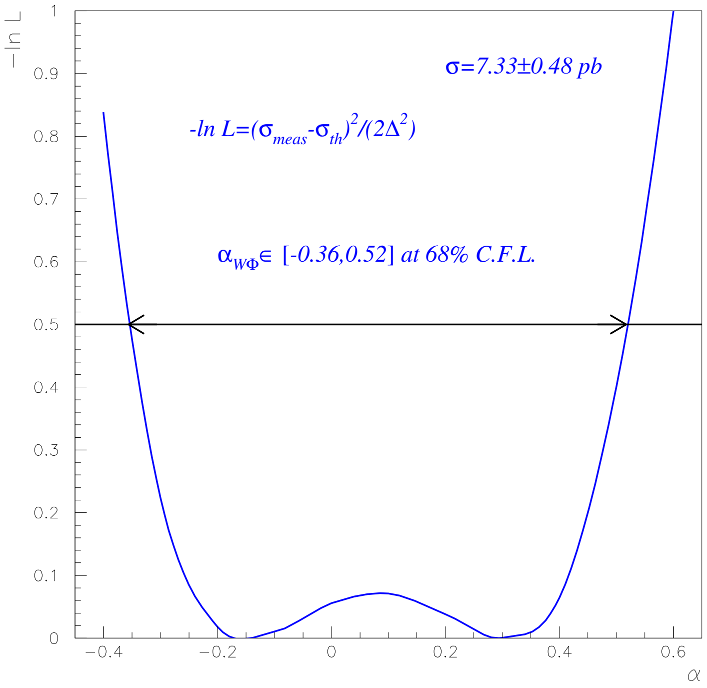


Cross-section dependence on α_W.

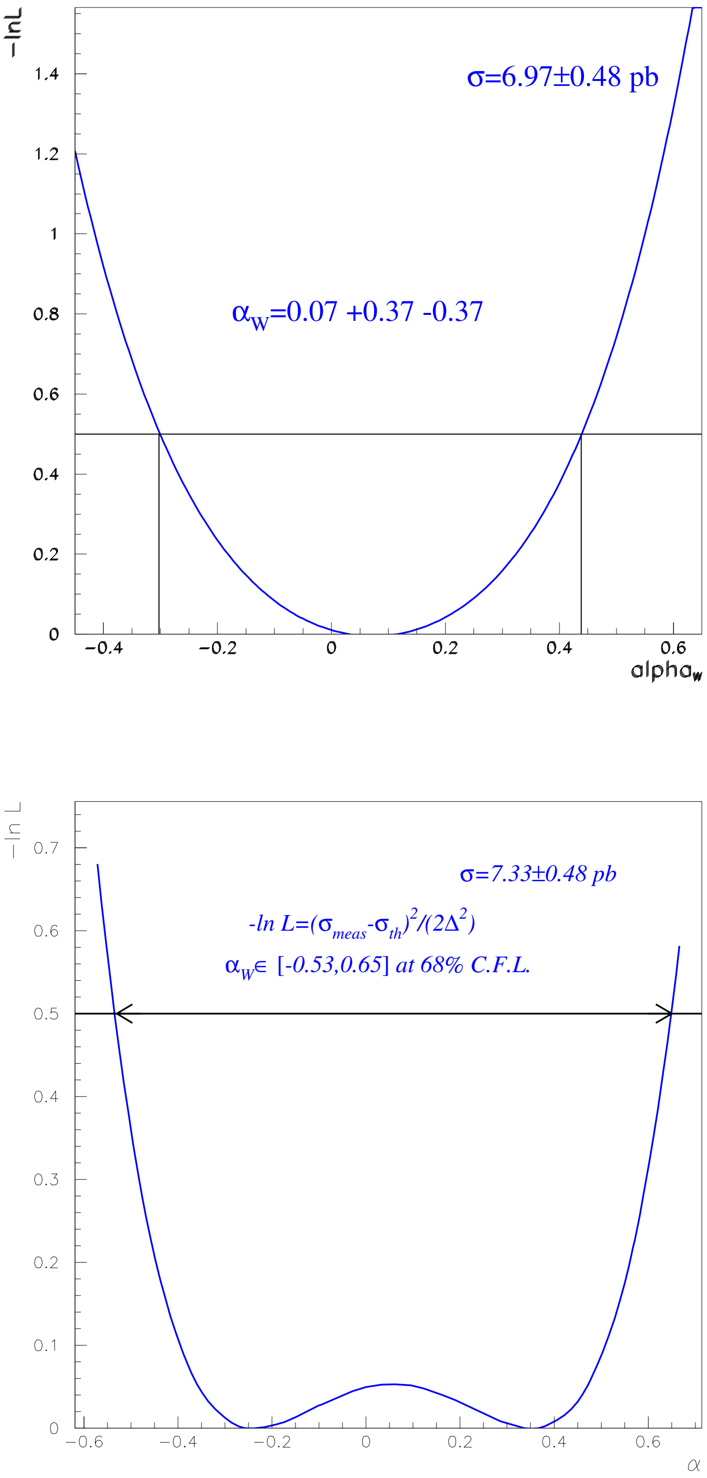


Cross-section dependence on $\alpha_{B\Phi}$.

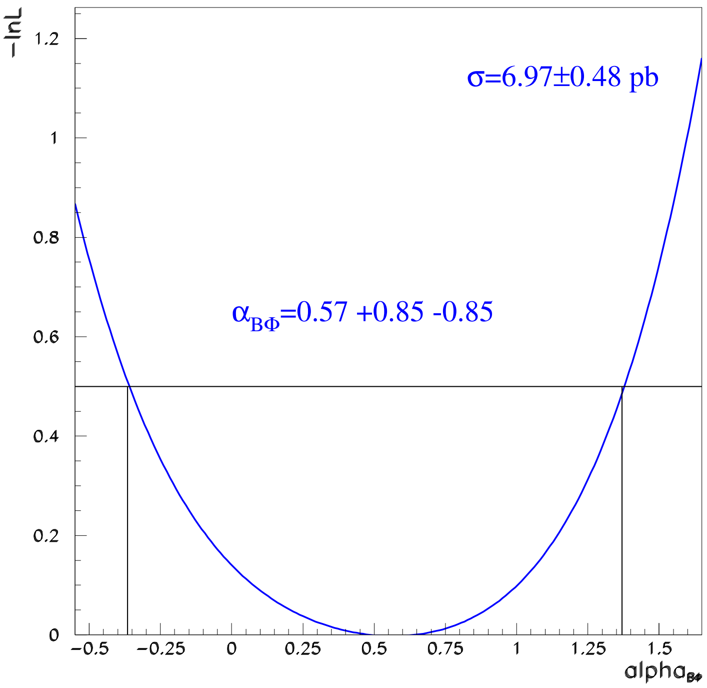


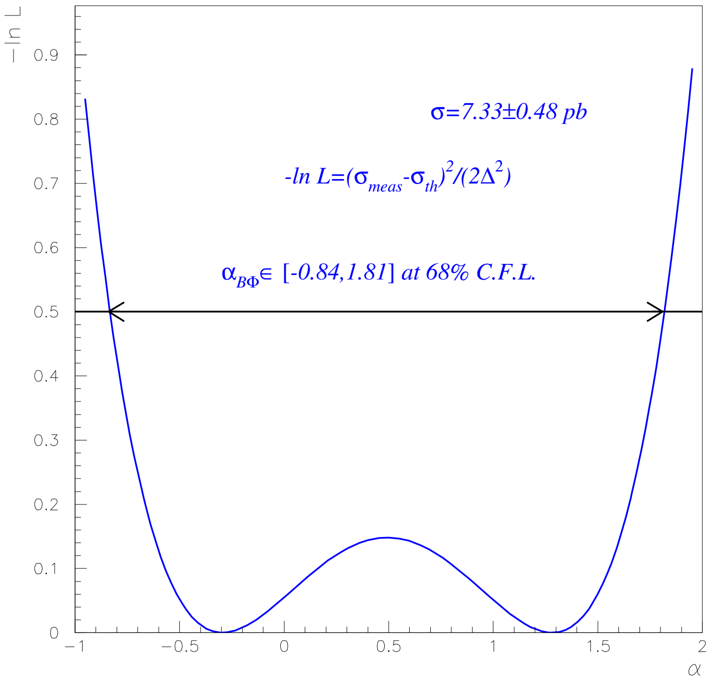


Log likelihood for cross-section dependence on $\alpha_{W\Phi}$.



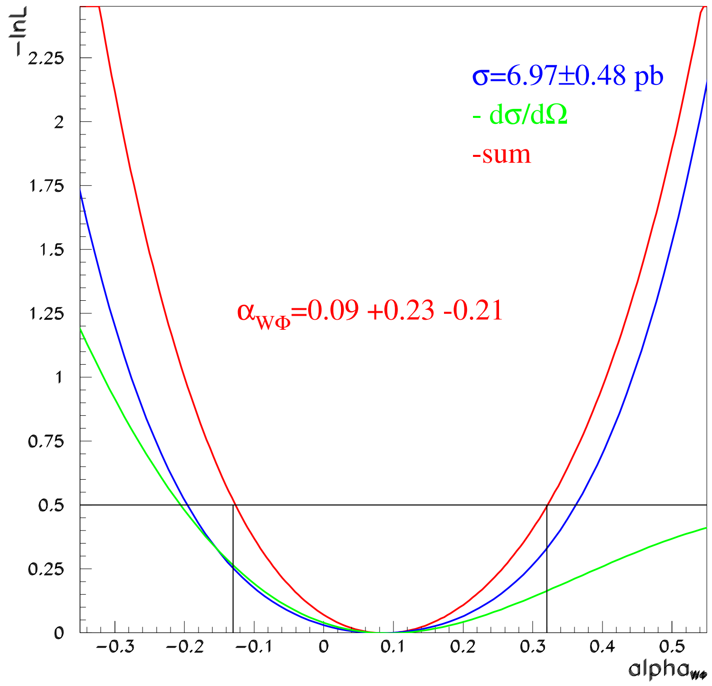
Log likelihood for cross-section dependence on α_W.

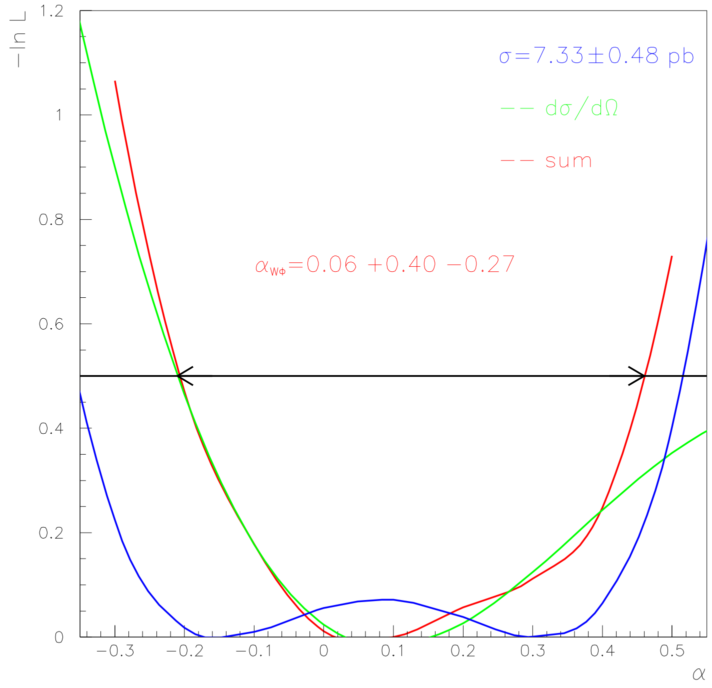


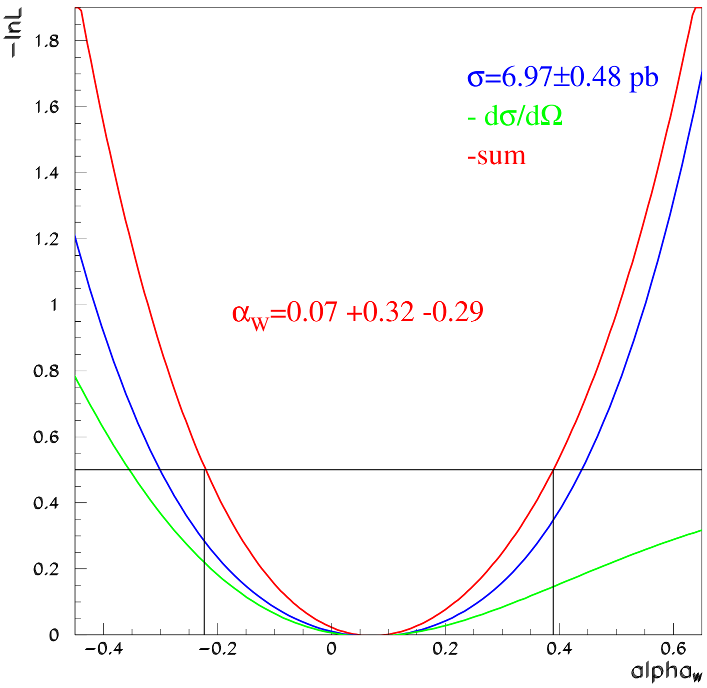


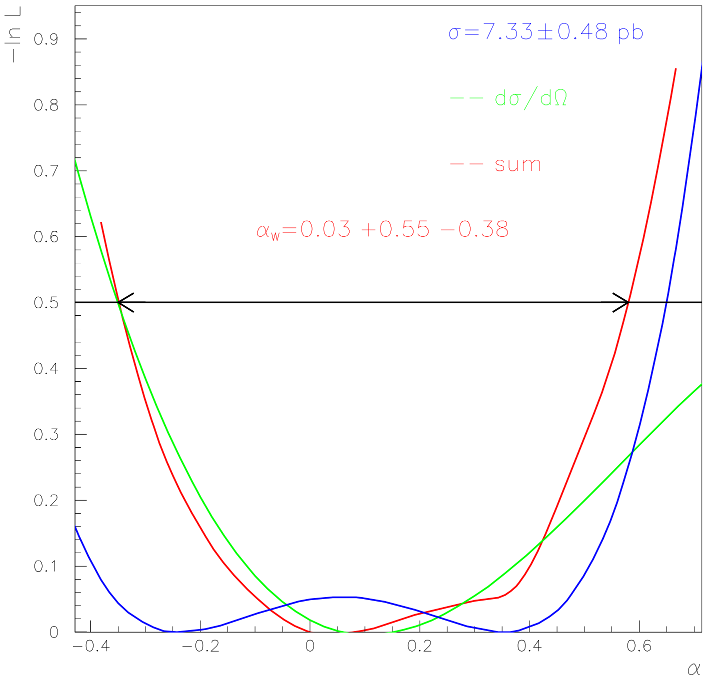
Log likelihood for cross-section dependence on $\alpha_{B\Phi}$.

Combined results

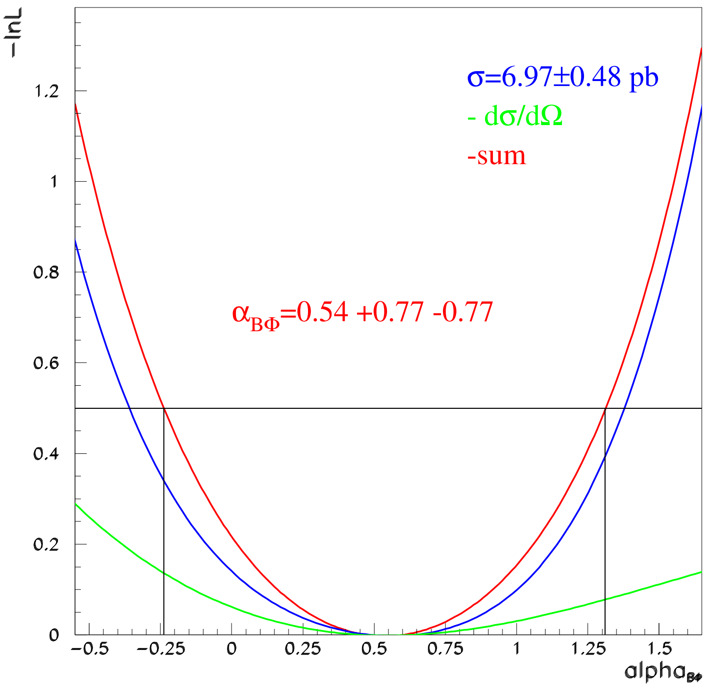


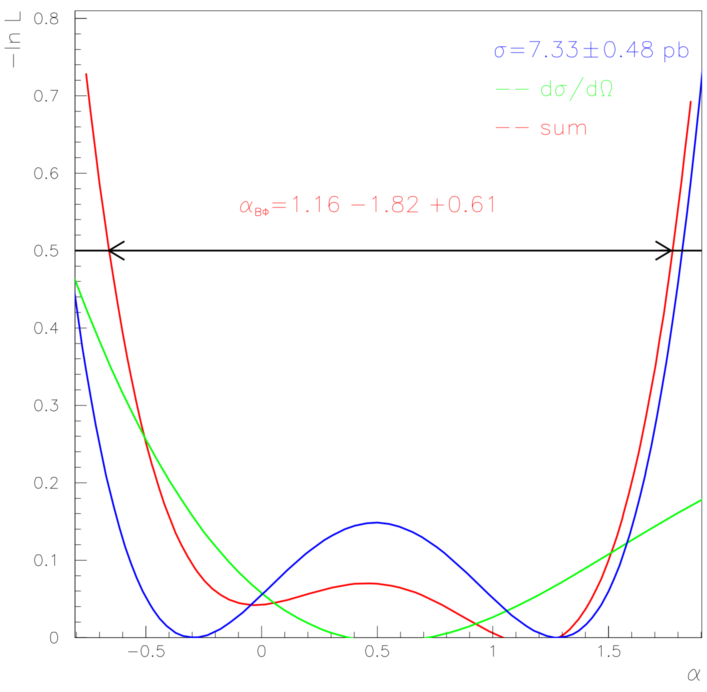






Combined log likelihood for α_W using distribution and cross-section dependence.





Combined log likelihood for $\alpha_{B\Phi}$ using distribution and cross-section dependence.

Conclusion

Results:

method	$\alpha_{W\Phi}$	α_W	$\alpha_{B\Phi}$
distribution	0.09 $+ \infty$ - 0.30	0.07 $+$ 0.88 - 0.42	0.50 $+ \infty$ - 1.34
σ	0.08 $+$ 0.28 -0.28	0.07 $+$ 0.37 - 0.37	0.57 $+$ 0.85 - 0.85
combined	0.09 $+$ 0.23 - 0.21	0.07 $+$ 0.32 -0.29	0.54 $+$ 0.77 - 0.77
comb - σ_{del}	0.06 $+$ 0.40 - 0.27	0.03 $+$ 0.55 - 0.38	1.16 $+$ 0.61 - 1.82

To do:

- Transition to the new set of TGC's
- Systematics