Language Barrier

Hadron Colliders

- Assume Lorentz, C, P, $\mathrm{U(1)_{EM}}$ invariance
- 5 parameters: g_1^Z, λ_γ, λ_Z, κ_γ, κ_Z
- Measure $WW\gamma$ with $W\gamma$ final states
- Measure linear combinations of $WW\gamma$ and WWZ couplings with WW final states

LEP2

- In addtion, assume SU(2)×U(1) gauge invariance (for dimension 6 operators, see Zeppenfeld talk)
- same as HISZ relations:

$$\lambda_\gamma = \lambda_Z$$

$$\Delta\kappa_Z = -\Delta\kappa_\gamma \tan^2\theta_W + \Delta g_1^Z$$

- 5 parameters → 3 paramters:

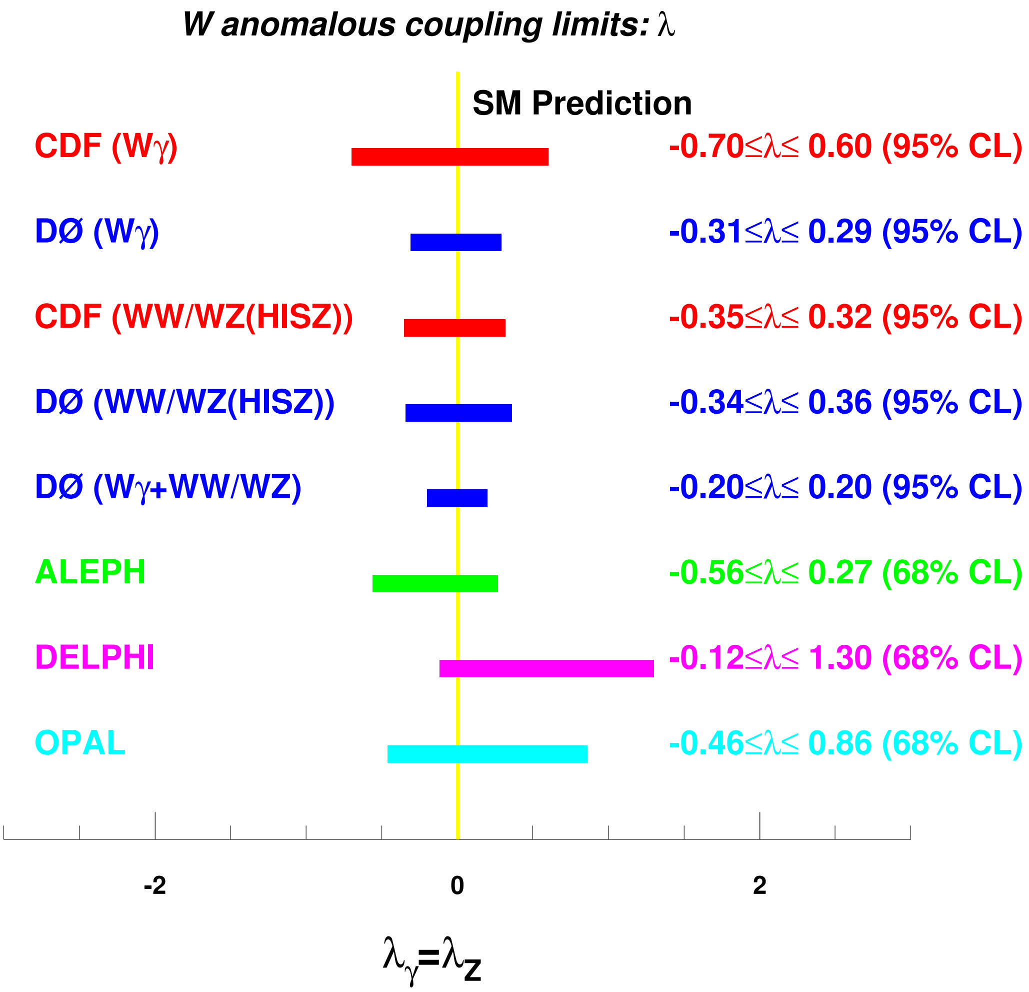
$$\alpha_{W\phi} = \Delta g_1^Z \cos^2\theta_W$$

$$\alpha_{B\phi} = \Delta\kappa_\gamma - \Delta g_1^Z \cos^2\theta_W$$

$$\alpha_W = \lambda_\gamma$$

- Measure linear combinations of $WW\gamma$ and WWZ couplings with WW final states

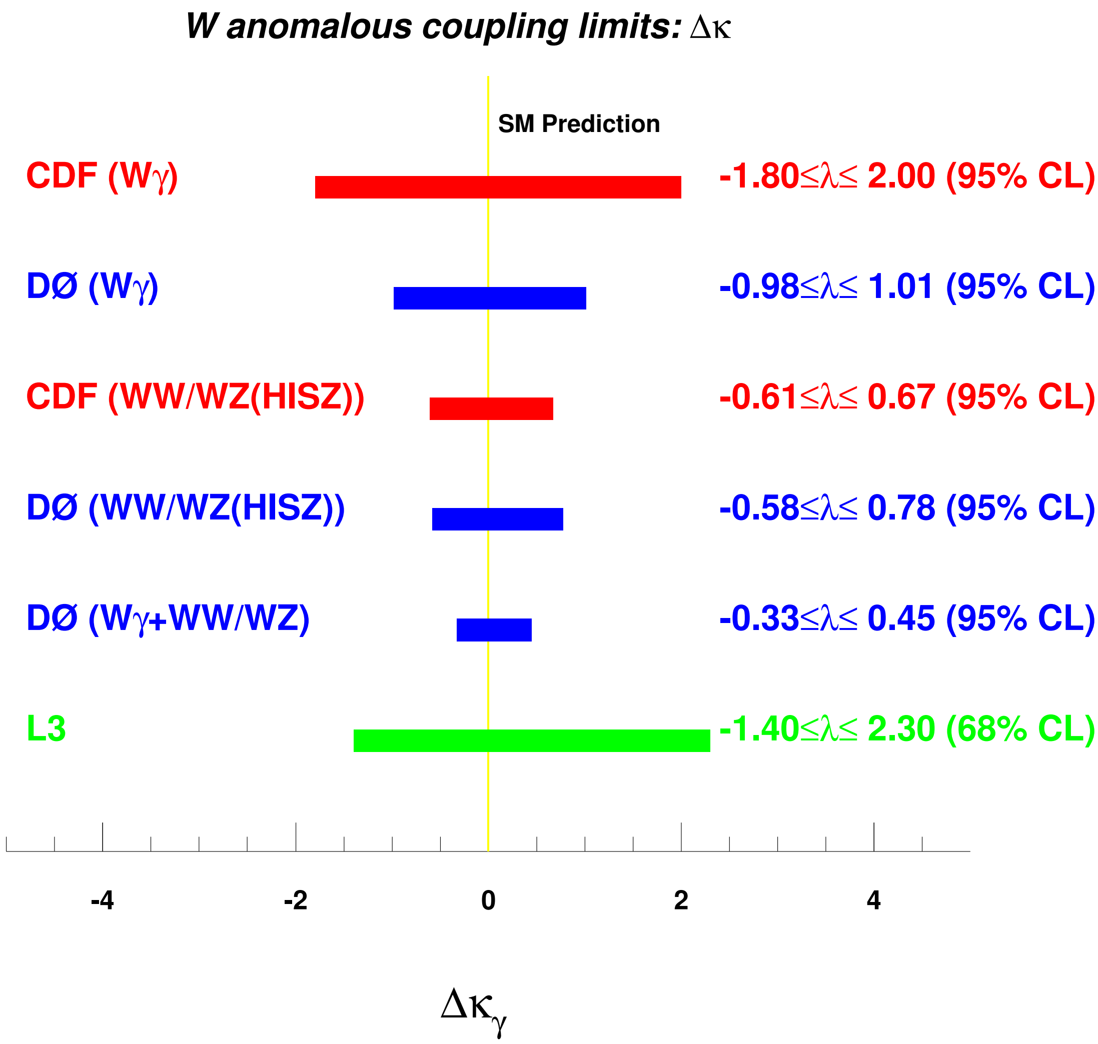
$WW\gamma$ and WWZ couplings



Caution:

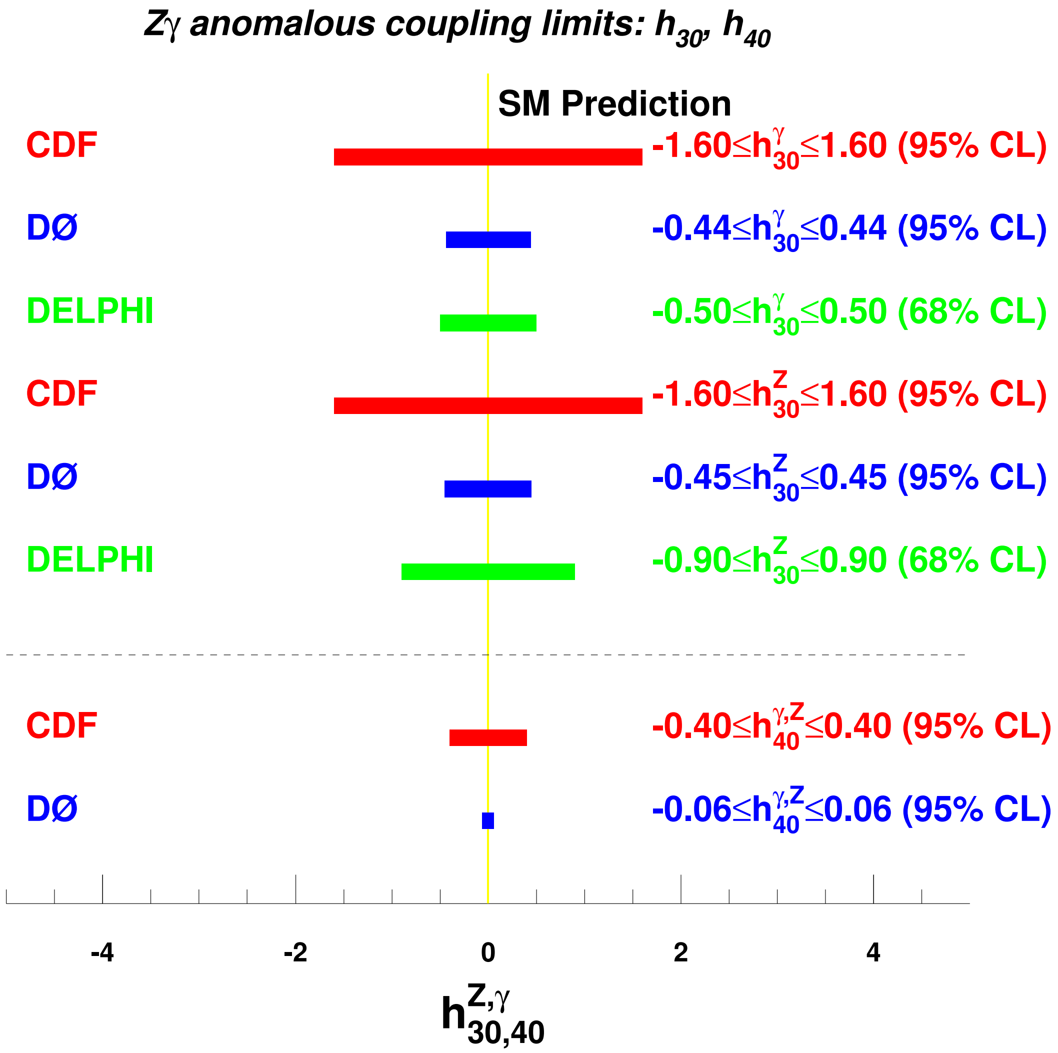
- Different confidence levels (95% Tevatron, 68% LEP)
- Different notation (g_Z^1,λ_γ,λ_Z,κ_γ,κ_Z vs. $\alpha_{W\phi}$,$\alpha_{B\phi}$,α_W)
- Different model assumptions

$WW\gamma$ and WWZ couplings



Same cautions as for λ

$ZZ\gamma$ and $Z\gamma\gamma$ Couplings



- h_{40} limits approaching loop correction level
- more sensitivity expected with DØ 1B $\nu\nu\gamma$ analysis

Trilnear Gauge Couplings

Milestones

- U(1)-only couplings for W rules out at 96% CL by DØ $W\gamma$ results ($\Rightarrow$ weak component to W magnetic dipole moment)
- U(1)-only couplings rules out for WW production at 99% CL by DØ WW results ($\Rightarrow$ existence of WWZ coupling)
- some hint of "radiation zero" in CDF $W\gamma$ angular distribution.
- WWZ couplings non-vanishing (δ_Z limit from LEP2)

- Future:
  - Improved statistics at LEP II
  - CDF + DØ combined results from Run 1

- Next milestone: λ and $\Delta\kappa$ limits at the 1% level to be sensitive to loop effects
- large anomaolous couplings possible with
  - W, Z not gauge bosons
  - fine tuning