Anomalous Triple Gauge Coupling of ZZ Production in Hadron Colliders

(Four lepton channel)

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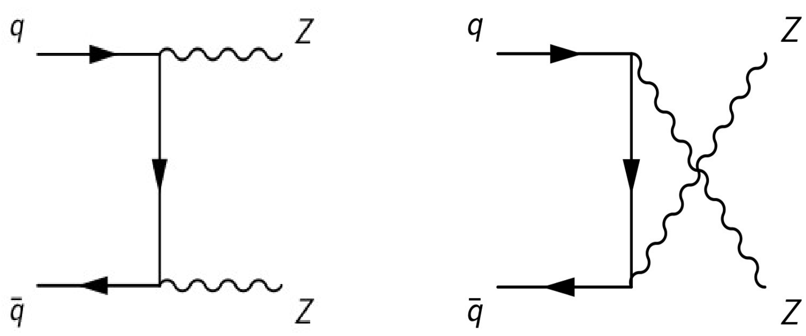
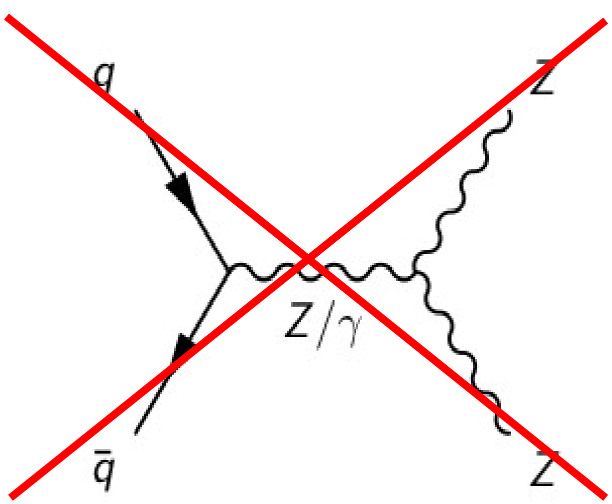
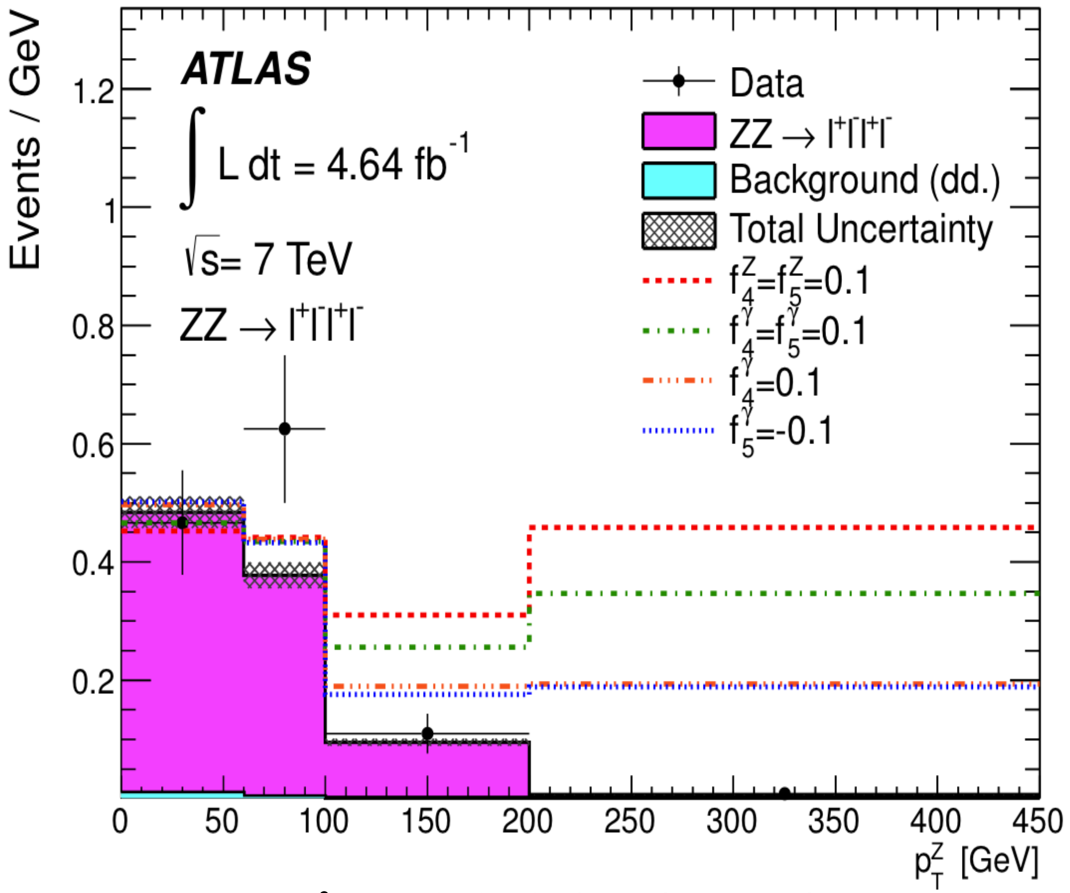
ZZ Properties

No s-channel in Leading order





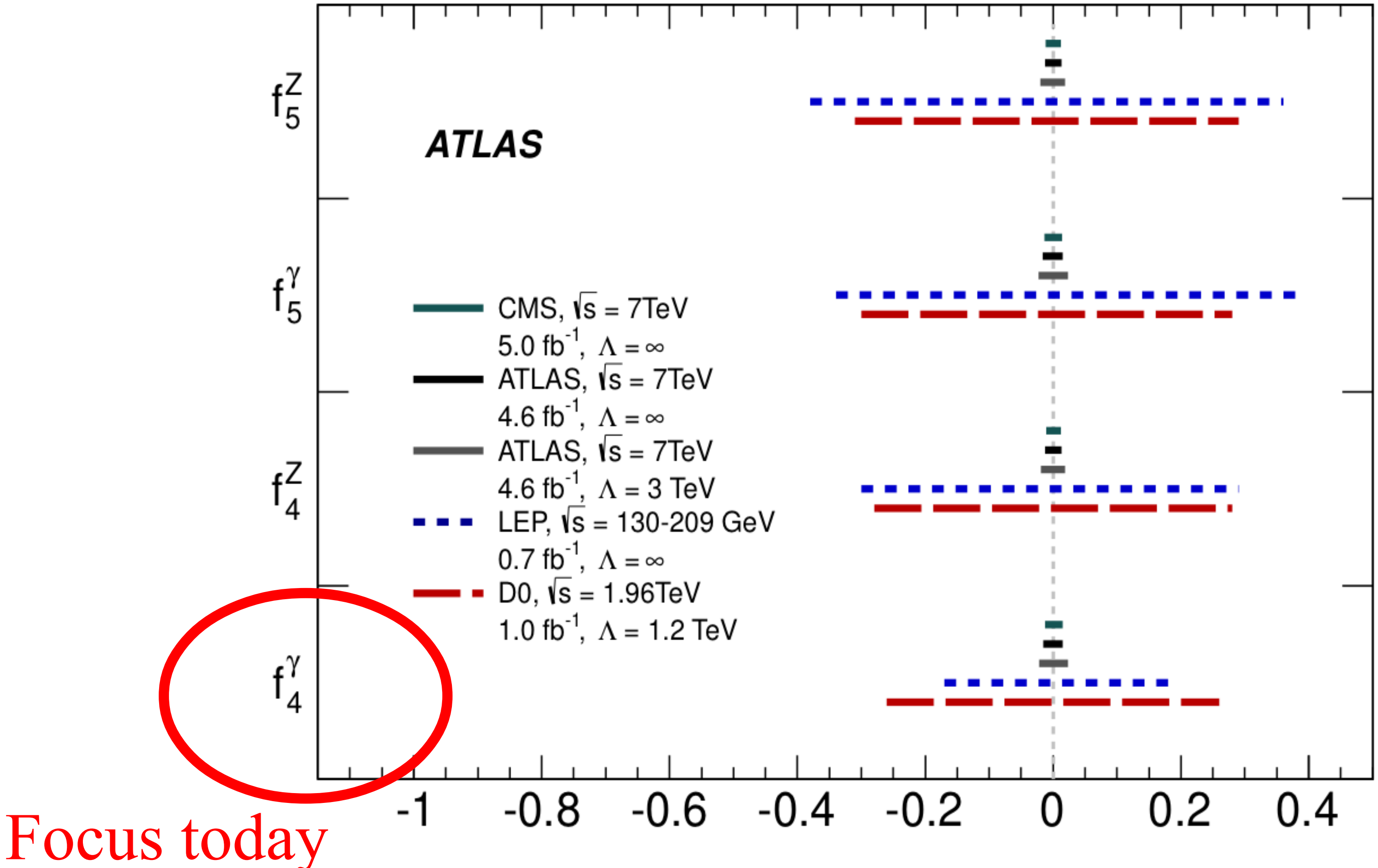
Leading pT(ll): Good probe aTGC



arXiv:1211.6096

Current Status of ZZ aTGC

ATLAS and CMS sets the best limits.



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Original Work Plan

- SHERPA 1.4.2, PDFSET CT10

  → Generate HepMC output (particle level)
- DELPHES 2.0.3

  → Generate ROOT output (detector smearing)
- Use reweighted differential shape

  → Extract aTGC limit using leading $p_T(ll)$ distribution with Profile Likelihood

Today's Menu

- SHERPA 1.4.2, PDFSET CT10

  → Generate HepMC output (particle level only)
- DELPHES 2.0.3 (not shown today)

  → runs successfully but results to be validated

- Use highest leading p_T(ll) bin

  → Simple counting experiments to evaluate 95% Confidence Interval

Leading Order Fiducial Xsec

- SHERPA 1.4.2, PDFSET CT10
- $ZZ \rightarrow 4l$ where l=e or μ (no leptonic τ)
- Fiducial volume definition:

electron: pT > 7 GeV $|\eta| < 3.16$
Muon:pT > 7 GeV $|\eta| < 2.5$
66 GeV < m(ll) < 116 GeV

Leading p_T(ll)	7TeV (fb)	14TeV(fb)	33TeV(fb)	100TeV(fb)
> 0 GeV	15.3	35.1	86.1	243
σ/σ_{7TeV}	**1**	**2.3**	**5.6**	**15.9**

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$p_T(ll) > 200$ GeV (for aTGC study)

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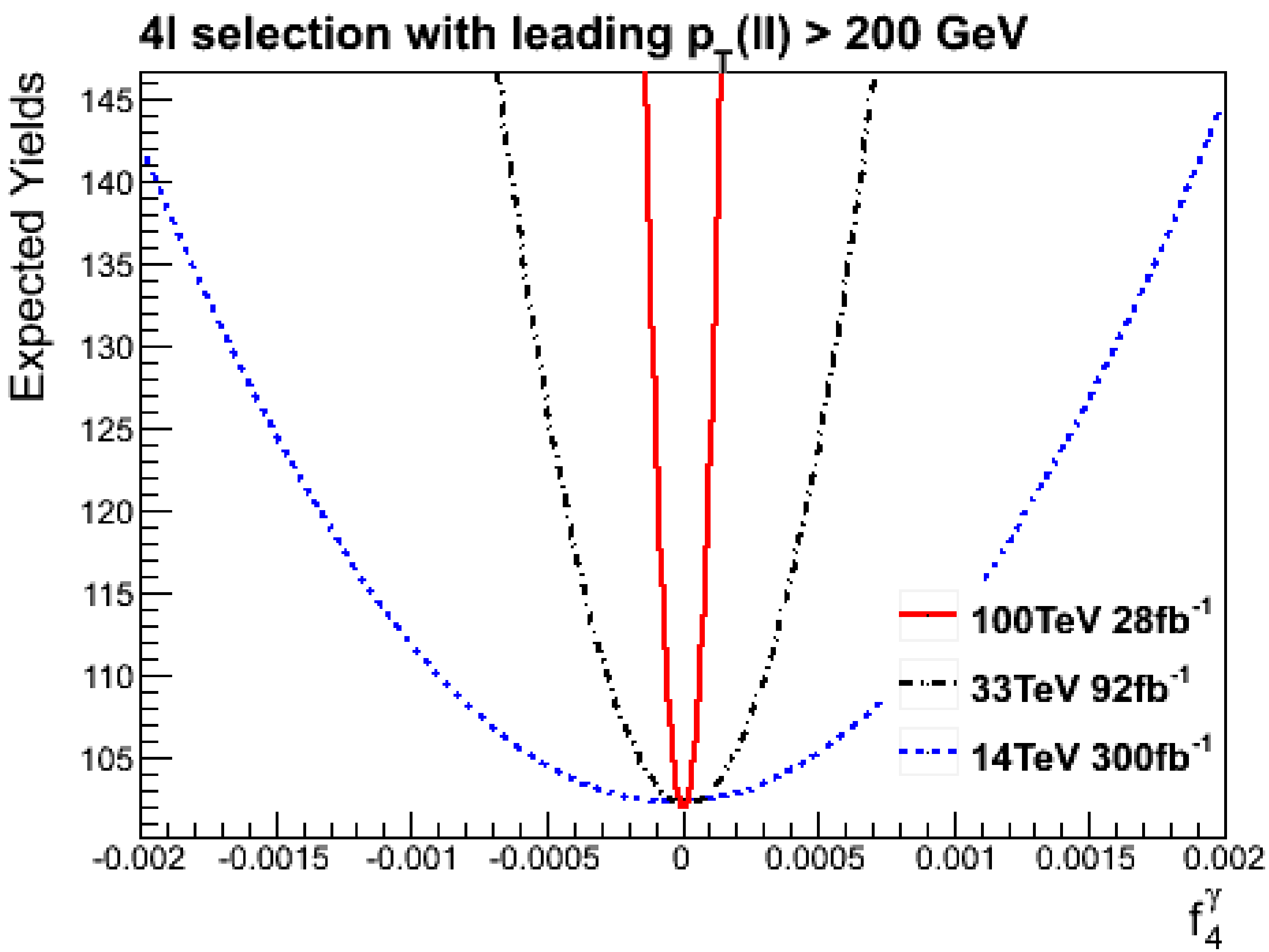
> 200GeV	0.185	0.68	2.22	7.28
σ/σ_{7TeV}	**1**	**3.7**	**12.0**	**39.6**

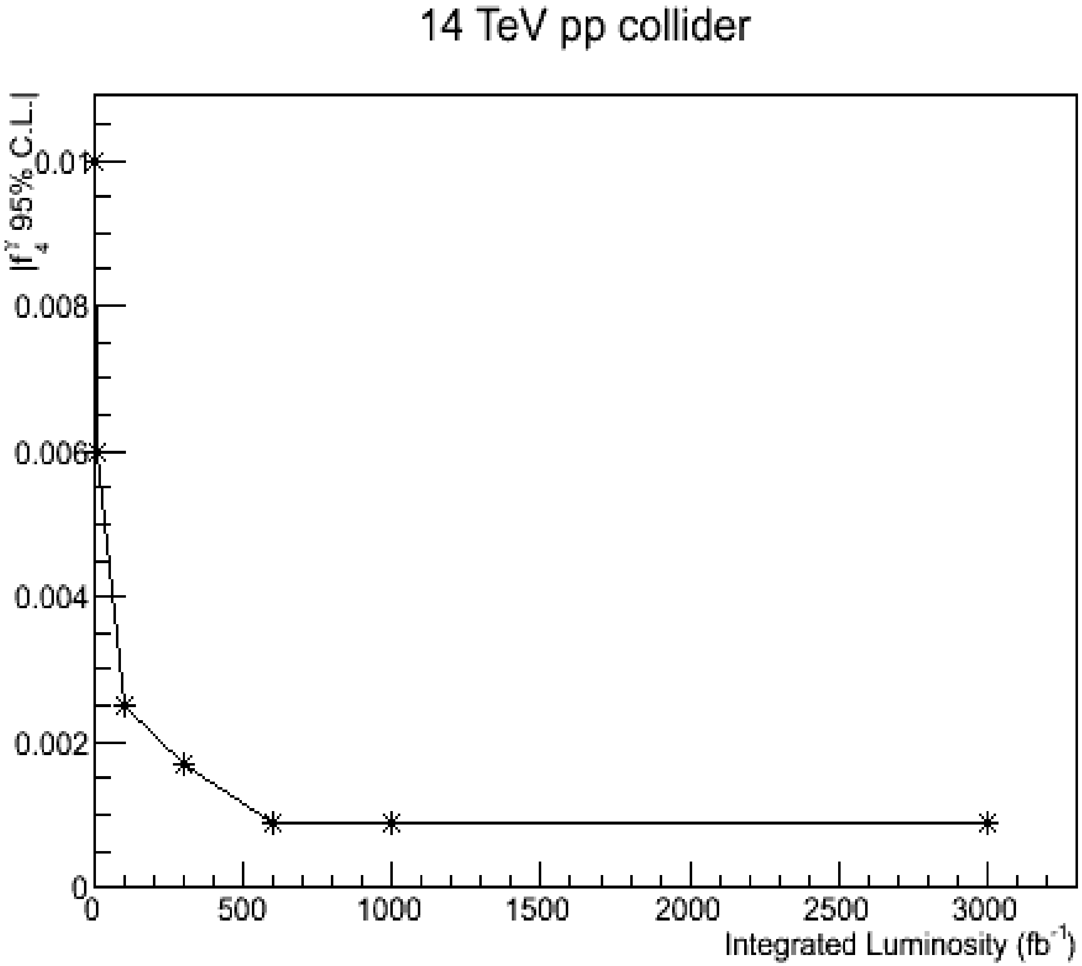
High Energy LHC

- Normalize event yields to 300fb^{-1} 14TeV data.
  Higher Energy colliders are more effective to test aTGC precision



High Intensity LHC

- Sensitivity improvement is waker than squared root of Luminosity



Summary

- Present preliminary results of f_4^γ expected limits:
  - f_4^γ limit improvement is weaker than √Lum dependence
  - Higher beam energy seems to me a preferable option to probe TGC in unprecedented precision

95% C.L	7TeV ($4.6fb^{-1}$)	14TeV ($300fb^{-1}$)	14TeV ($3000fb^{-1}$)	33TeV ($92fb^{-1}$)	100TeV ($28fb^{-1}$)
$\|f_4^\gamma\|$	1.5E-2	1.7E-3	8E-4	5.5E-4	1E-4

- To Do:
  Study Delphes output, use differential shape, apply NLO k-factor, and include systematic uncertainties.