Diffractive W Production at the LHC

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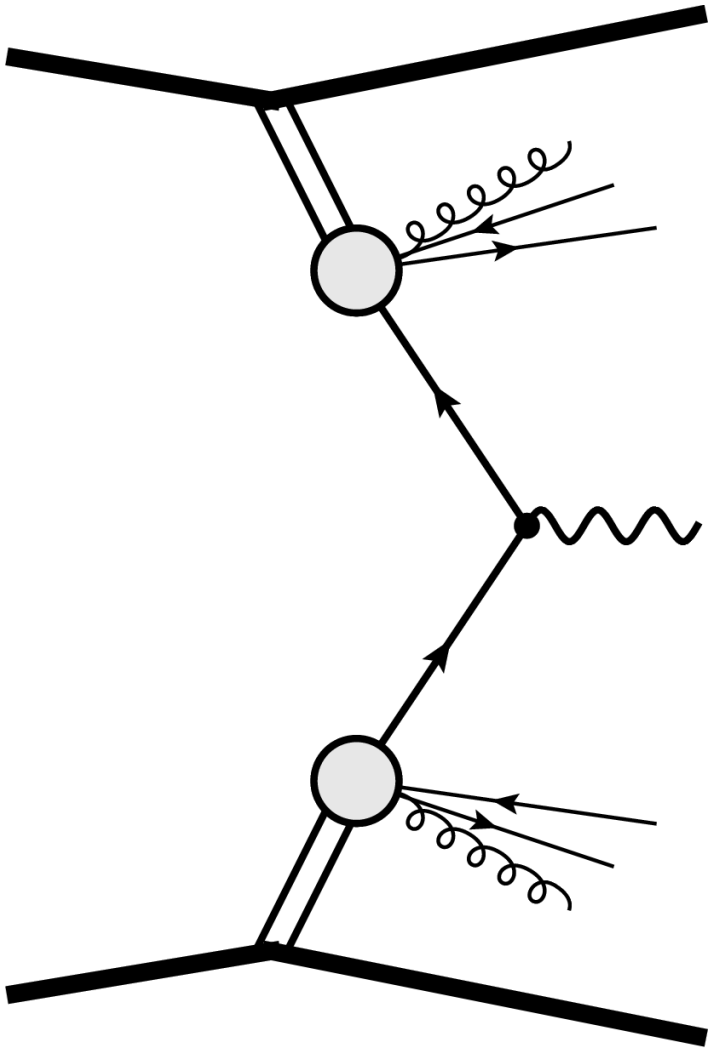
Central Diffractive W/Z Production



Double Pomeron Exchange

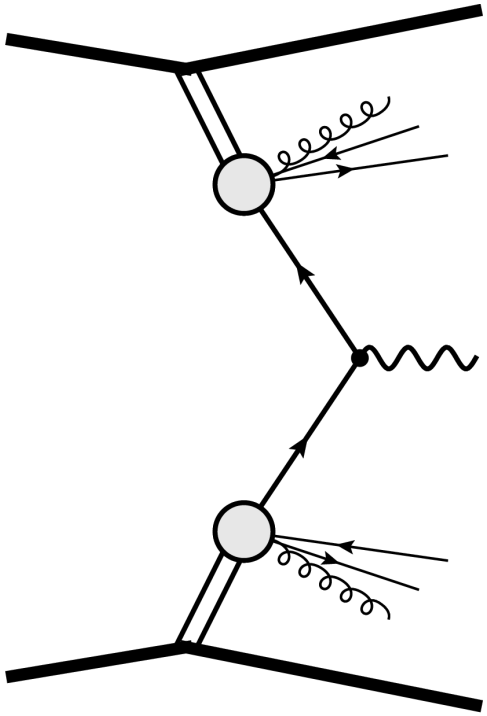
Measurement of Rapidity Gap Survival Probability for DPE processes

Probing diffractive mechanism

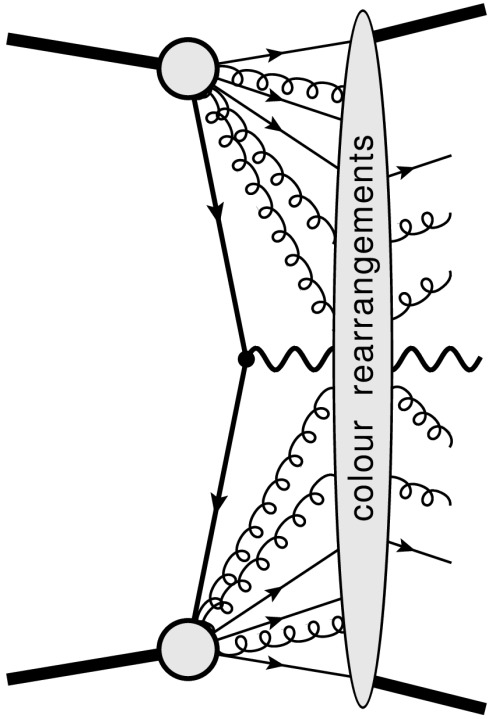
Flavour composition of the Pomeron

Measurement with AFP

Diffractive Mechanism



Double Pomeron Exchange



Soft Colour Interactions

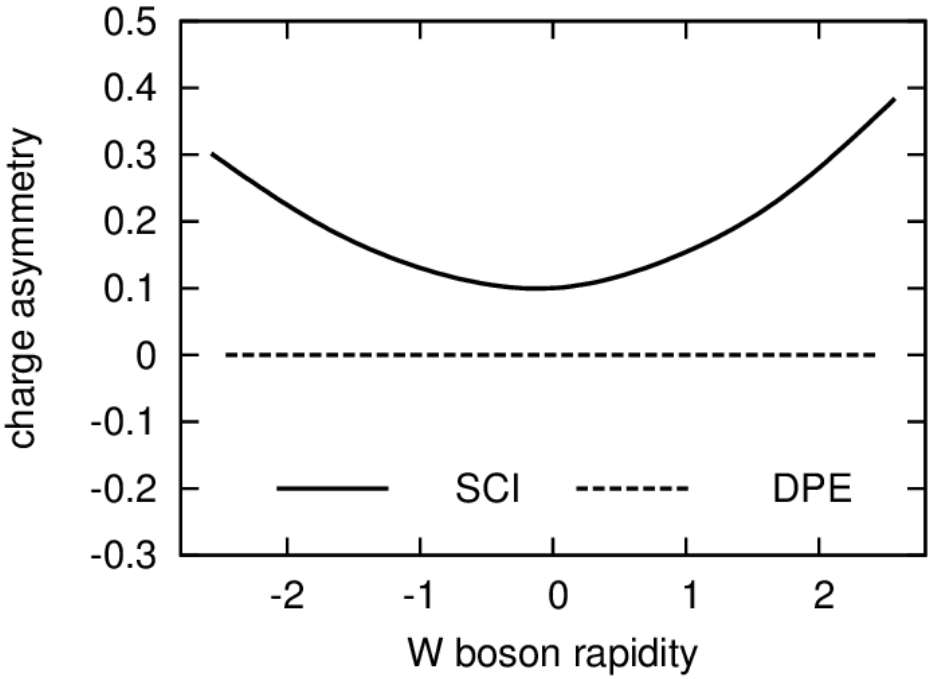
Quarks from Pomeron

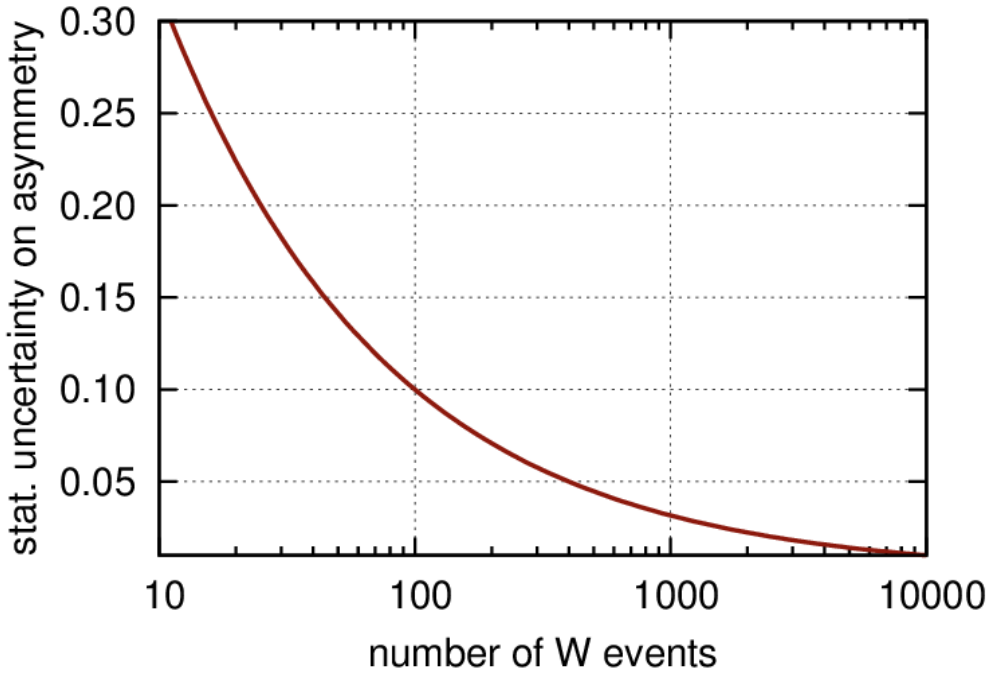
Charge and flavour symmetry: u=d=s=ubar=dbar=sbar

Quarks from protons

Diffractive signature due to color rearrangements

W Charge Asymmetry





- Total asymmetry: A=0 (DPE), A=0.14 (SCI)

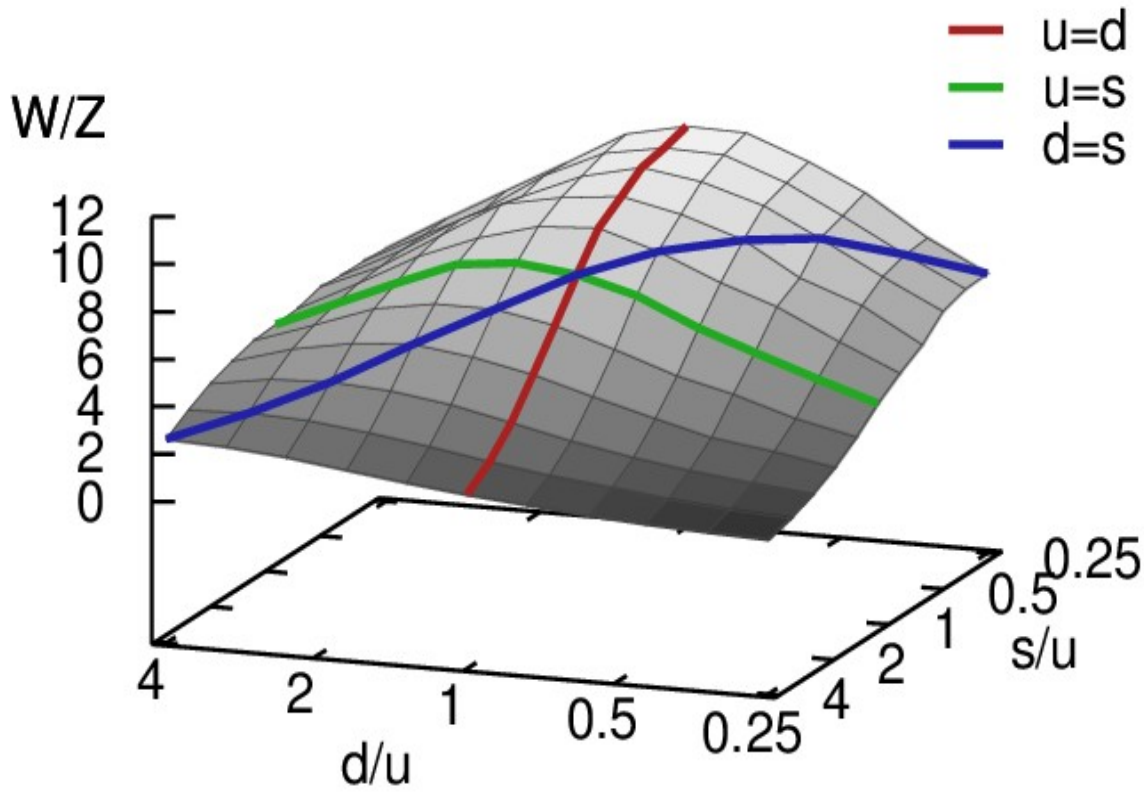
Flavour Symmetry of the Pomeron

Natural assumption
for Pomeron model:
$u(x,Q^2) = d(x,Q^2) = s(x,Q^2)$

Never tested
experimentally

HERA measurements
constrain u+d+s

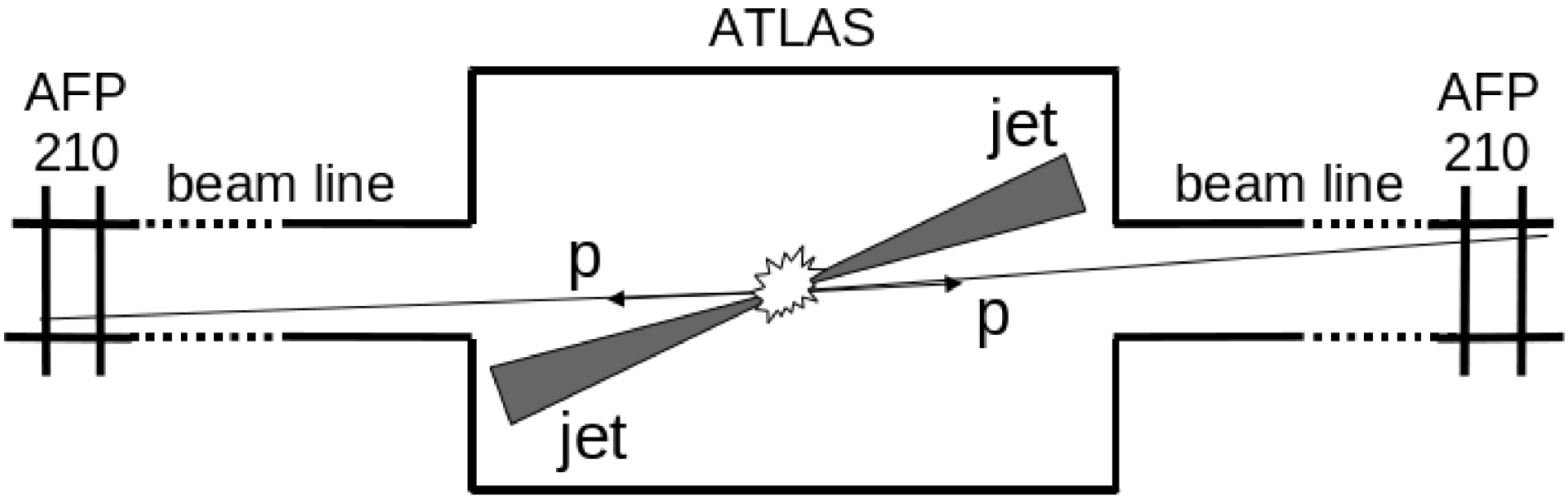
DPE W and Z at the LHC:



- W/Z cross section ratio is sensitive
- Many systematic effects cancel

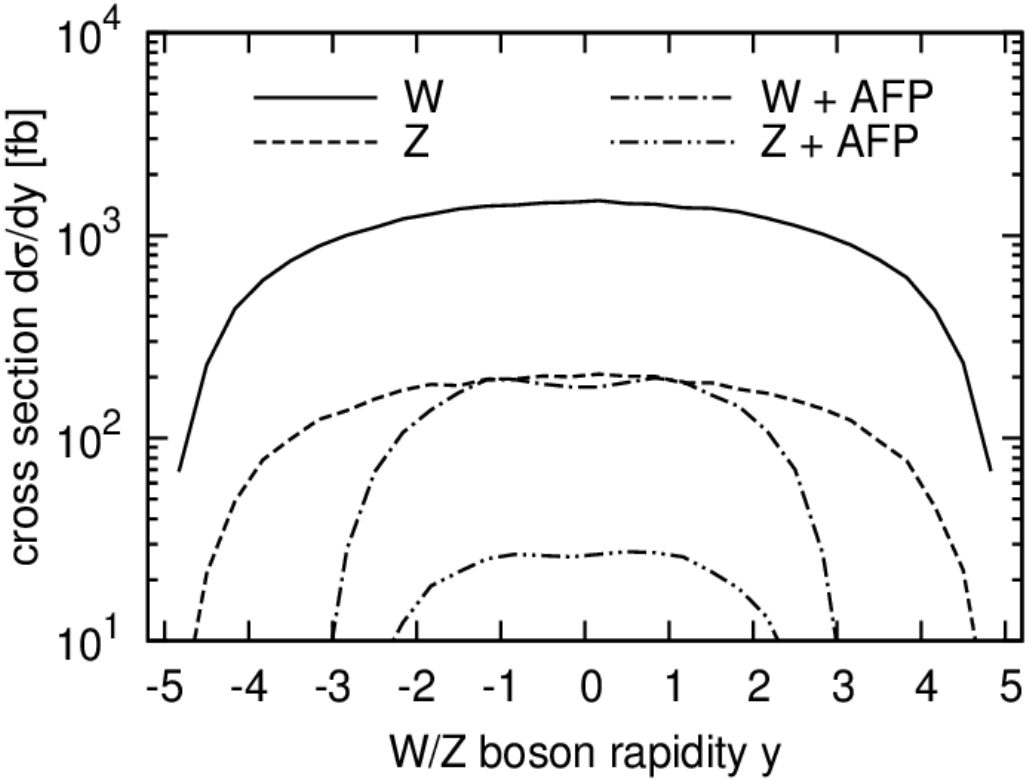
K. Golec-Biernat, C. Royon, L. Schoeffel, R.S.
Phys. Rev. D84 (2011) 114006

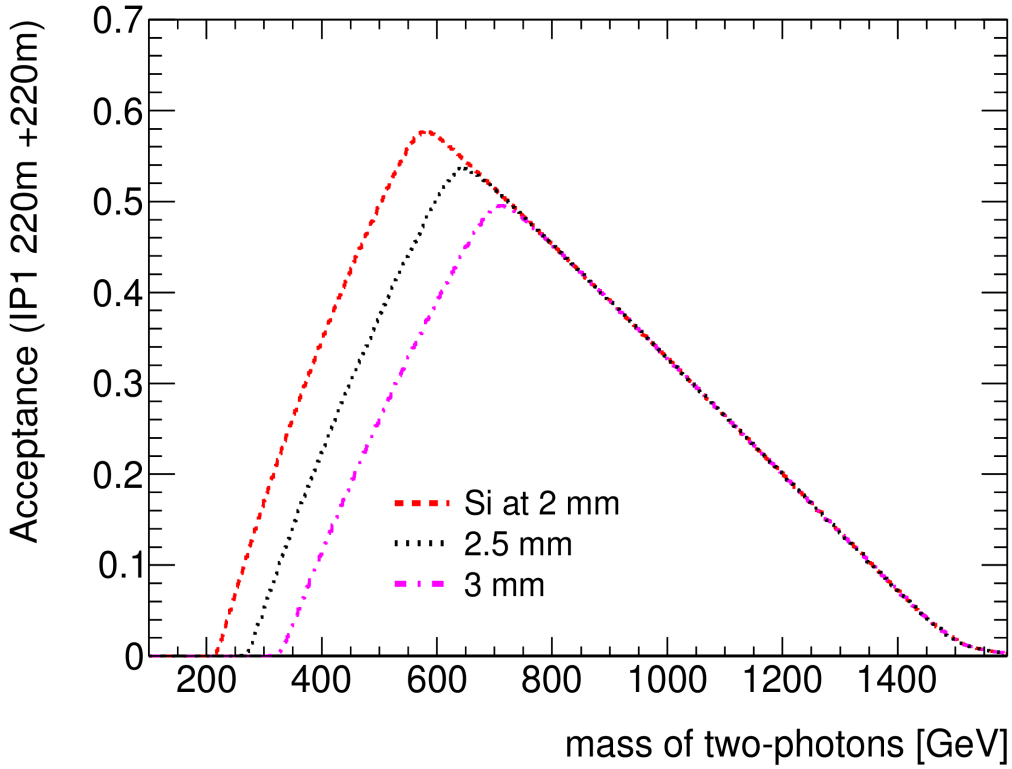
CD – Measurement Principle



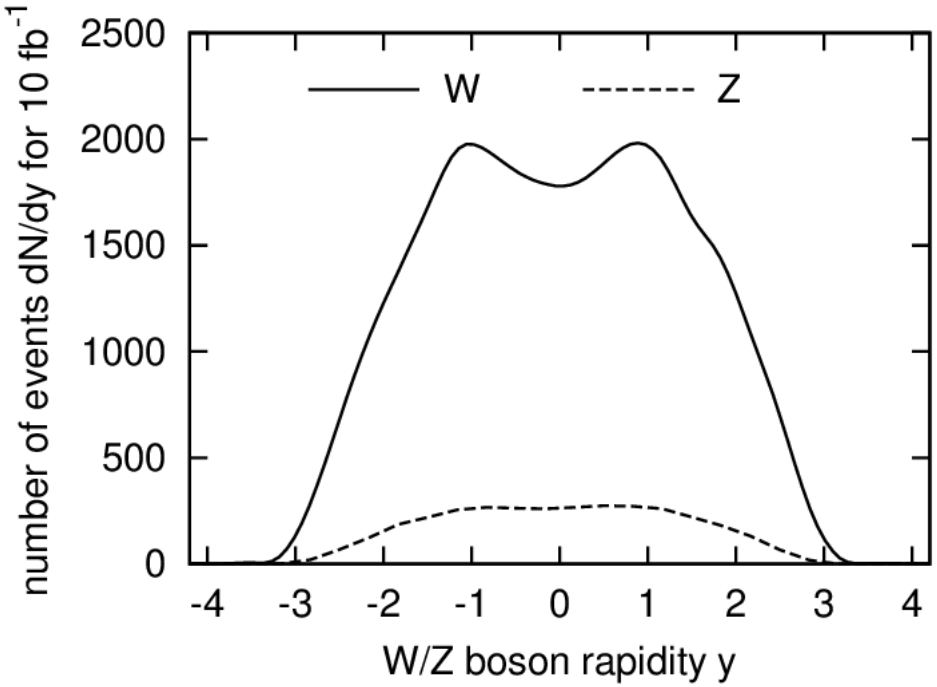
- Lepton + MET in central detector
- Protons tagged in AFP detectors

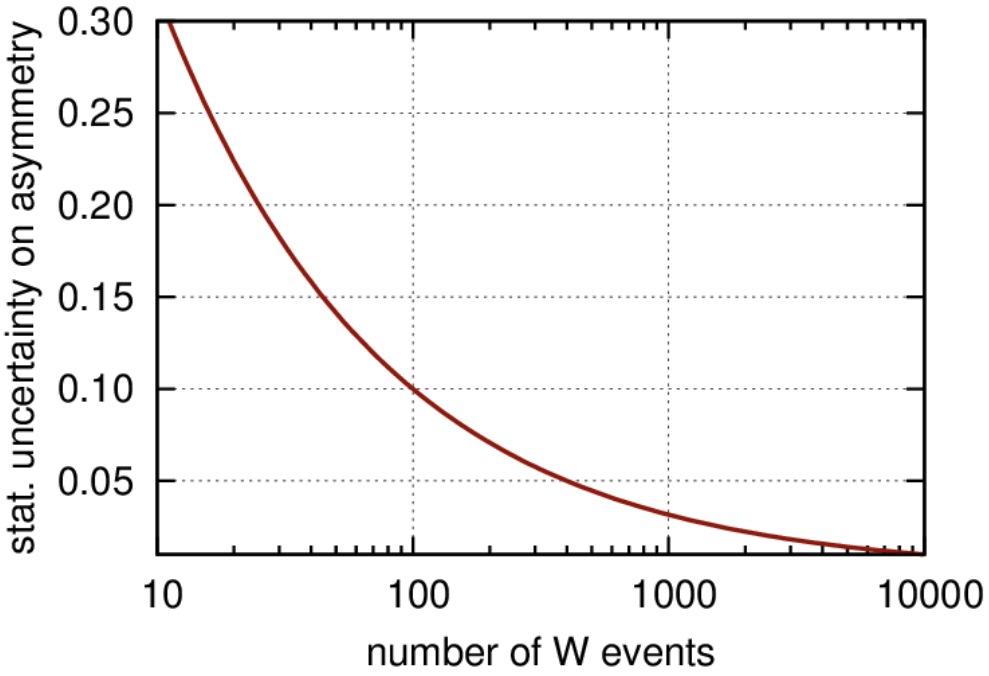
DPE W/Z Cross Sections





DPE W/Z Number of Events

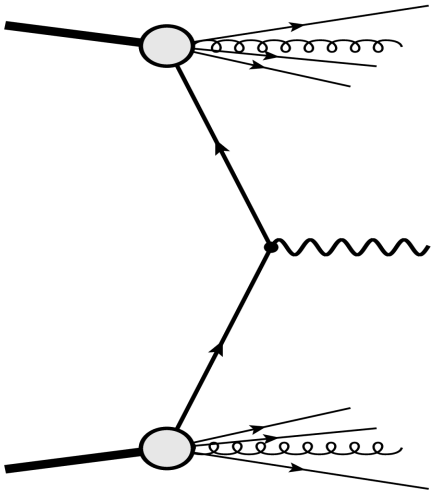




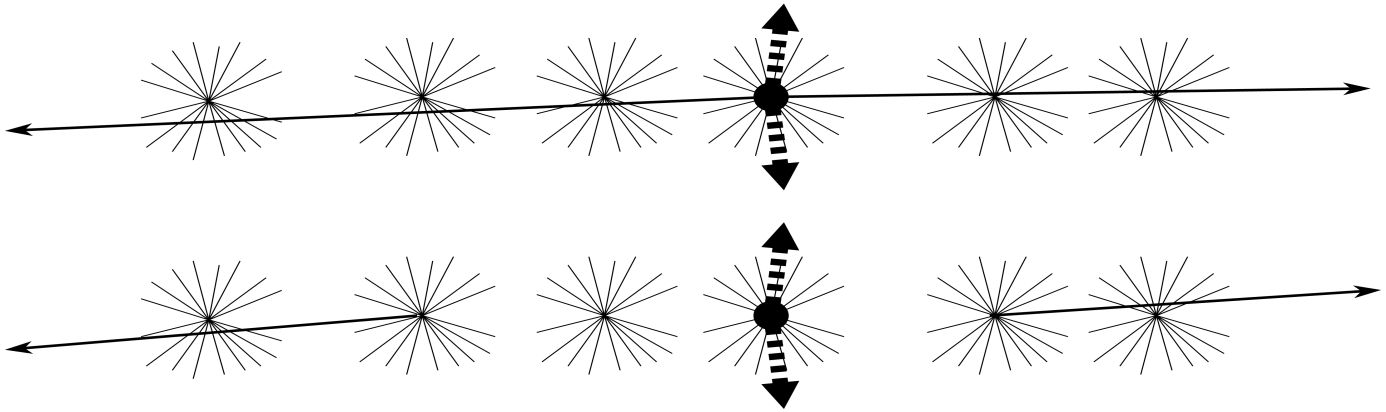
~700 events for 1/fb

DPE: A = 0
SCI: A = 0.14

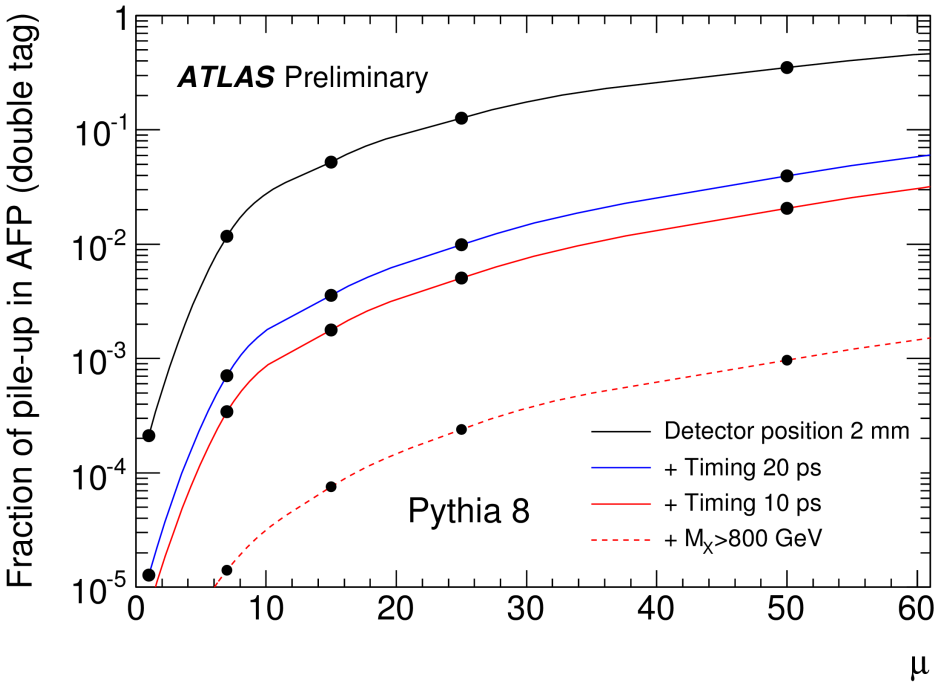
Non-diffractive Background



Non–difftactive Production



Cross section for non-diffractive W is more than 4 orders of magnitude larger than the cross section for central diffractive production!



Summary

- Central Diffractive production of W boson can be measured at the LHC with AFP detectors
- Asymmetry in Central Diffractive W boson production can probe diffractive mechanism
- Additional Central Diffractive Z can probe flavour composition of the Pomeron
- Measurements are not easy – background from non-diffractive production
- Dedicated runs possible towards the end of the LHC