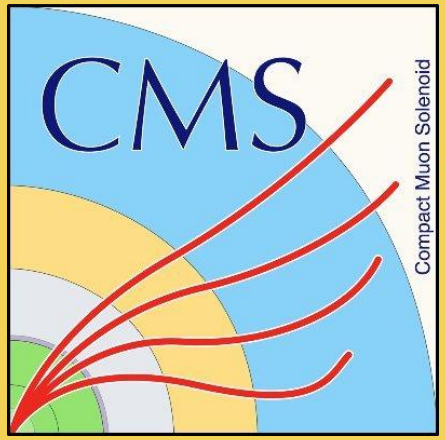

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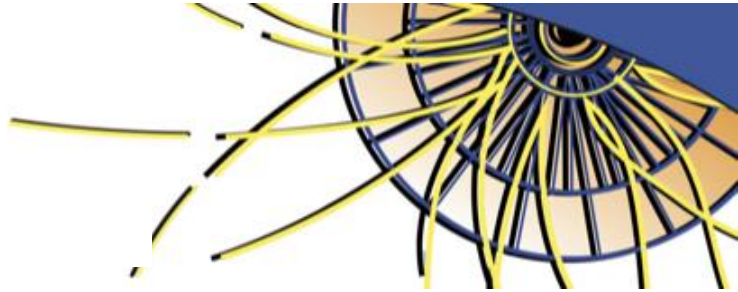

LHCP2021
The Ninth Annual Conference on Large Hadron Collider Physics

Measurements of the weak diboson production cross sections in leptonic decays at $\sqrt{s}$=5.02 TeV with the CMS experiment

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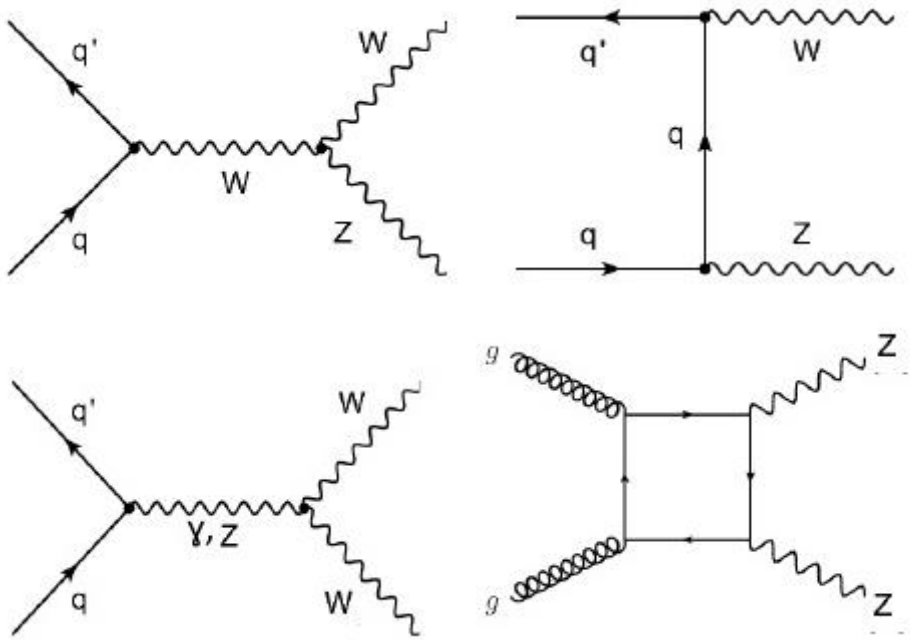
Motivation

Summary: Results on the measurements of diboson processes (W^+W^-, $W^{\pm}Z$, ZZ) at the 5 TeV energy regime using 304 pb^{-1} recorded in 2017 are presented.

CMS-PAS-SMP-20-012

- Diboson production is studied as a test for the **Standard Model** of particle physics.
- It also contributes as an irreducible background in other measurements, such as:
  - Higgs boson measurements.
  - Beyond Standard Model searches.
- Data was recorded with a maximum instantaneous luminosity of $\mathcal{L}_{ins} = 1.37 \times 10^{33} \mathrm{cm}^{-2}\mathrm{s}^{-1}$.
- All measurements are characterized by a relatively low pile-up contribution (~2 pp interactions per bunch crossing).

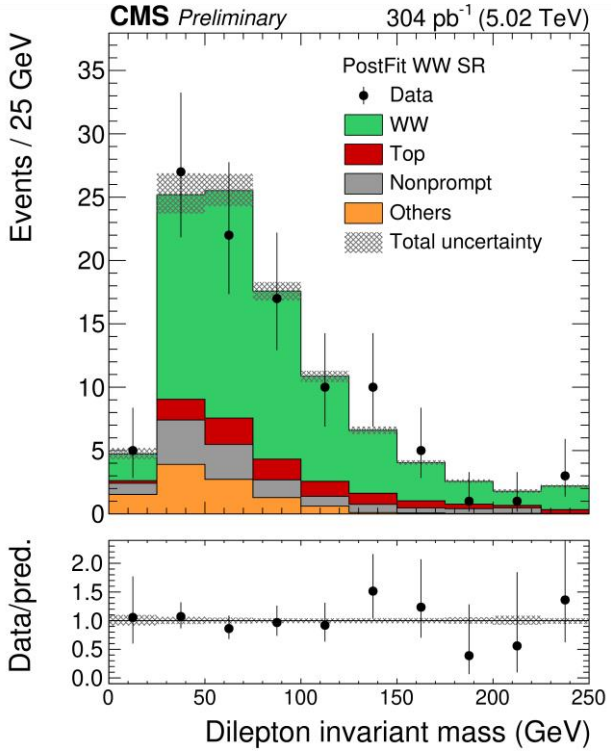


First diboson measurements at 5 TeV!

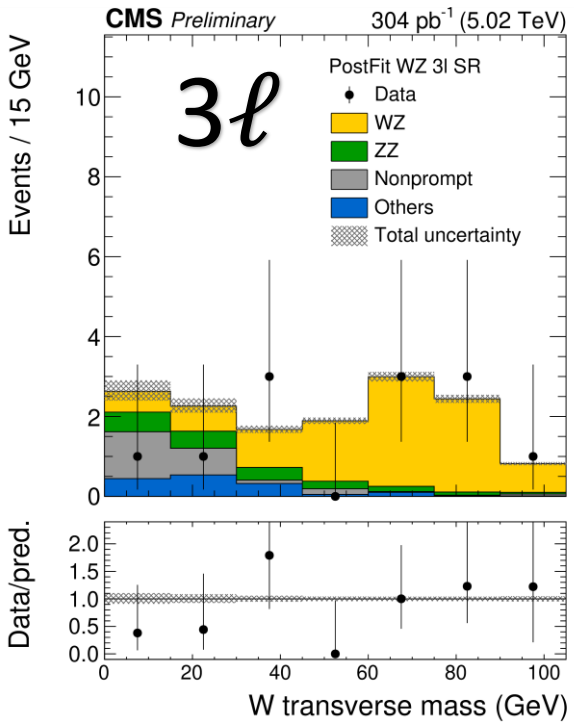
Description of the Analysis

- The object selection in this analysis relies on precise lepton identification and several extra kinematic requirements.
- Signal regions are defined to properly distinguish from WW, WZ and ZZ contributions.

WW (2ℓOS)
$p_T(\ell_1)$> 20 GeV
$p_T(\ell_2)$> 10 GeV



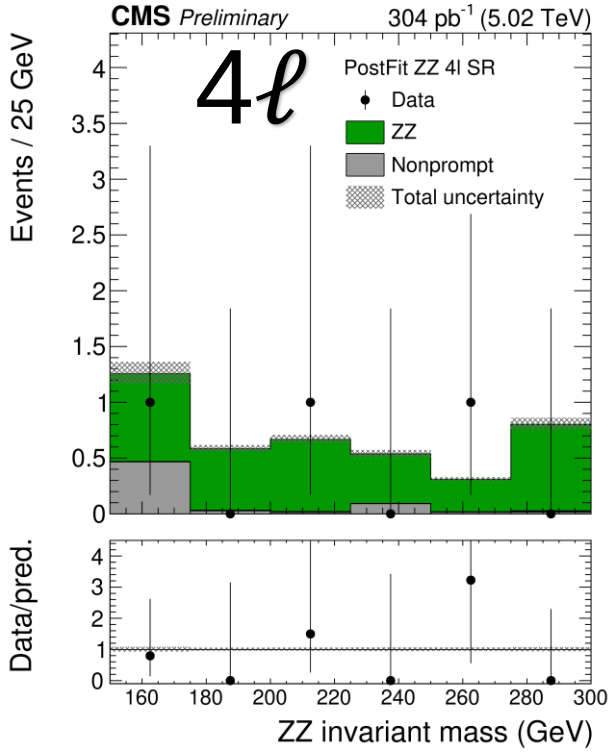
WZ (3ℓ)
$p_T(\ell_{Z_1}) > 8$ GeV
$p_T(\ell_{Z_2}) > 8$ GeV
$p_T(\ell_W) > 20$ GeV



WZ (2μss)
$p_T(\ell_1)$> 20 GeV
$p_T(\ell_2)$> 10 GeV

ZZ (2ℓ2ν)
$p_T(\ell_1)$> 20 GeV
$p_T(\ell_2)$> 10 GeV

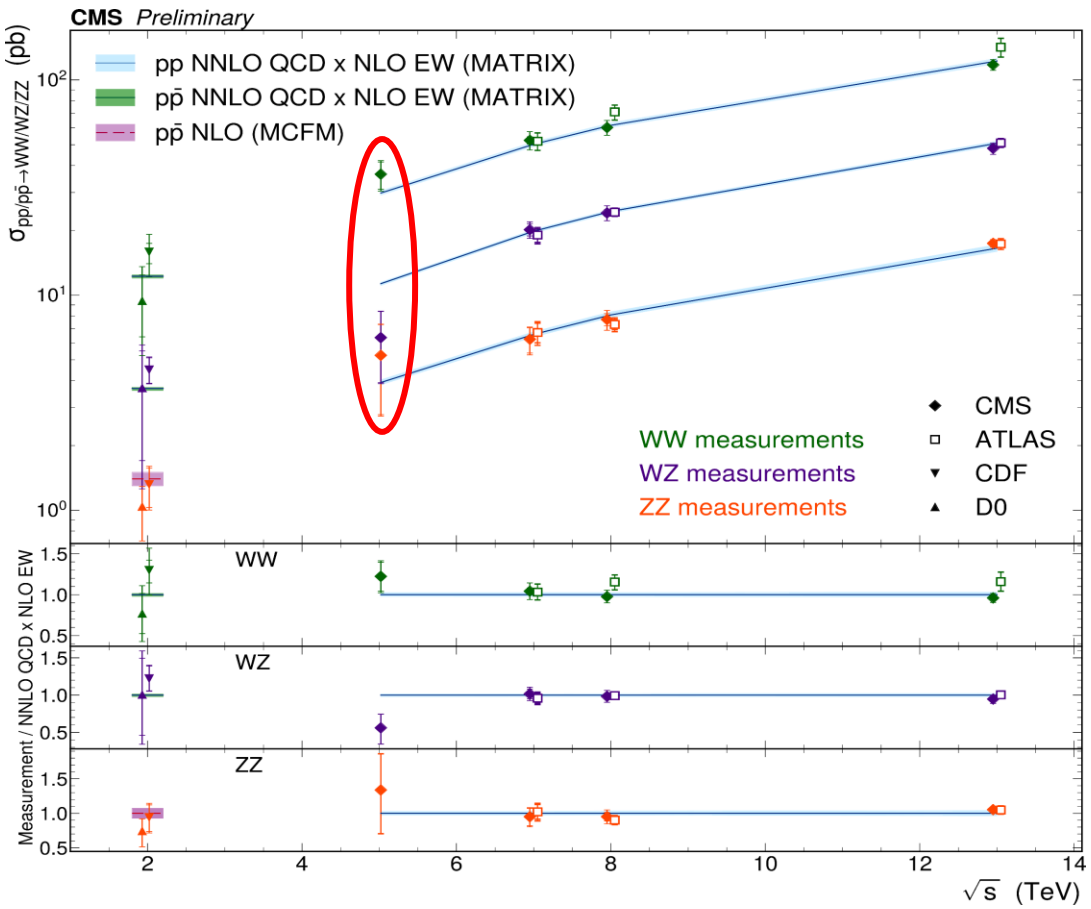
ZZ (4ℓ)
4ℓ: p_T > 8 GeV



Results and conclusions

- Measured cross-sections are consistent at **NNLO QCDxNLO EWK** predictions.

$$\sigma = \frac{N_{\text{signal}}^{\text{SR}}}{\mathcal{BR}(\text{V} \to XX)\mathcal{BR}(\text{V} \to XX)\epsilon\mathcal{L}'}$$



Statistically dominated uncertainties

$$\sigma_{WW} = 36.5\ ^{+5.5}_{-5.1}\ (\text{stat})\ ^{+2.6}_{-2.5}(\text{syst})\ \text{pb}$$

$$\sigma_{WZ} = 6.4\ ^{+2.4}_{-2.1}\ (\text{stat})\ ^{+0.5}_{-0.3}(\text{syst})\ \text{pb}$$

$$\sigma_{ZZ} = 5.3\ ^{+2.5}_{-2.0}\ (\text{stat})\ ^{+0.5}_{-0.4}(\text{syst})\ \text{pb}$$

- A never-done-before measurement of the diboson production cross sections in a **new energy regime** has been presented.
- This analysis has contributed to reduce the gap between Tevatron and LHC measurements.