



Measurement of inclusive four-lepton production at ATLAS

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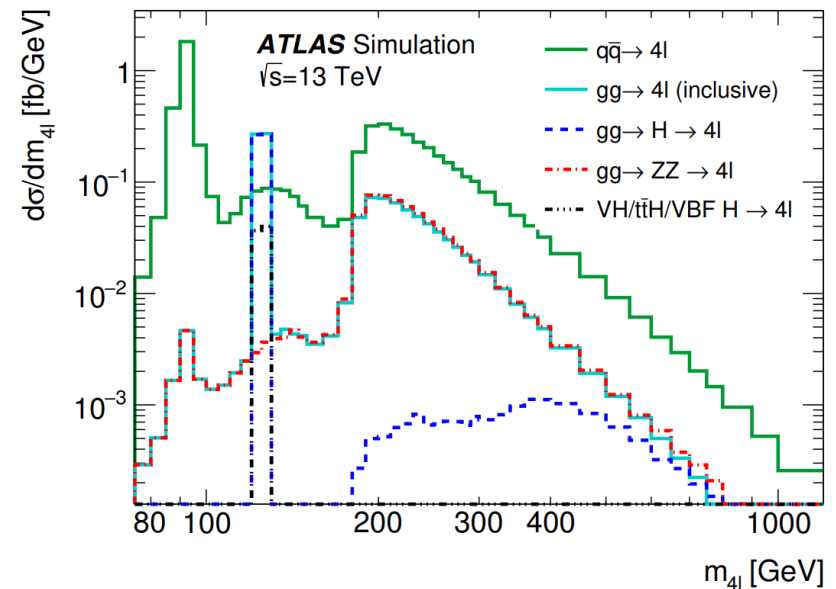
Introduction

➤ Motivation

- four-lepton final state is “clean” and has rich physics
- allow precision test on the SM
- sensitive to BSM

➤ Introduction

- ATLAS Run-2 data corresponding to 139fb^{-1} of $\sqrt{s} = 13\text{ TeV}$ pp collisions
- 10 variables are measured with differential cross-sections or double differential cross-sections (in slice of a second variable)
- potential of re-interpretation with all information in HEPData
 - constraints BSM B-L model based on the measurement are evaluated



Main aspects of the analysis

➤ Fiducial phase-space

- based on 4l final state, and try to be **inclusive** and **model-independent**

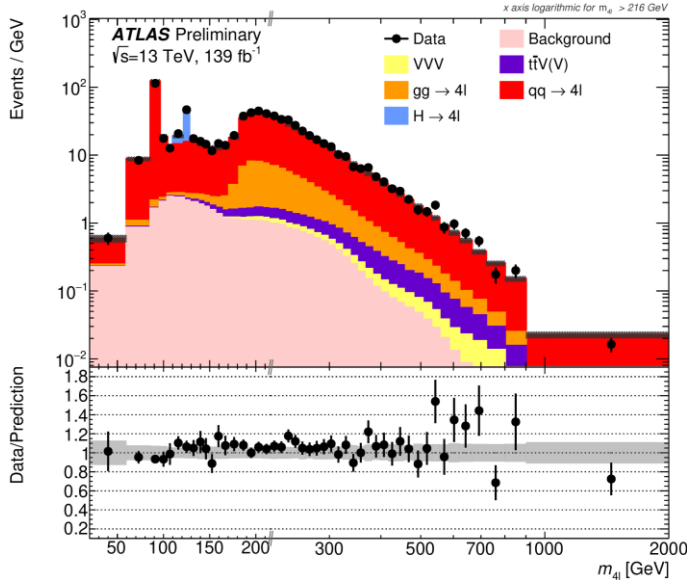
<i>Lepton selection</i>	
Muon selection	Bare, $p_T > 5 \text{ GeV}$, $ \eta < 2.7$
Electron selection	Dressed, $p_T > 7 \text{ GeV}$, $ \eta < 2.47$
<i>Event selection</i>	
Four-lepton signature	At least 4 leptons, with 2 Same-Flavour, Opposite-Sign pairs
Lepton kinematics	$p_T > 20/10 \text{ GeV}$ for leading two leptons
Lepton separation	$\Delta R_{ij} > 0.05$ for any leptons
J/ψ -Veto	$m_{ij} > 5 \text{ GeV}$ for all SFOS pairs
Truth isolation	$ptcone30/p_T < 0.16$

➤ Background and uncertainties

- background from the **non-prompt leptons**
- statistical uncertainty** dominant for most of the bins

➤ Detector correction

- unfolding technique introduced to correct detector effects and get “particle-level data”

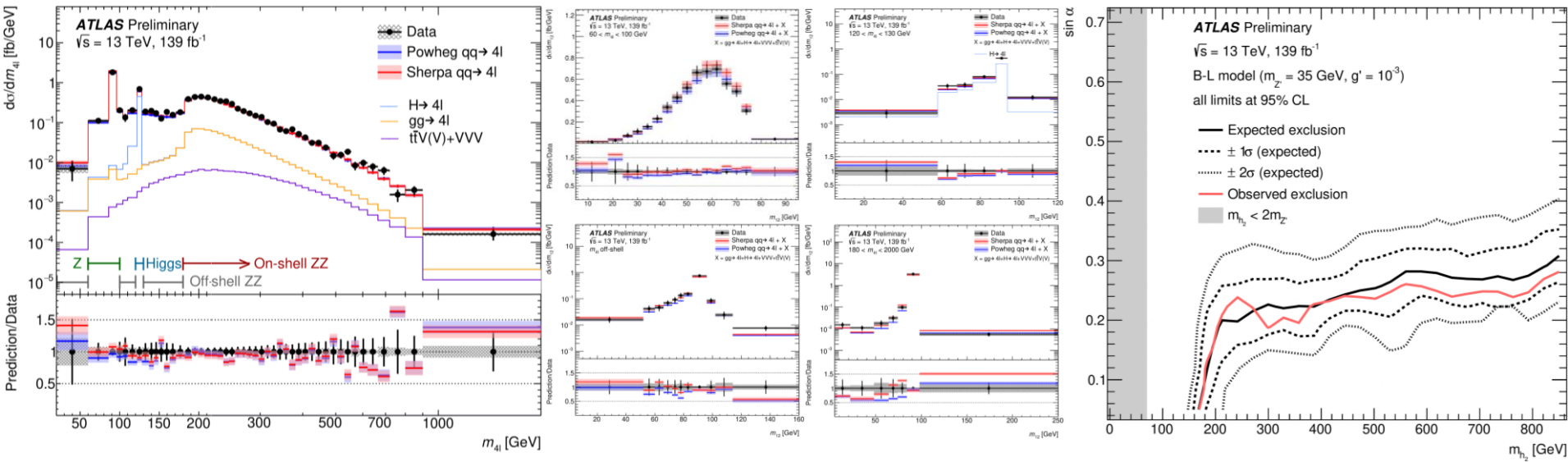


Results

[CONF note](#)

➤ Cross-section

- Fiducial cross-section inclusively and in slices of m_{4l}
- the measurements extended the fiducial phase space and increased granularity compared to previous results



➤ $Z \rightarrow 4l$ Branching ratio

- $B_{Z \rightarrow 4l} = (4.41 \pm 0.30) \times 10^{-6}$
- most precise result and compatible with previous study

➤ Test on B-L model

- exclusion on $m_{h_2} \sim \sin\alpha$ parameter-space
- using the double differential distributions yields significantly stronger limits than the m_{4l} distribution alone