Measurements of Higgs fiducial cross section in Run 3 for ATLAS

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Given the time restriction...

Why measure fiducial cross section in Run 3?

How to measure it in Run 3?

What did we measure?

Why measure fiducial cross section in Run 3?



Defined through measurable quantities!

Why measure fiducial cross section in Run 3?



Defined through measurable quantities!

It both offers stringent test of the SM...

Why measure fiducial cross section in Run 3?



Defined through measurable quantities!

...and extensive validation of detector upgrade!



e.g.: installation of NSW

e.g.: new electronics of LAr calorimeter



And many, many more!

How to measure σ_{fid} in Run 3?





Low stat, high S/B ratio!

Low S/B ratio, high stat!

Both channels required extensive studies and validations on object reconstruction, trigger performance, etc...

Source	Uncertainty [%]
Statistical uncertainty	25.1
Systematic uncertainty	7.9
Electron uncertainties	6.3
Muon uncertainties	3.8
Luminosity	2.2
ZZ^* theoretical uncertainties	0.7
Reducible background estimation	0.6
Other uncertainties	<1.0
Total	26.4

Source	Uncertainty [%]
Statistical uncertainty	14.0
Systematic uncertainty	10.3
Background modelling (spurious signal)	6.0
Photon trigger and selection efficiency	5.8
Photon energy scale & resolution	5.5
Luminosity	2.2
Pile-up modelling	1.2
Higgs boson mass	0.1
Theoretical (signal) modelling	<0.1
Total	17.4

Consult paper 2306.11379 for detail! (fid phase space, generators used...)

How to measure σ_{fid} in Run 3?





Low stat, high S/B ratio!

Low S/B ratio, high stat!

Likelihood fit for N_{sig}!



Consult paper <u>2306.11379</u> for detail! (fid phase space, generators used...)

What did we measure?



What did we measure?

