

Proposal for high mass:

- lineshape summary
- interference proposal

# Lineshape with complex pole

## ☐ inclusive Xsec

- 8 TeV includes OFFP

<https://twiki.cern.ch/twiki/bin/view/LHCPhysics/CERNYellowReportPageAt8TeV>

- 7 TeV – soon: dFG are working on it
- residual uncertainty after OFFP inclusion are smaller than PDF, scale uncertainty

## ☐ mH shape (same for WW and ZZ):

- central values with OFFP + uncertainty bin by bin available

<http://personalpages.to.infn.it/~giampier/allheavy3.txt>

-> central value bin by bin from POWHEG reweighting at 7 TeV and 8TeV

-> % uncertainty bin by bin assumed the same in 7 TeV and 8 TeV

# Interference in H->ZZ: xsec

Effect on total xsec is small: confirmed by Kauer and Passarino

$gg (\rightarrow H) \rightarrow ZZ \rightarrow l\bar{l}\nu\nu$  (2l2v) and  $gg (\rightarrow H) \rightarrow ZZ \rightarrow l\bar{l}l\bar{l}$  (4l)  
Integrated results

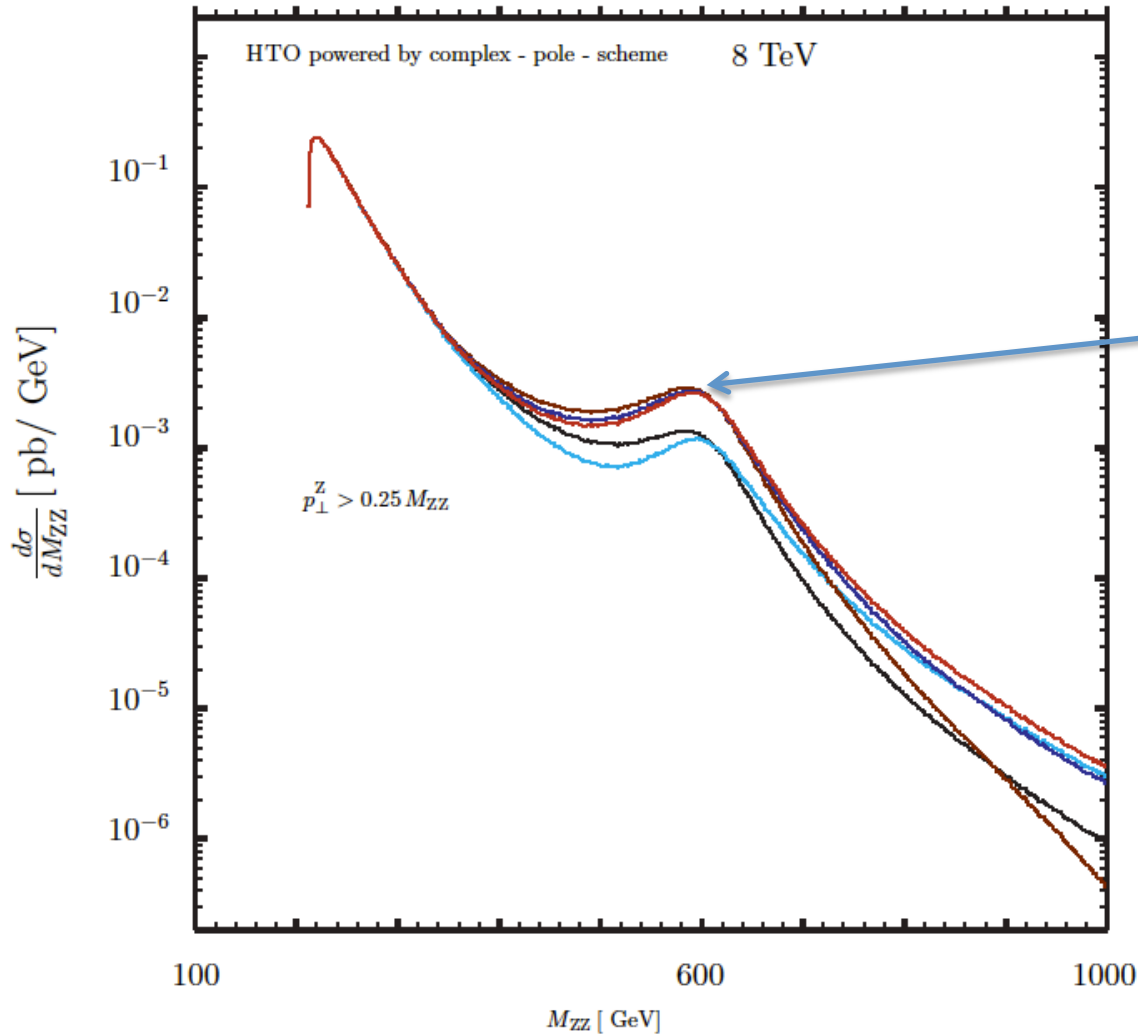
$p_T(V) > 7 \text{ GeV}$		$\sigma \text{ [fb]}, pp, \sqrt{s} = 8 \text{ TeV, single flavour } (l, \nu)$			interference	
process	$M_H$	$ \mathcal{M}_H ^2$	$ \mathcal{M}_{\text{cont}} ^2$	$ \mathcal{M}_H + \mathcal{M}_{\text{cont}} ^2$	$R_1$	$R_2$
2l2v	500 GeV	0.4264(4)	0.19956(8)	0.6284(4)	1.0039(8)	1.006(2)
4l	500 GeV	0.1131(5)	0.2649(9)	0.382(2)	1.010(5)	1.03(2)

(S + B)-inspired interference measure:  $R_1 = \sigma(|\mathcal{M}_H + \mathcal{M}_{\text{cont}}|^2) / [\sigma(|\mathcal{M}_H|^2) + \sigma(|\mathcal{M}_{\text{cont}}|^2)]$

(S/B)-inspired interference measure:  $R_2 = \sigma(|\mathcal{M}_H|^2 + 2 \text{Re}(\mathcal{M}_H \mathcal{M}_{\text{cont}}^*)) / \sigma(|\mathcal{M}_H|^2)$

# Interference in H->ZZ: mZZ shape

New results from Giampiero



S+B (LO)

S+B+I (LO)

S+B+I comparing different recipes to scale to NNLO  
( $K = S_{NNLO}/S_{LO}$ )

multiplicative  
(S+I)\*K + B

additive  
(S\*K) + I + B

intermediate:  
S\*K + I\*K' + B

where K' just include gg initiated diagrams

# Interference for ZZ

## □ total Xsec

- 8 TeV small effect ~few %

-> much smaller than PDF and scale uncertainty

-> can we just neglect it?

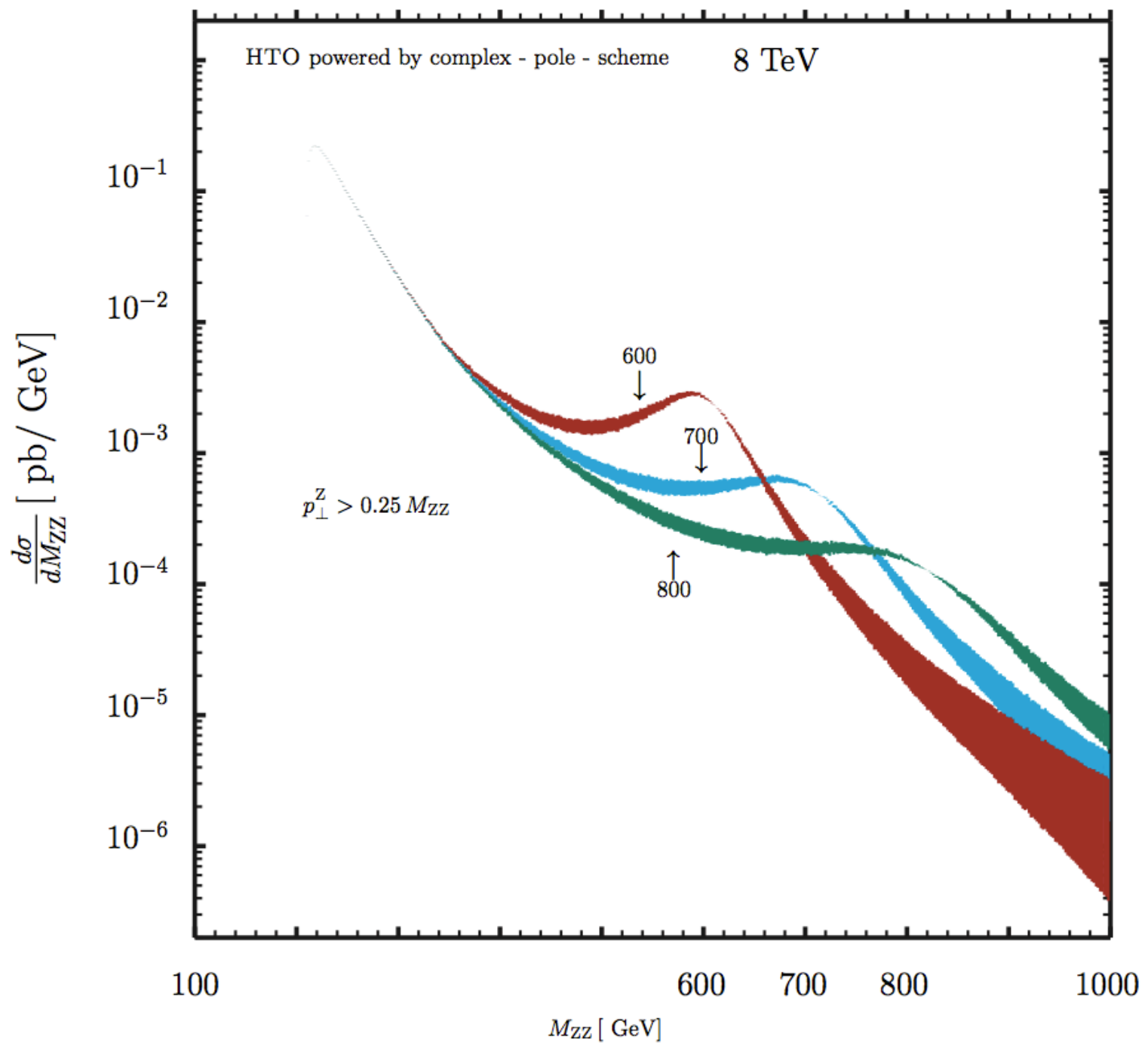
- 7 TeV numbers

can we assume  $I/(S+B) \sim \text{constant}$  btw 7 and 8 TeV ?

## □ mZZ shape: much larger effect

- $I/(S+B)$  central values + uncertainty bin by bin comparing different recipes (as in previous slide)

- From Giampiero we get the  $R = [(S+B+I)/(S+B) - 1]$  with the intermediate recipe and the uncertainty from the difference w.r.t. the other two recipes. Thus we will correct our signal by:  $S \rightarrow S+I = S + (S+B) * R$



# Interference for WW

□ Effect is huge on the inclusive xsec and on ALL the shapes (not just mH)

-> only way to go is to run MCFM

-> never in time for ICHEP

-> keep the huge uncertainty on xsec as for 2011 recipe:

$$1 + 1.5 * (mH/TeV)^3$$