

# VBF Higgs to Invisible

HIG-14-038, AN-14-243

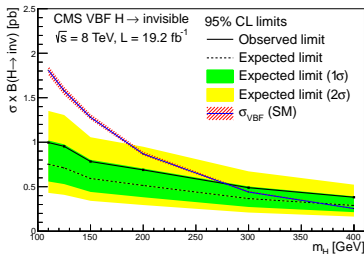
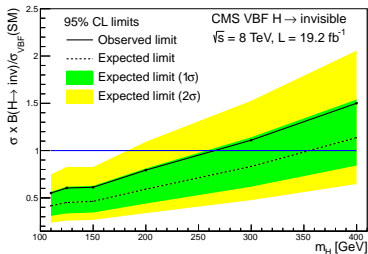
## Points in favour of a journal article

- ▶ This is a legacy result not an intermediate result:
  - due to reduced trigger acceptance we don't expect to improve our expected limit until at least the end of 2016
- ▶ Systematic uncertainties are not all finalised:
  - Uncertainty on the  $Z \rightarrow \nu\nu$  background from the extrapolation from the  $Z \rightarrow \mu\mu$  region and JES/JER
- ▶ The final limit from combining with ZH searches is significantly improved:
  - first direct observed(expected) limit on  $B(H \rightarrow \text{inv})$  below 50(40)%
  - a relative improvement of 17% on the previous combined observed limit and 11% on the expected limit

## VBF only limit

- We hope to improve the  $Z/\gamma^* \rightarrow \mu\mu$  to  $Z \rightarrow \nu\nu$  extrapolation uncertainty
  - This could double our improvement in expected limit over the prompt analysis
  - It could allow us to reproduce the prompt data combined limit in the VBF channel alone

	Observed (expected) limit on $B(H \rightarrow \text{inv})$
Prompt analysis	0.65 (0.49)
Parked analysis (current $Z \rightarrow \nu\nu$ unc.)	0.60 (0.45)
Parked analysis (improved $Z \rightarrow \nu\nu$ unc.)	0.58 (0.41)



## Combination with ZH

- ▶ The improvement to the combined result is greater than that in VBF only
  - Prompt limit was 0.58 (0.44) observed (expected)
  - With the parked VBF analysis this becomes 0.48(0.39)
- ▶ We believe this to be due to the new VBF best fit signal strength being more similar to that from ZH.

## Combination with ZH

