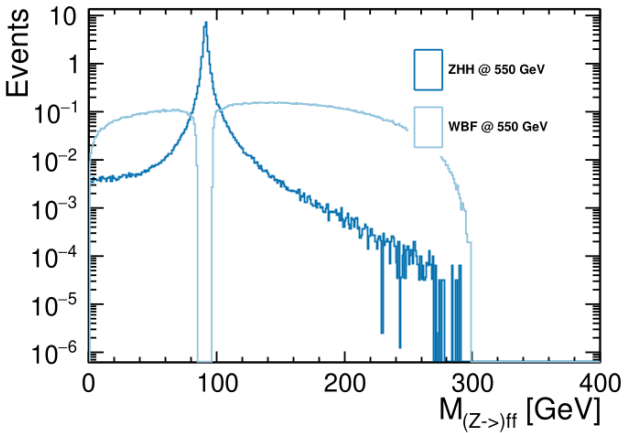
ZHH Analysis.

ZHH/WBF splitting

Julie Munch Torndal

Di-Higgs working group meeting
May 6, 2026

ZHH/WBF splitting



cut window at 79 GeV to 102 GeV

DESY.

Cross sections

E_{CM} = 550 GeV	$eeHH$	$\mu\mu HH$	$\tau\tau HH$	$\nu_e\nu_e HH$	$\nu_{\mu,\tau}\nu_{\mu,\tau}HH$	$qqHH$
σ_{LR} [fb]	0.0132	0.0127	0.0126	0.0407	0.0501	0.256
σ_{RL} [fb]	0.008 32	0.008 11	0.008 09	0.0160	0.0320	0.164
σ_{LL} [fb]	0.000 512					
σ_{RR} [fb]	0.000 512					
$\sigma_{(-0.8,0.3)}$ [fb]	0.008 20	0.007 69	0.007 67	0.0244	0.0304	0.155
N_{exp}	16.4	15.4	15.3	48.8	60.8	311

	$\ell\ell HH$	$\nu_\ell\nu_\ell HH$	$qqHH$
$\sigma_{(-0.8,0.3)}$ [fb]	0.024	0.055	0.16
N_{exp}	47	110	310

In cross sections, 17% of events from WBF+interference:

$$(48, 8\text{–}30, 4)/(48, 8 + 60, 8) = 0.17$$

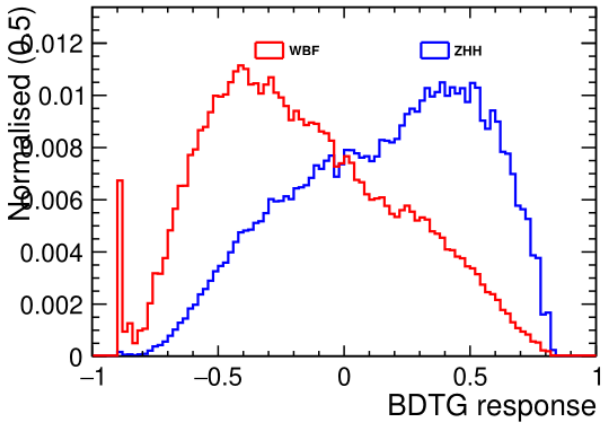
In training, 28% of events assigned as WBF events:

$$10, 5/(16, 5 + 20, 6) = 0.28$$

Some effect from negative interference, but OK splitting?

	σ [fb]	expected events
$e\nu bbqq$	113	$2.27 \cdot 10^5$
$\mu\nu bbqq$	112	$2.25 \cdot 10^5$
$\tau\nu bbqq$	113	$2.26 \cdot 10^5$
$\nu\nu bbbb$	0.0662	132
bbqqqq	326	$6.52 \cdot 10^5$
$\nu\nu$bb	168	$3.35 \cdot 10^5$
$\tau\tau$bb	13.9	$2.79 \cdot 10^4$
bbbb	12.2	$2.44 \cdot 10^4$
qqbb	147	$2.94 \cdot 10^5$
ttH	1.32	$2.64 \cdot 10^3$
ttZ	3.38	$6.75 \cdot 10^3$
vvqqH	0.418	837
Other bkgs	$3.08 \cdot 10^4$	$6.15 \cdot 10^7$
Total bkg	$3.18 \cdot 10^4$	$6.36 \cdot 10^7$
vvHH	0.0548	110
(**v23v23bbbb**)	0.0103	20.6
(**v1v1bbbb**)	0.00827	16.5
(**WBF**)	0.00524	10.5

Next steps



Make plot a la above for ZHH and WBF signal classes