

ZHH Analysis.

Template fit

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Di-Higgs working group meeting
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HELMHOLTZ



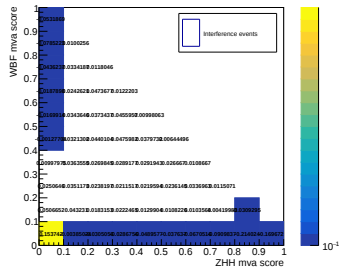
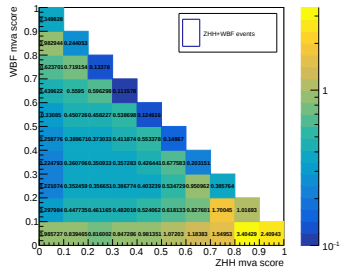
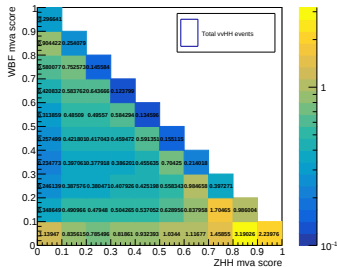
Fit model

$$\text{Template} = f_1 * \text{hist}_{ZHH} + f_2 * \text{hist}_{WBF} + \text{hist}_{int}$$

Fit model: 2D χ^2

$$LLH = \sum_i \sum_j \text{Log}(\text{Poisson}(SM_{i,j}, \text{temp}_{i,j}))$$

where $SM_{i,j}$ is rounded to an integer



Result of fit with binning of 10×10 bins

FCN=37.9302 FROM MIGRAD

STATUS=CONVERGED

50 CALLS

51 TOTAL

EDM=7.75211e-08

STRATEGY= 2

ERROR MATRIX ACCURATE

EXT PARAMETER				STEP	FIRST
NO.	NAME	VALUE	ERROR	SIZE	DERIVATIVE
1	factor1	9.23887e-01	2.74155e-01	7.81267e-04	1.42408e-03
2	factor2	4.88991e-01	6.82495e-01	1.95952e-03	3.97783e-04
factor1 = 0.923887		Confidence Interval : [0.676877, 1.21944] (parab = 0.274155)			
factor2 = 0.488991		Confidence Interval : [0.488991, 1.33828] (parab = 0.682495)			

Summary

Incl. rounding, incl. interference

binning	factor1	factor2
10x10	0.923887 ± 0.274155	0.488991 ± 0.682495
9x9	1.09334 ± 0.305417	0.551304 ± 0.835141
8x8	1.03736 ± 0.299815	1.19304 ± 1.00195
7x7	1.00159 ± 0.293069	1.04782 ± 0.942873
6x6	0.976458 ± 0.299715	1.17209 ± 1.0294
5x5	1.04184 ± 0.302669	0.651508 ± 0.883524

Excl rounding, incl. interference

Incl. rounding, excl. interference

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10x10	0.923887 ± 0.274155	0.488991 ± 0.682495
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5x5	1.04184 ± 0.302669	0.651508 ± 0.883524
binning	factor1	factor2

Excl rounding, incl. interference

10x10	1.00001 ± 0.294398	0.999986 ± 0.932861
9x9	1 ± 0.294753	0.999989 ± 0.936208
8x8	1 ± 0.29514	0.99999 ± 0.938739
7x7	1 ± 0.295826	0.999992 ± 0.945515
6x6	1 ± 0.296929	0.999994 ± 0.955923
5x5	1 ± 0.298564	0.999997 ± 0.970001

Incl. rounding, excl. interference

Summary

Incl. rounding, incl. interference

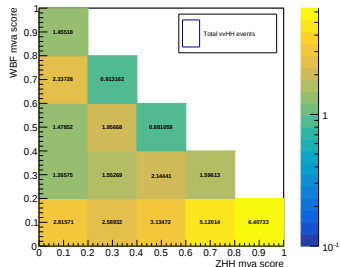
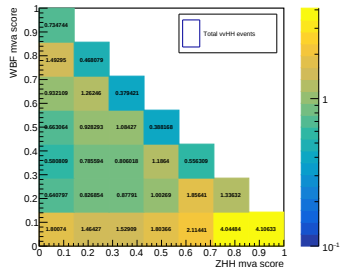
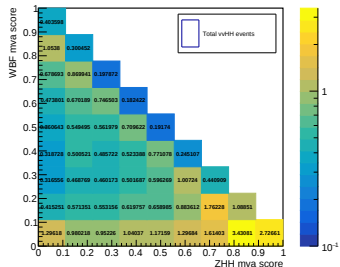
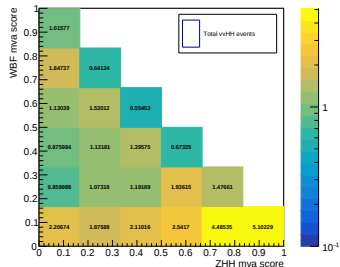
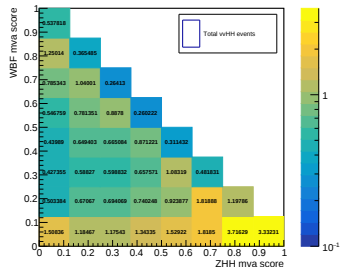
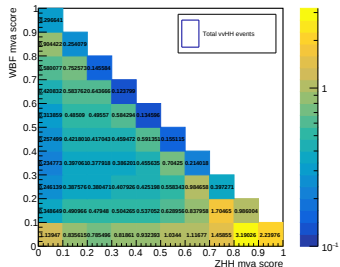
binning	factor1	factor2
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9x9	1.09334 ± 0.305417	0.551304 ± 0.835141
8x8	1.03736 ± 0.299815	1.19304 ± 1.00195
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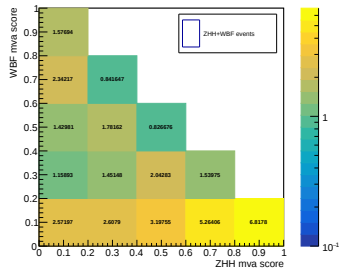
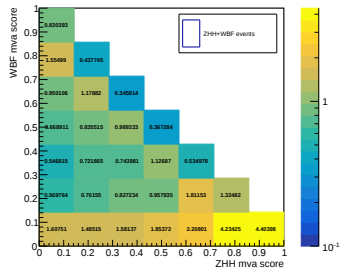
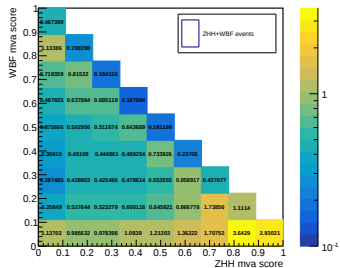
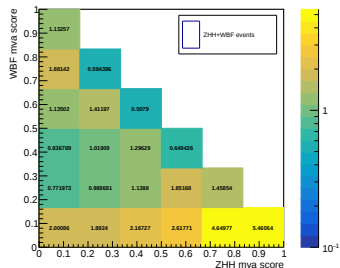
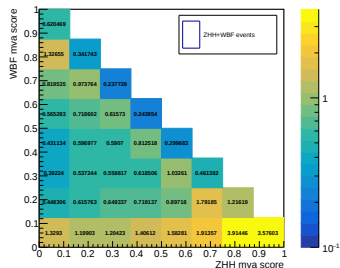
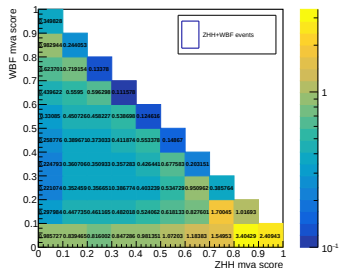
Excl rounding, incl. interference

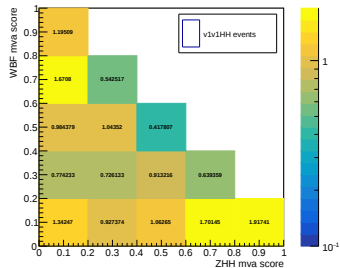
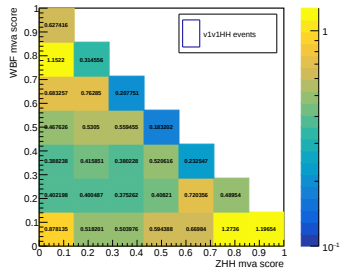
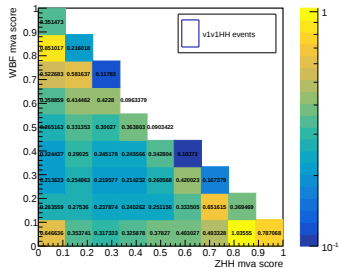
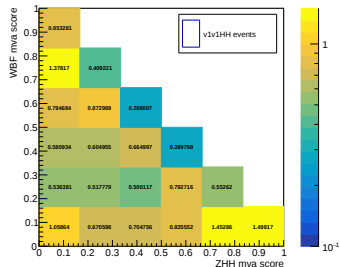
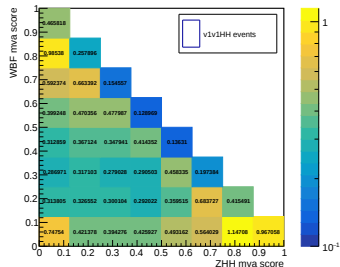
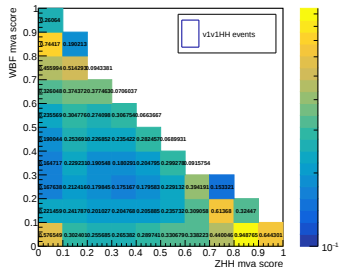
binning	factor1	factor2
10x10	1.00001 ± 0.294398	0.999986 ± 0.932861
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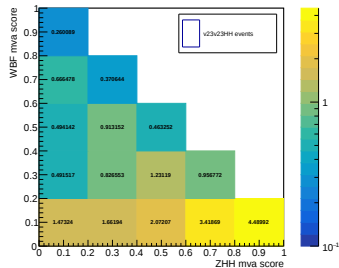
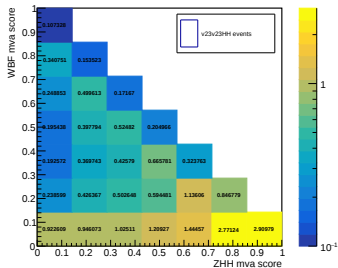
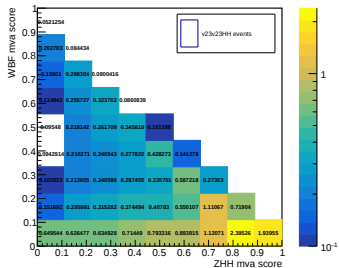
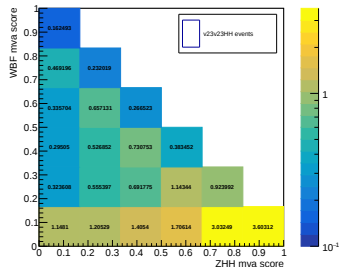
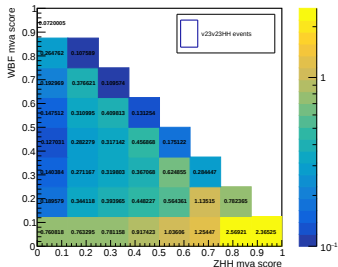
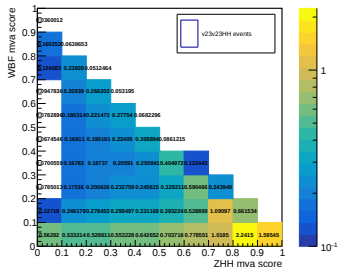
Incl. rounding, excl. interference

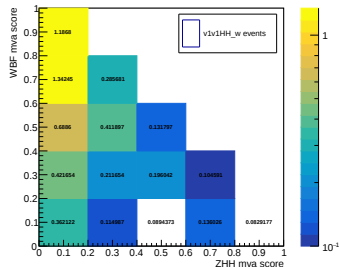
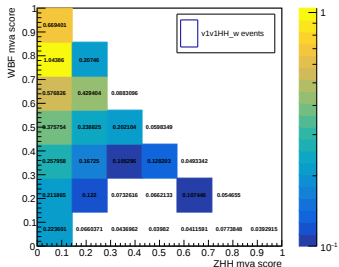
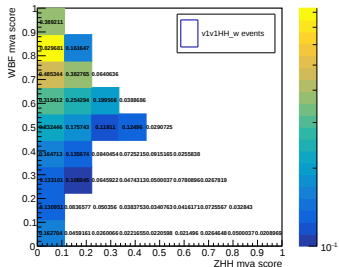
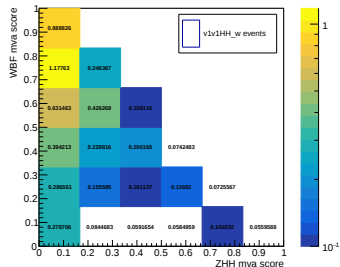
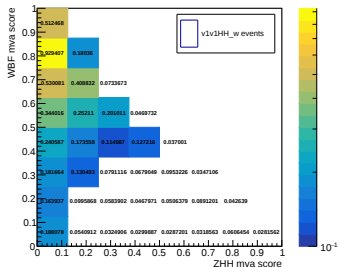
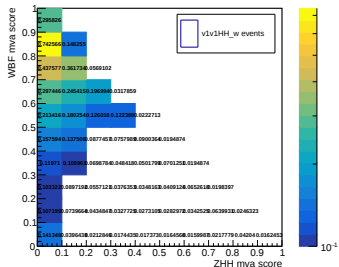
binning	factor1	factor2
10x10	0.922083 ± 0.272323	0.455334 ± 0.708311
9x9	1.10363 ± 0.315134	0.560597 ± 0.907012
8x8	1.04445 ± 0.313423	1.21191 ± 1.06611
7x7	1.00314 ± 0.302868	1.07723 ± 1.0096
6x6	0.972507 ± 0.305572	1.23473 ± 1.07616
5x5	1.04829 ± 0.303617	0.673194 ± 0.927778

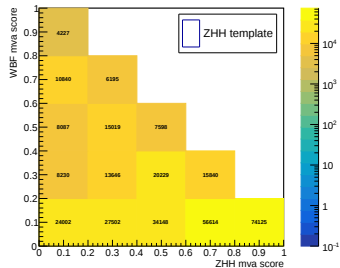
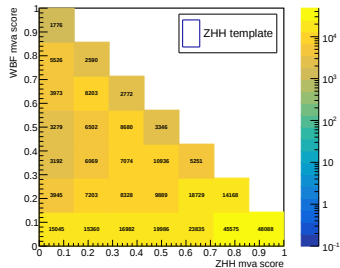
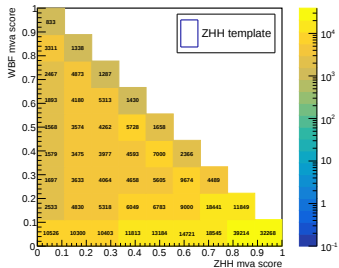
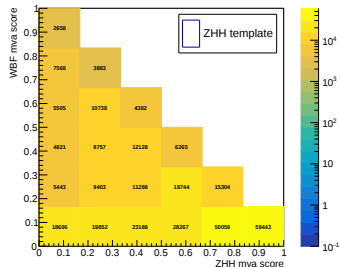
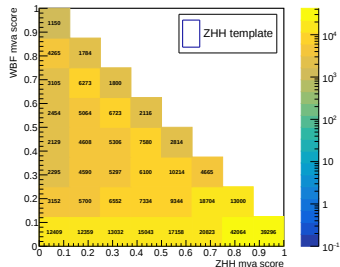
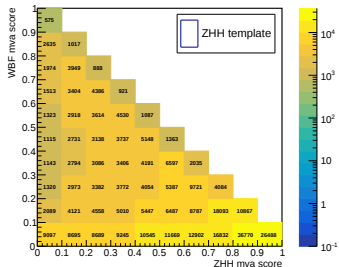


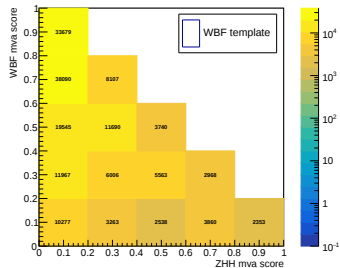
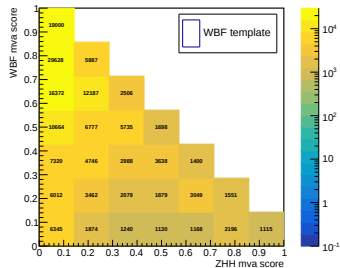
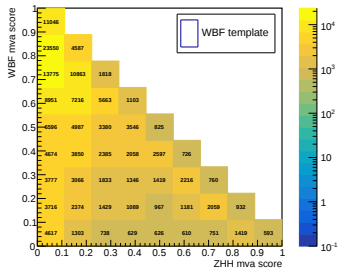
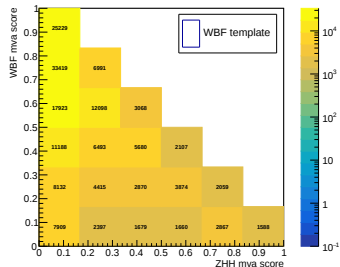
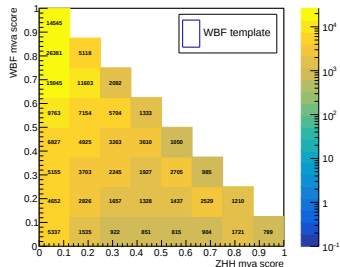
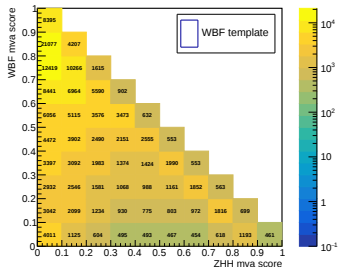




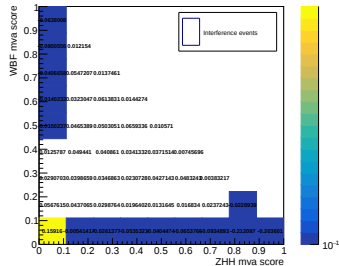
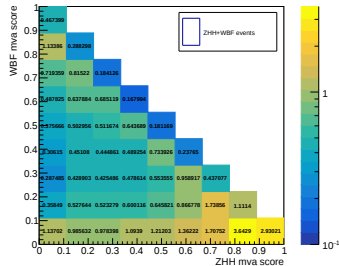
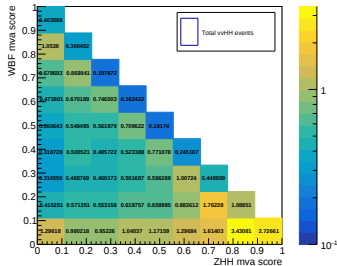








Backup



Result of fit with binning of 9x9 bins

FCN=38.4945 FROM MIGRAD

STATUS=CONVERGED

62 CALLS

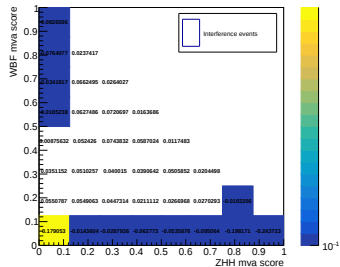
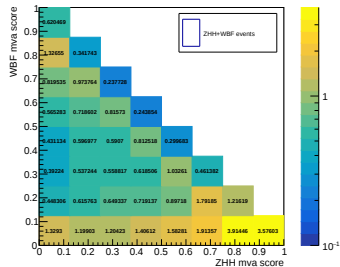
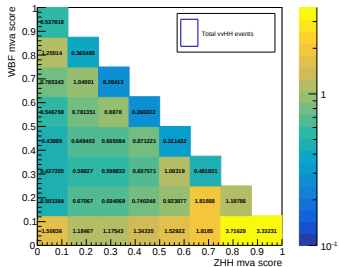
63 TOTAL

EDM=2.90777e-07

STRATEGY= 2

ERROR MATRIX ACCURATE

EXT PARAMETER				STEP	
NO.	NAME	VALUE	ERROR	SIZE	FIRST DERIVATIVE
1	factor1	1.09334e+00	3.05417e-01	8.68827e-04	-1.10007e-03
2	factor2	5.51304e-01	8.35141e-01	2.38898e-03	-9.88604e-04
factor1 = 1.09334				Confidence Interval : [0.810547, 1.42418] (parab = 0.305417)	
factor2 = 0.551304				Confidence Interval : [0.551304, 1.58939] (parab = 0.835141)	



Result of fit with binning of 8x8 bins

FCN=35.3329 FROM MIGRAD

STATUS=CONVERGED

62 CALLS

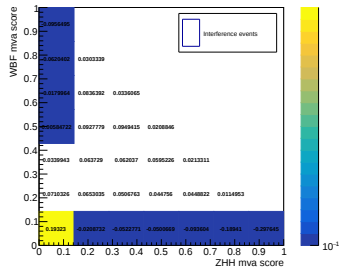
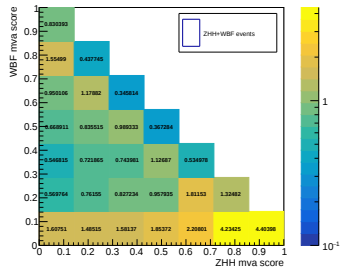
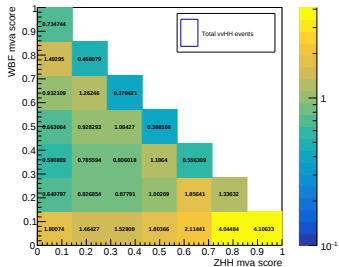
63 TOTAL

EDM=1.26782e-07

STRATEGY= 2

ERROR MATRIX ACCURATE

EXT	PARAMETER	STEP	FIRST
NO.	NAME	SIZE	DERIVATIVE
1	factor1	8.27368e-04	-1.33495e-04
2	factor2	2.72525e-03	4.86442e-04
factor1 = 1.03736		Confidence Interval : [0.757466, 1.36595] (parab = 0.299815)	
factor2 = 1.19304		Confidence Interval : [0.372667, 2.37254] (parab = 1.00195)	



Result of fit with binning of 7x7 bins

FCN=29.9478 FROM MIGRAD

STATUS=CONVERGED

57 CALLS

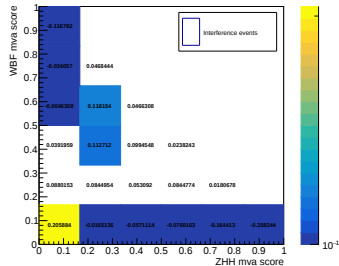
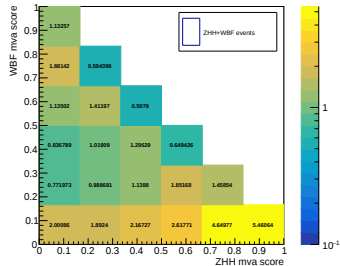
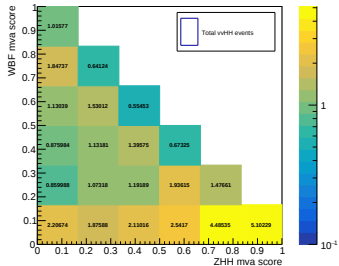
58 TOTAL

EDM=2.72416e-09

STRATEGY= 2

ERROR MATRIX ACCURATE

EXT PARAMETER				STEP	
NO.	NAME	VALUE	ERROR	SIZE	FIRST DERIVATIVE
1	factor1	1.00159e+00	2.93069e-01	7.42406e-04	-2.13381e-04
2	factor2	1.04782e+00	9.42873e-01	2.39317e-03	-7.16518e-05
factor1 = 1.00159		Confidence Interval : [0.729633, 1.32286] (parab = 0.293069)			
factor2 = 1.04782		Confidence Interval : [0.270497, 2.17385] (parab = 0.942873)			



Result of fit with binning of 6x6 bins

FCN=25.3391 FROM MIGRAD

STATUS=CONVERGED

57 CALLS

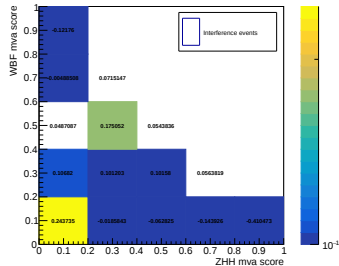
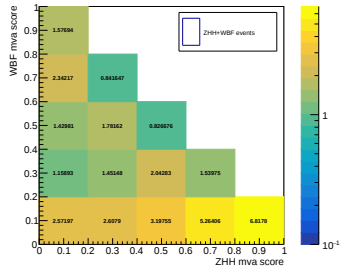
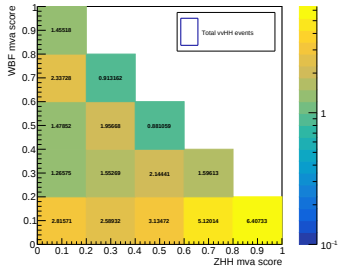
58 TOTAL

EDM=3.55329e-09

STRATEGY= 2

ERROR MATRIX ACCURATE

EXT	PARAMETER			STEP	FIRST
NO.	NAME	VALUE	ERROR	SIZE	DERIVATIVE
1	factor1	9.76458e-01	2.99715e-01	6.84651e-04	2.47734e-04
2	factor2	1.17209e+00	1.02940e+00	2.35188e-03	-1.94649e-05
factor1 = 0.976458		Confidence Interval : [0.703588, 1.29994] (parab = 0.299715)			
factor2 = 1.17209		Confidence Interval : [0.320736, 2.35978] (parab = 1.0294)			



Result of fit with binning of 5x5 bins

FCN=19.8583 FROM MIGRAD

STATUS=CONVERGED

38 CALLS

39 TOTAL

EDM=1.40219e-06

STRATEGY= 2

ERROR MATRIX ACCURATE

EXT PARAMETER

STEP

FIRST

NO. NAME

VALUE

ERROR

SIZE

DERIVATIVE

1 factor1

1.04184e+00

3.02669e-01

6.11309e-04

2.54290e-03

2 factor2

6.51508e-01

8.83524e-01

1.82029e-03

2.07012e-03

factor1 = 1.04184

Confidence Interval : [0.763379, 1.36874] (parab = 0.302669)

factor2 = 0.651508

Confidence Interval : [-0.0380866, 1.72265] (parab = 0.883524)