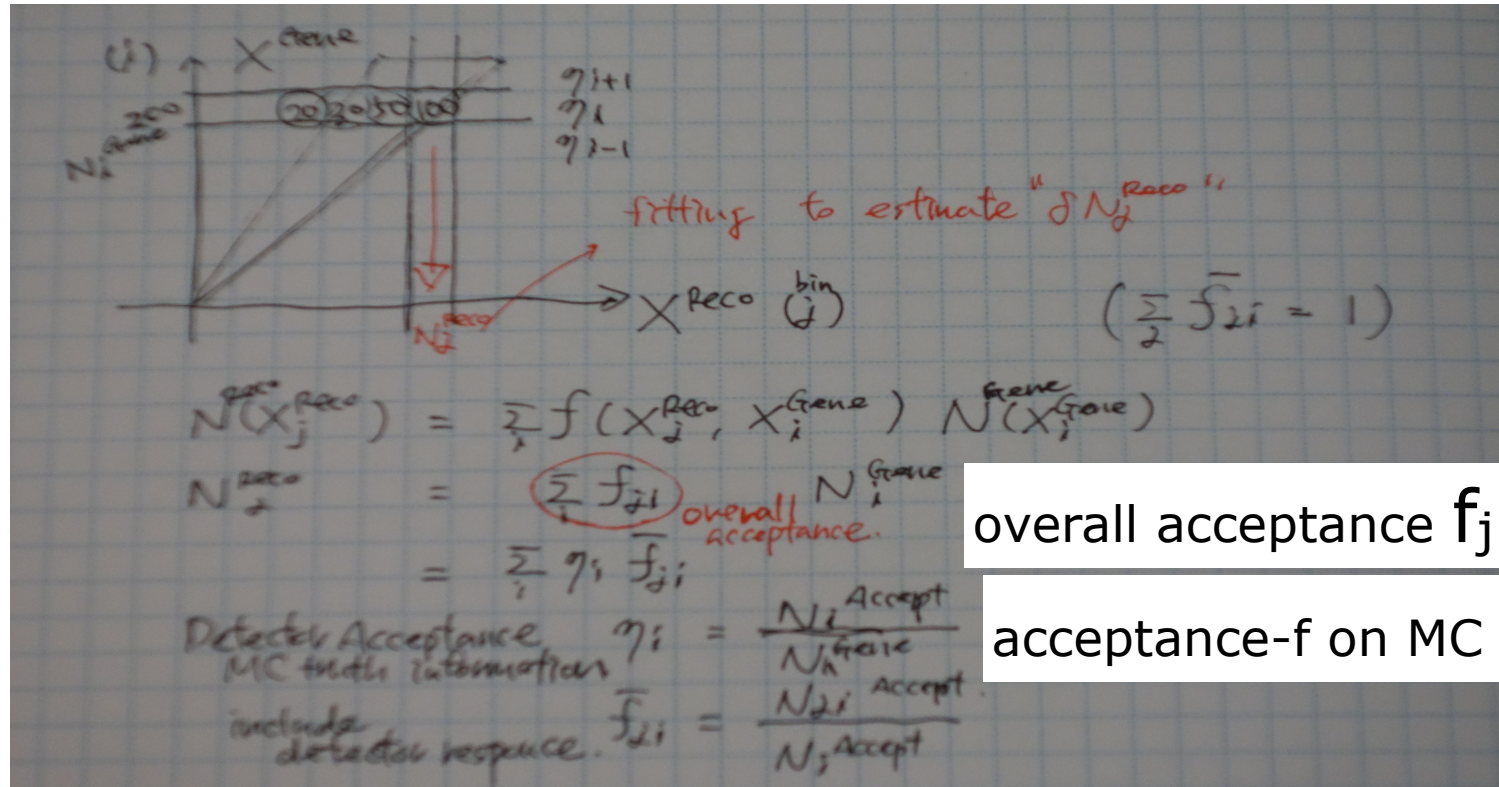
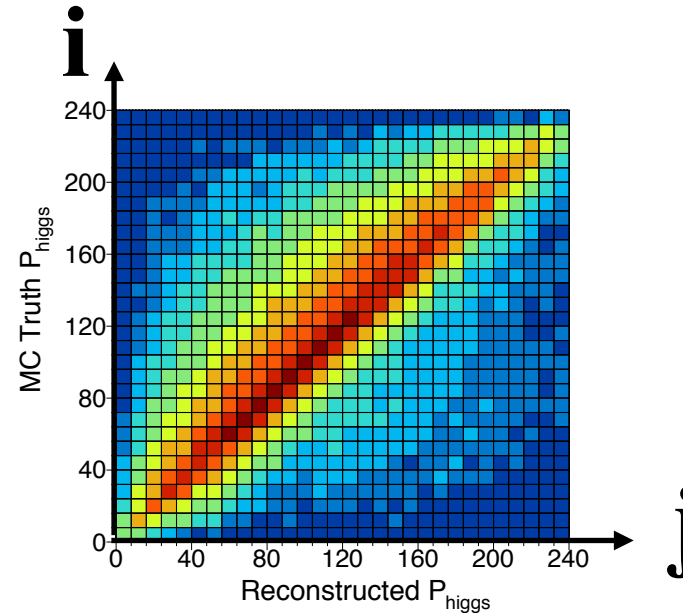
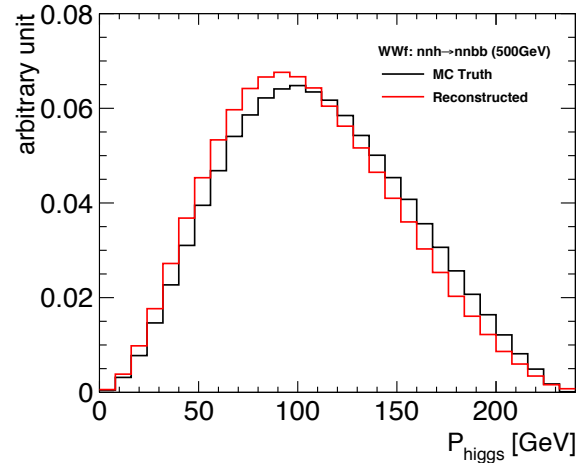


16/02/12

- Analysis on HWW anomalous.
- The process “500GeV (WW-f)” is still analyzed.
- Change the analysis method which is to use “overall acceptance-f”.
- Expand “f” from 1 to 2or3-dimension to use 2or3 kinds of variables.

Overall Acceptance

500GeV WWf vvh ($h \rightarrow bb$)

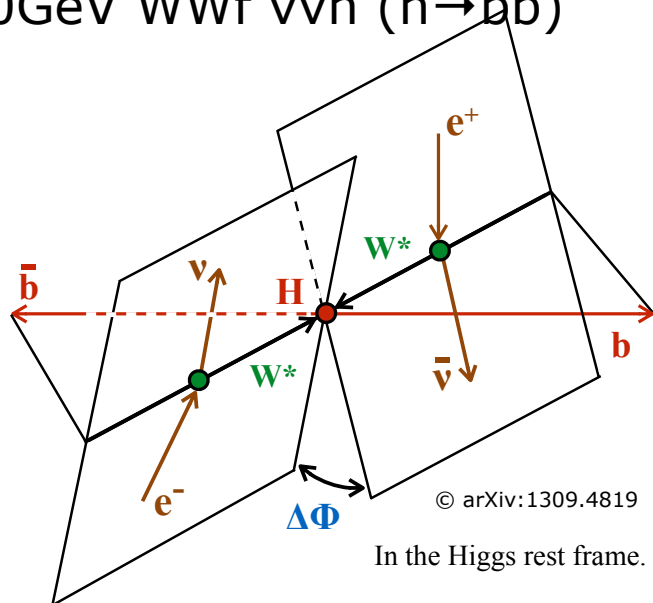


overall acceptance f_j

acceptance-f on MC η_i

Overall Acceptance

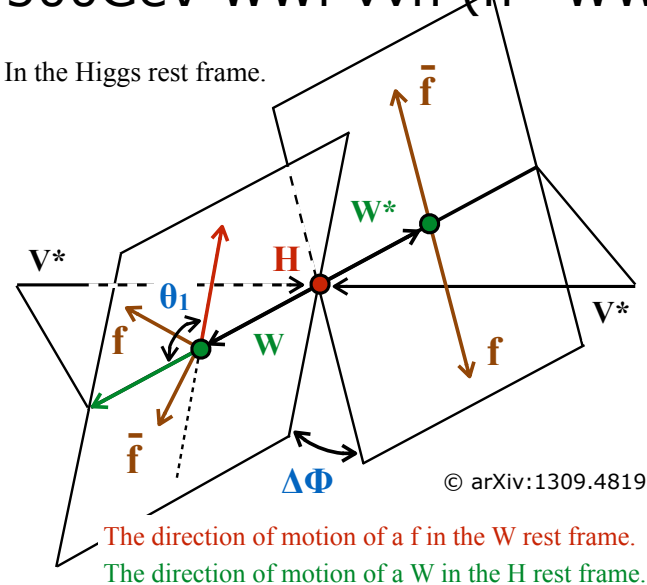
500GeV WWf vv $\bar{h}$ ($h \rightarrow b\bar{b}$)



Ph, θ_h

500GeV WWf vv $\bar{h}$ ($h \rightarrow WW^* \rightarrow 4j$)

In the Higgs rest frame.



Pw, θ_1 , $\Delta\Phi$

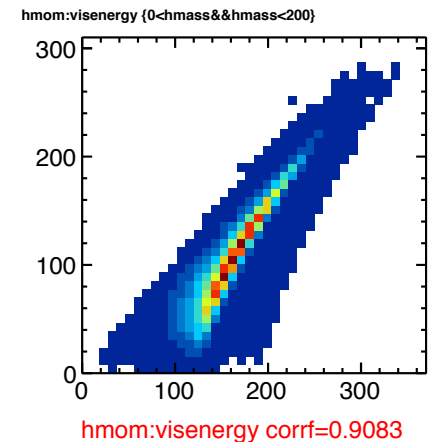
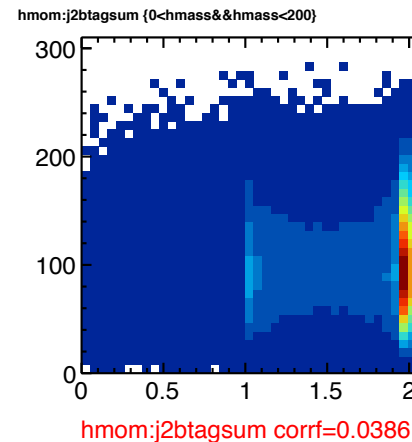
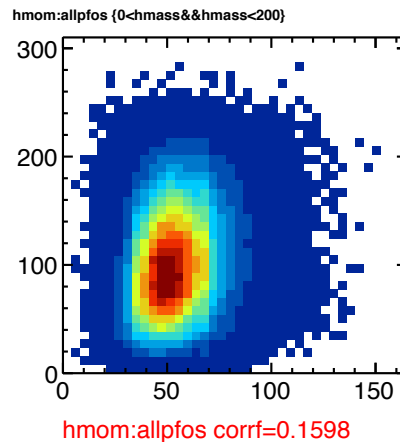
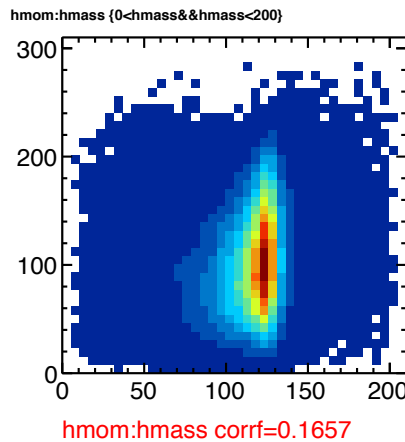
Expand to use 3 variables

$$\begin{aligned}
 & \lambda_2 + \alpha\beta + (pq) \\
 & N^{\text{Rec}}(X_{\beta\gamma}^{\text{Rec}}) = \sum_i \cdot \sum_\alpha \cdot \sum_p f(X_{\beta\gamma}^{\text{Rec}}, X_{i\alpha p}^{\text{Gene}}) \times N(X_{i\alpha p}^{\text{Gene}}) \\
 & \quad \left(\sum_k \cdot \sum_\alpha \cdot \sum_p f_{\beta\gamma i\alpha p} \right) \\
 & = \sum_i \cdot \sum_\alpha \cdot \sum_p \eta_{i\alpha p} \bar{f}_{\beta\gamma i\alpha p} \\
 & \text{detector acceptance } \eta_{i\alpha p} = \frac{N_{i\alpha p}^{\text{Accept}}}{N_{i\alpha p}^{\text{Gene}}} \\
 & \text{(6-dim array). } \bar{f}_{\beta\gamma i\alpha p} = \frac{N_{\beta\gamma i\alpha p}^{\text{Accept}}}{N_{i\alpha p}^{\text{Accept}}}
 \end{aligned}$$

Philosophy of Analysis

- Make an acceptance flat.
- Choose variables we use for Bkgs suppression.
Check correlations between sensitive variables and cut variables.
- Scan them to get the most significant points for Sig.
- Sometimes loosen them partially in order to avoid an uneven acceptance.

e.g.) 500GeV WWf vvh ($h \rightarrow b\bar{b}$)



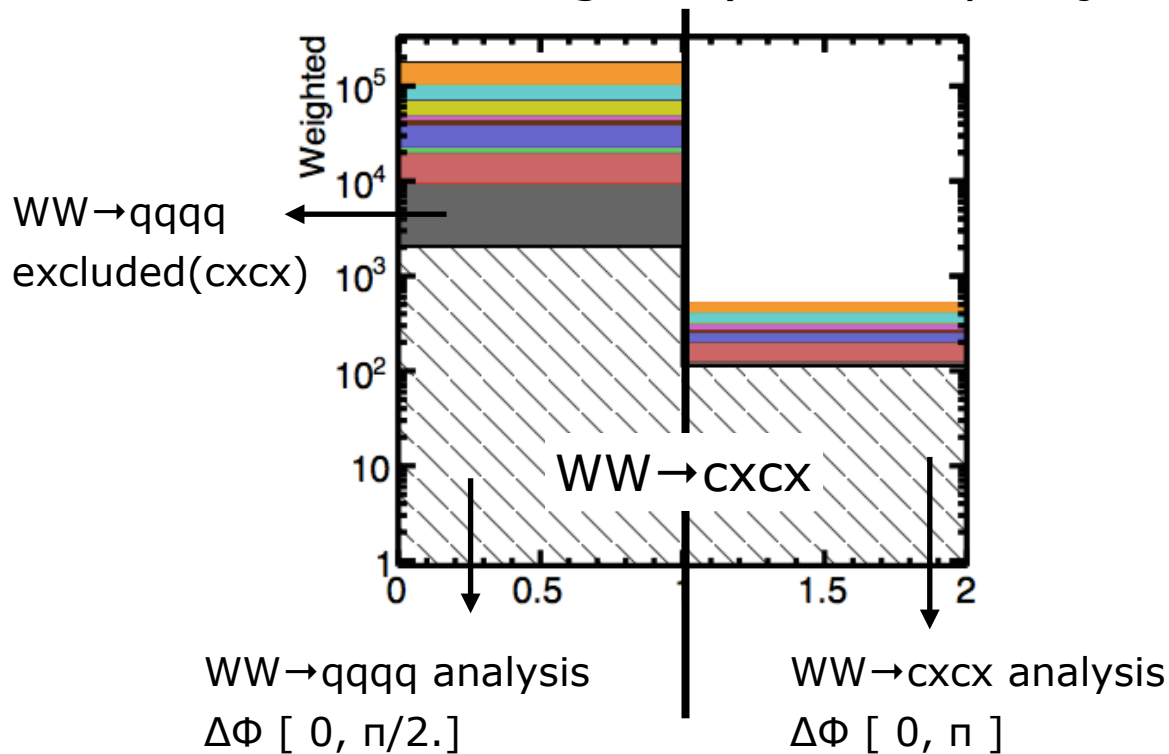
- Visible energy is very useful to cut Bkgs, but strongly correlated.

Categorization on $h \rightarrow WW^* \rightarrow 4j$ ets

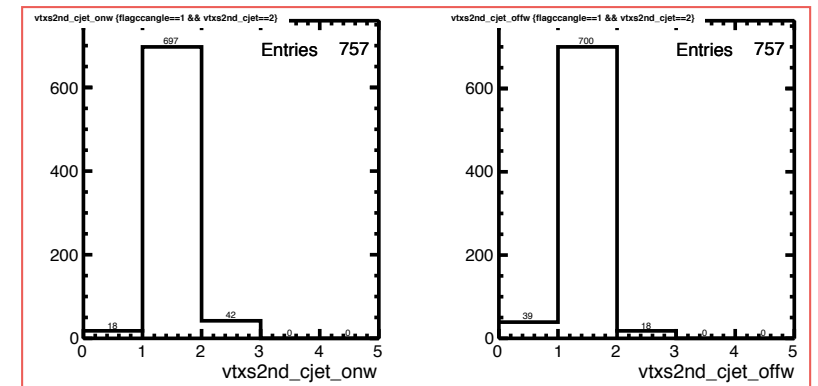
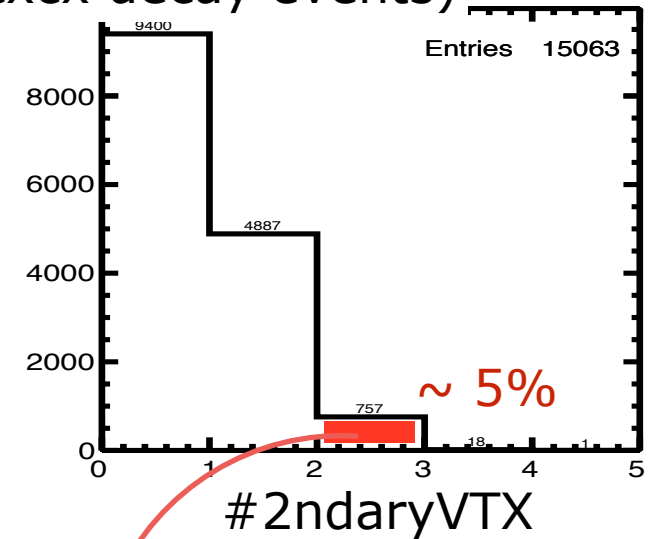
500GeV WWf vvh ($h \rightarrow WW^* \rightarrow 4j$)

- cc-jets are useful for $\Delta\Phi$ reconstruction.
- Events which have two 2ndary vertices is $\sim 5\%$ for all $WW \rightarrow cxcx$ decay events.

After all cuts + ctag cut (to identify cc-jets)



(cxcx decay events)

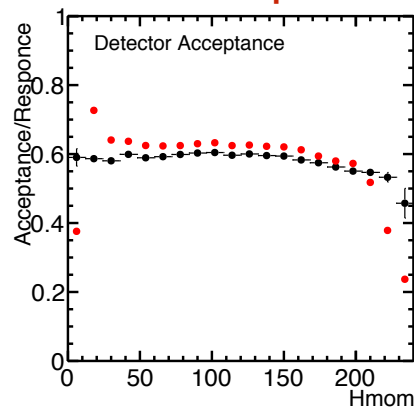


#2ndaryVTX
from cjet
which is derived from W

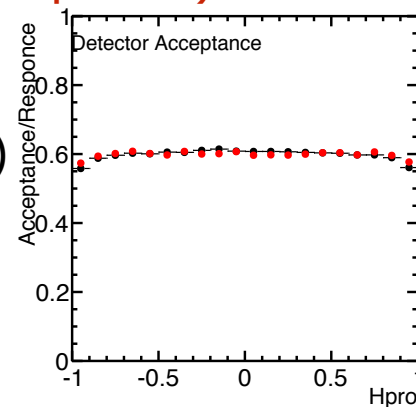
#2ndaryVTX
from cjet
which is derived from W*

1D Acceptance

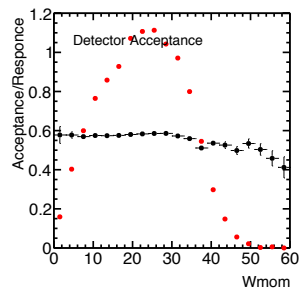
η_i (acceptance MC info)
 f_j (overall acceptance included detector response)



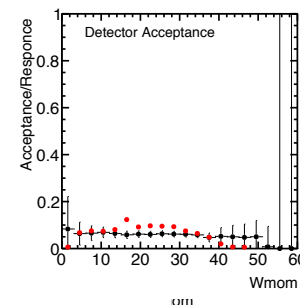
500GeV
 WWf vvh ($h \rightarrow bb$)
 Ph



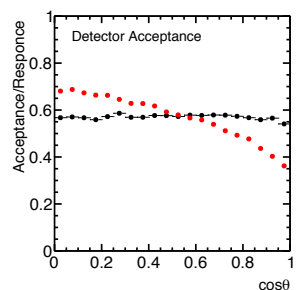
500GeV
 WWf vvh ($h \rightarrow bb$)
 θh



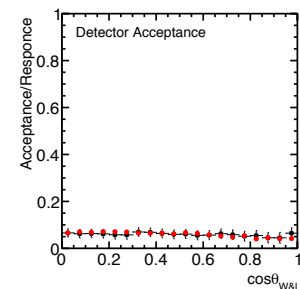
500GeV WWf
 WW $\rightarrow$ qqqq
 Pw



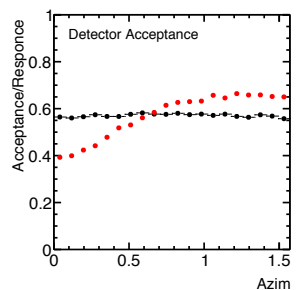
500GeV WWf
 WW $\rightarrow$ cxcx
 Pw



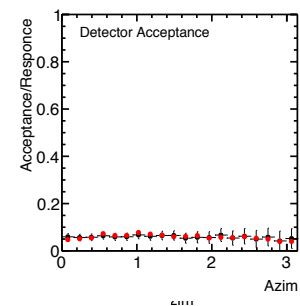
500GeV WWf
 WW $\rightarrow$ qqqq
 $\theta 1$



500GeV WWf
 WW $\rightarrow$ cxcx
 $\theta 1$



500GeV WWf
 WW $\rightarrow$ qqqq
 $\Delta\Phi$

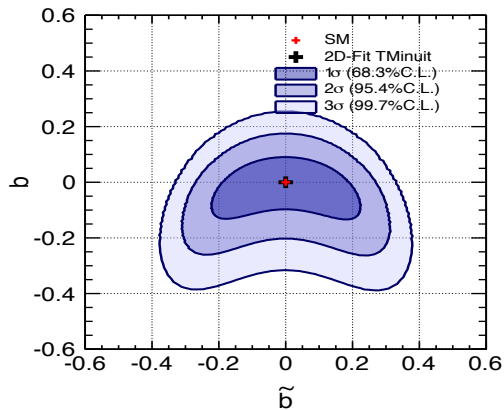


500GeV WWf
 WW $\rightarrow$ cxcx
 $\Delta\Phi$

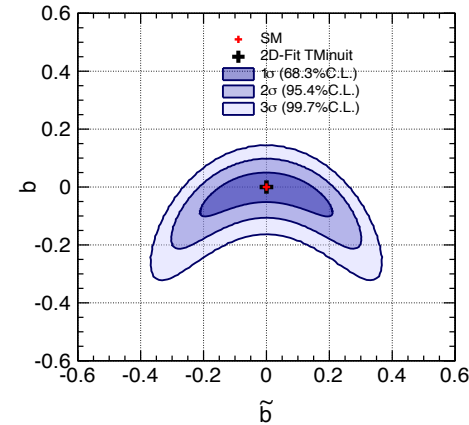
Sensitivity on b vs bt

500GeV WWf vv $\bar{v}$ h (h $\rightarrow$ bb)

Ph

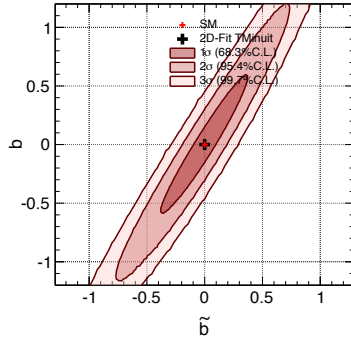


Ph+ θ h

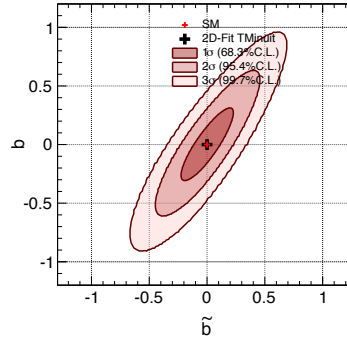


500GeV WWf WW $\rightarrow$ qqqq

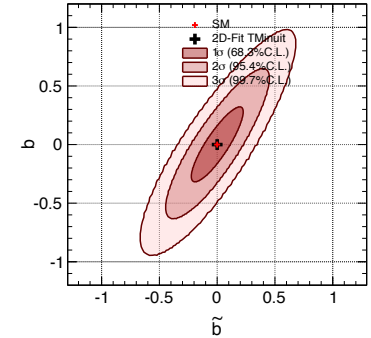
Pw



θ 1+Pw

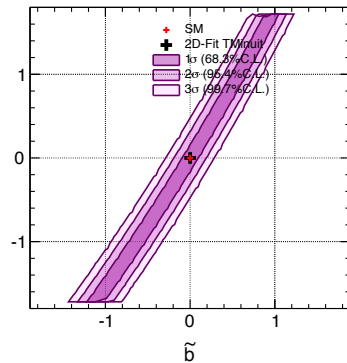


$\Delta\Phi$ + θ 1+Pw

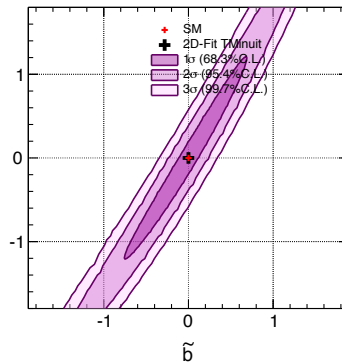


500GeV WWf WW $\rightarrow$ cxcx

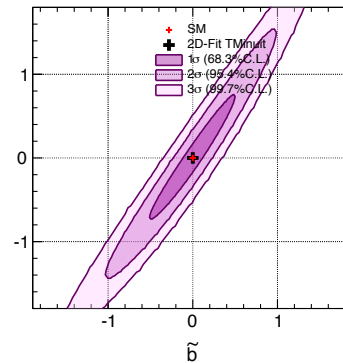
$\Delta\Phi$



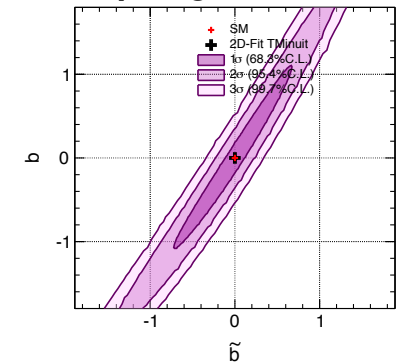
$\Delta\Phi$ + θ 1



Pw+ θ 1

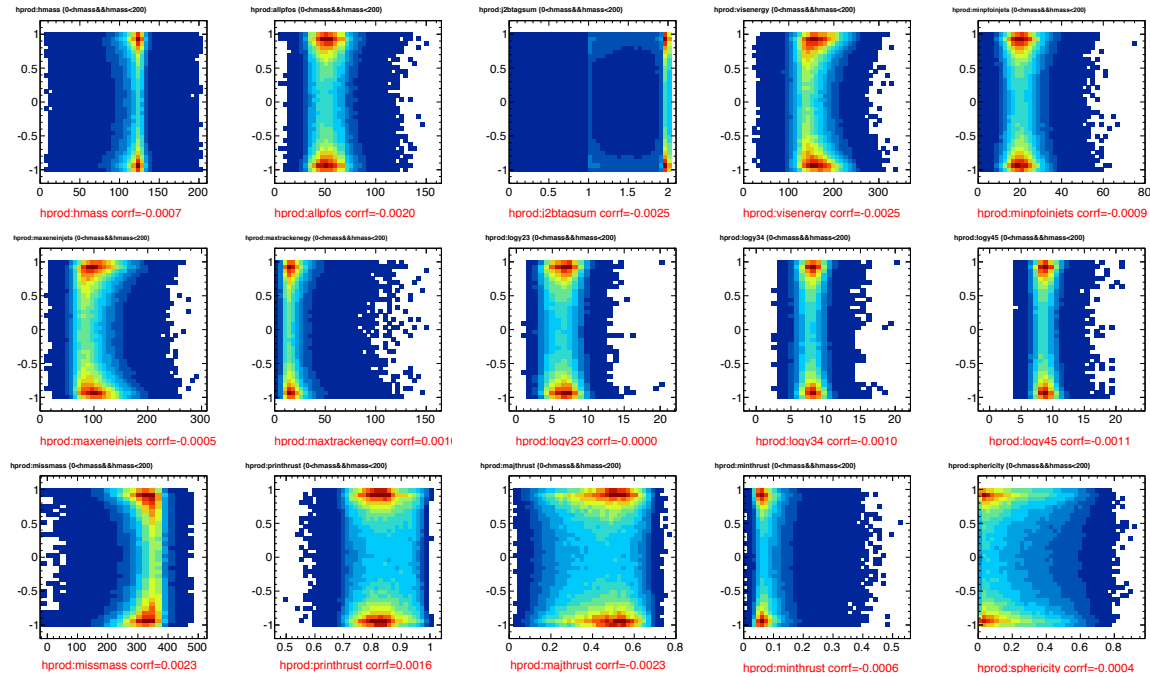
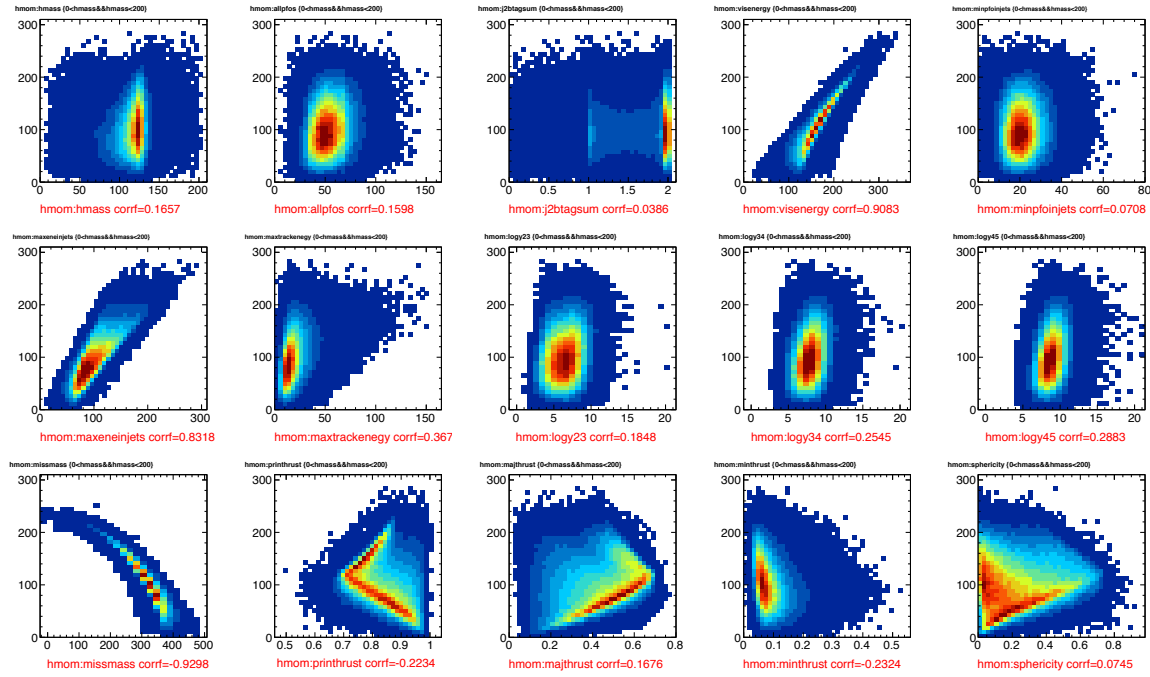


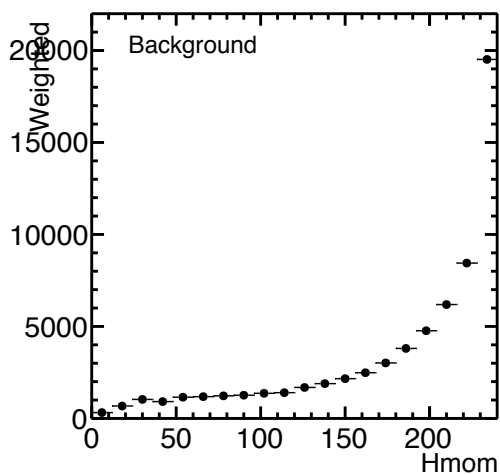
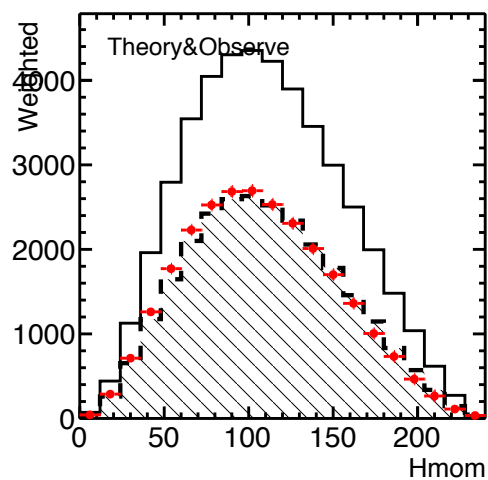
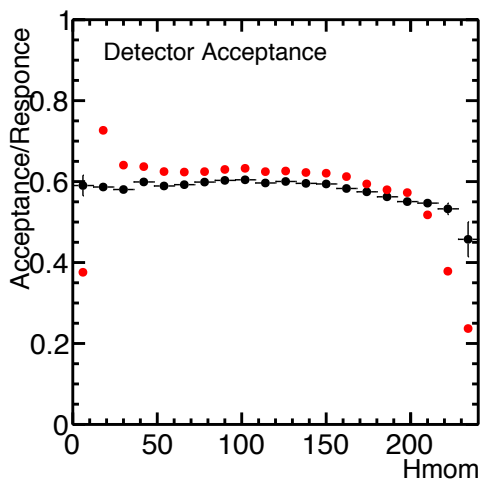
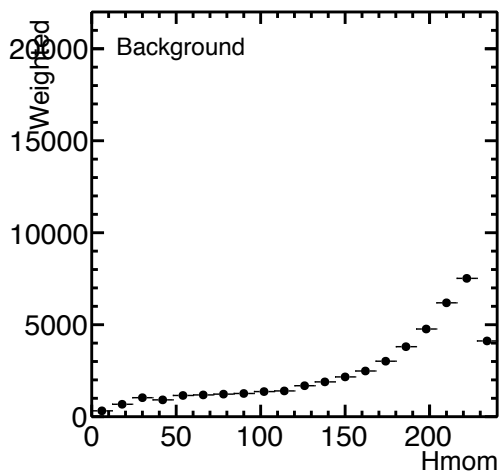
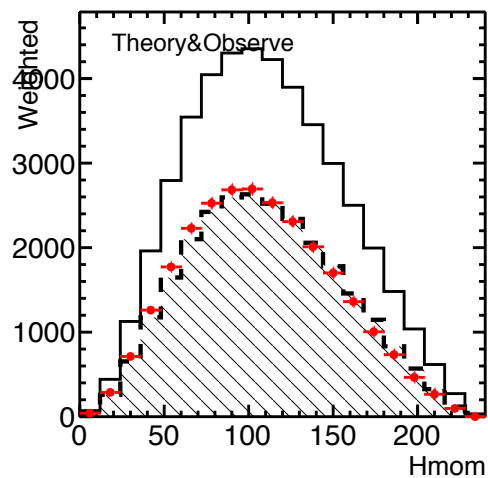
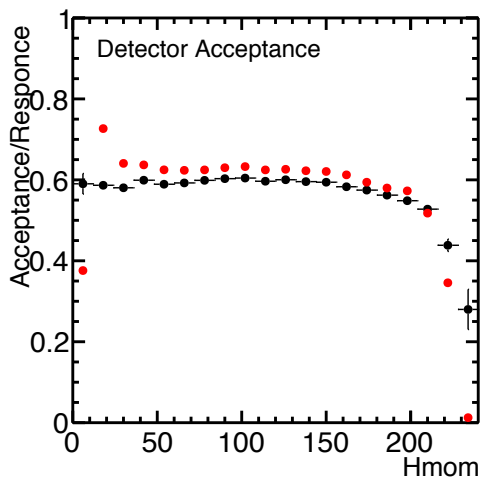
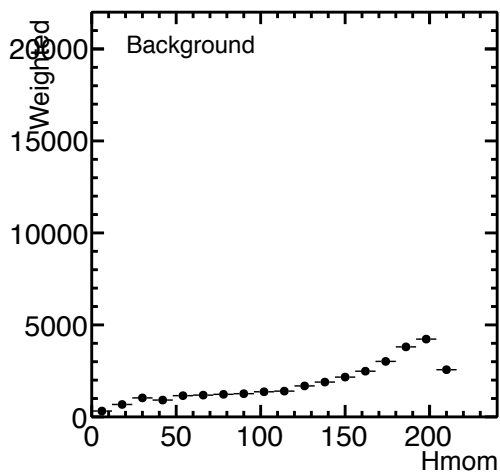
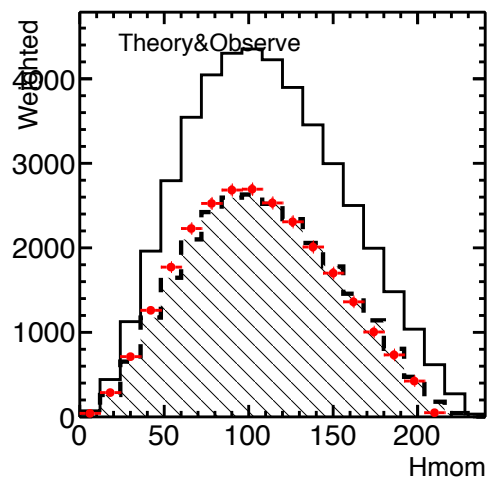
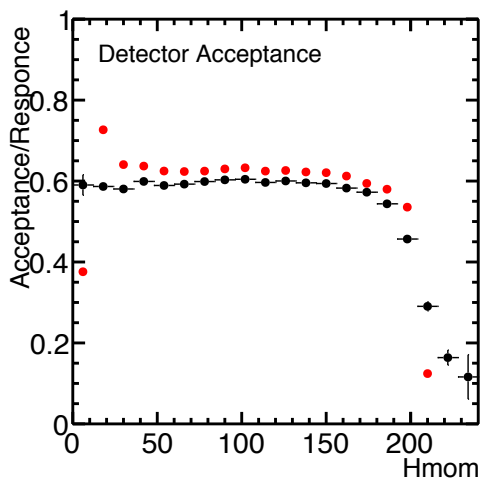
$\Delta\Phi$ + θ 1+Pw

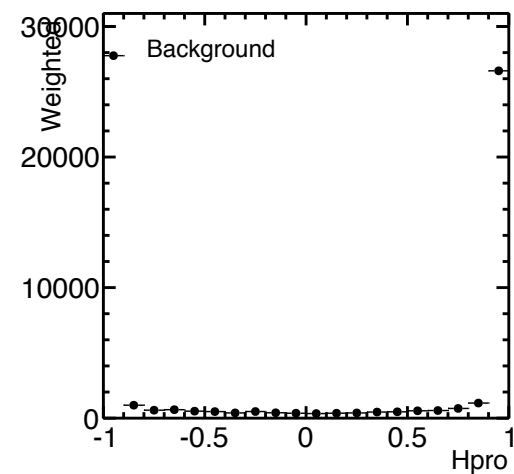
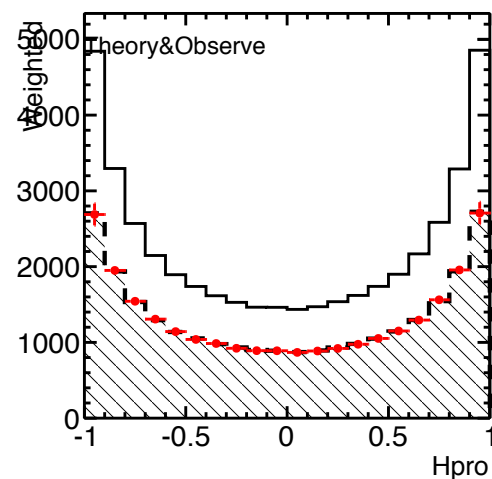
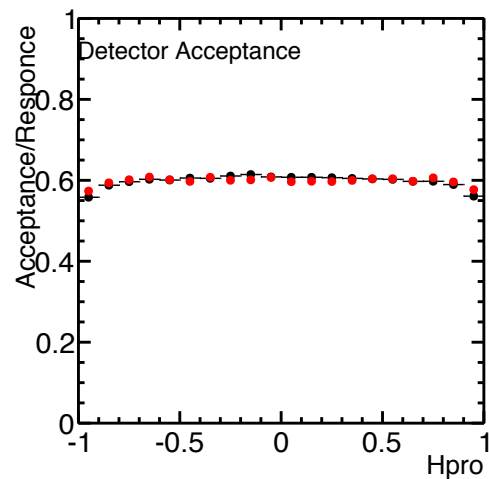
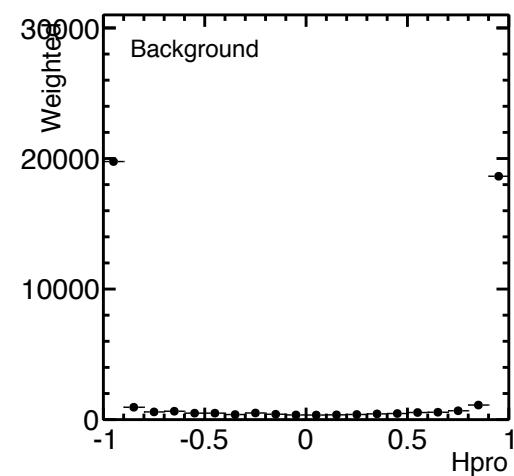
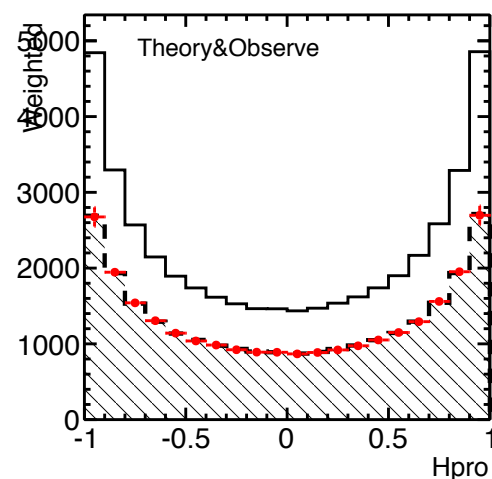
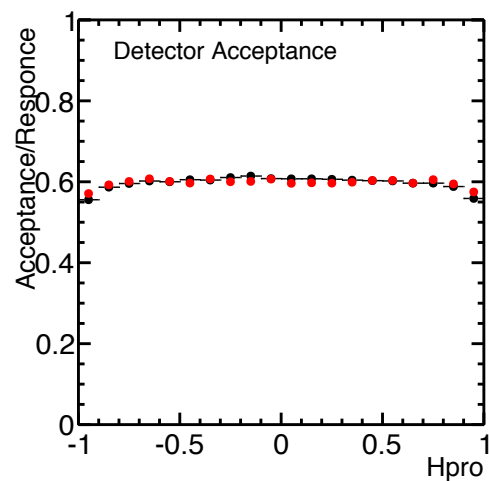
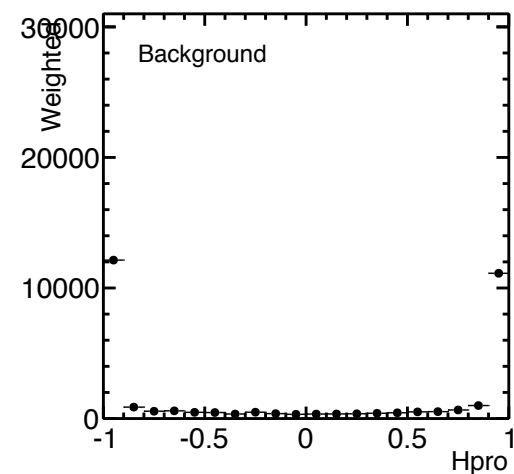
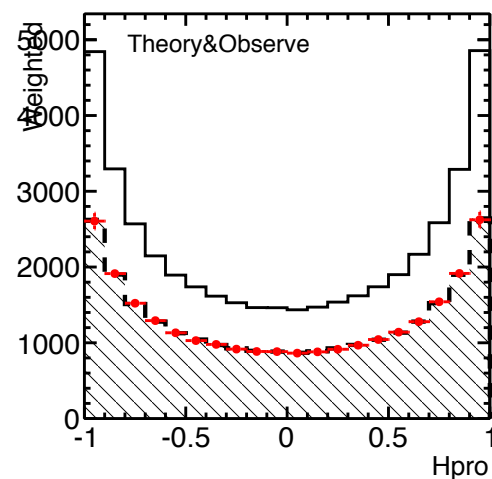
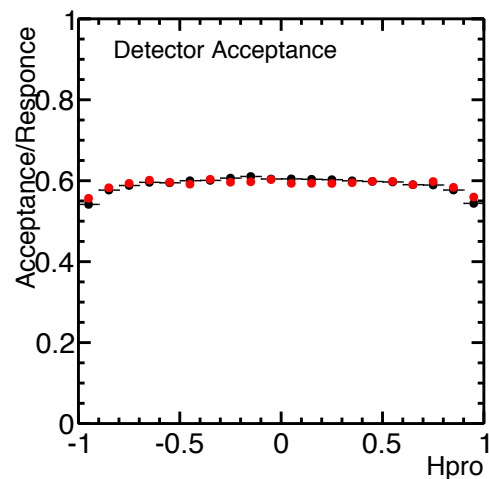


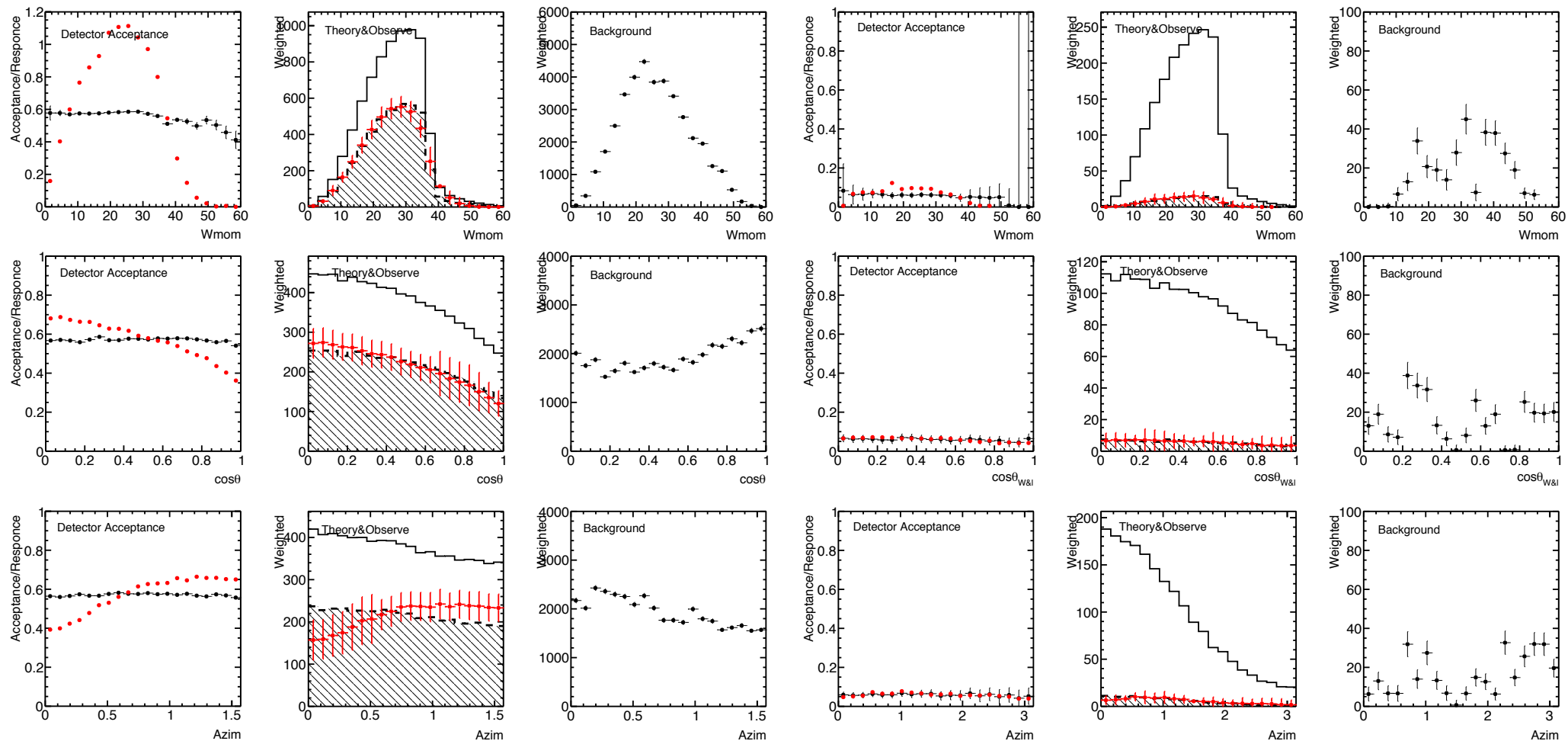
Next

- Analysis on HWW anomalous.
- 250GeV Zh $\rightarrow$ vv+qqqq(cxcx) / qq+qqqq(cxcx) / qq+qqlv
- Combine 5(8) analysis









χ^2 Test with BSM models

$$\chi^2 = \sum_{bin=1}^n \left(\frac{f_{SM}(x_{bin}) \cdot \eta_{bin} - f_{BSM}(x_{bin}; a, b, \tilde{b}) \cdot \eta_{bin}}{\delta f_{SM}(x_{bin})} \right)^2 + \left(\frac{N_{SM} \cdot \epsilon - N_{BSM} \cdot \epsilon}{\delta\sigma \cdot N_{SM} \cdot \epsilon} \right)^2$$

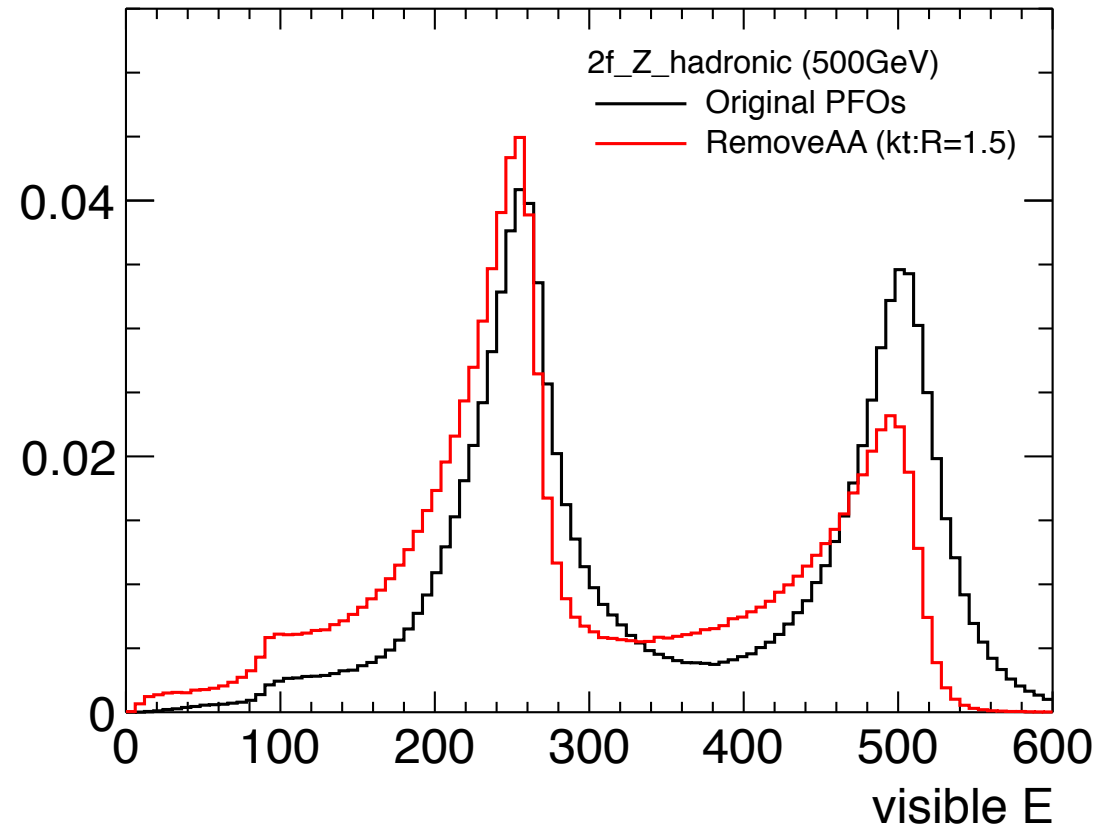
Theoretical angular distribution (points to f_{SM} and f_{BSM})

Statistical error estimated by full-simu (points to $\delta f_{SM}(x_{bin})$)

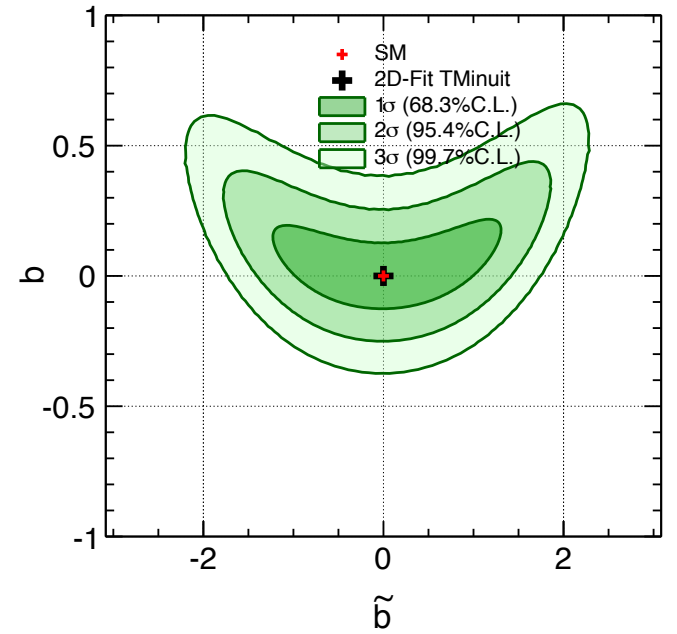
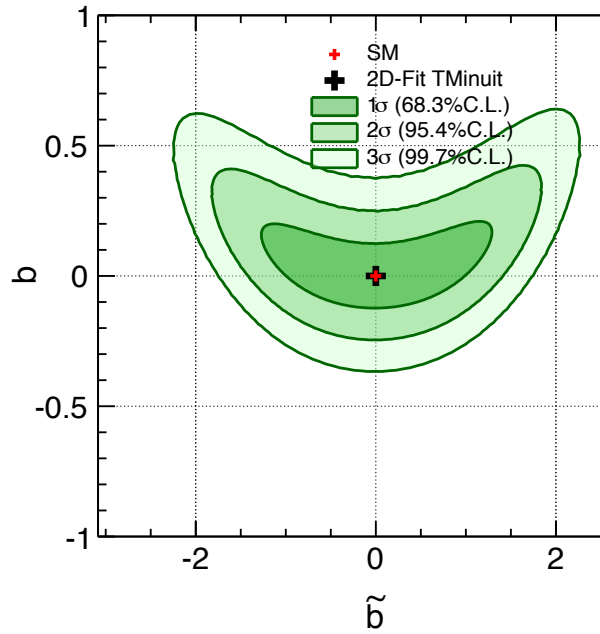
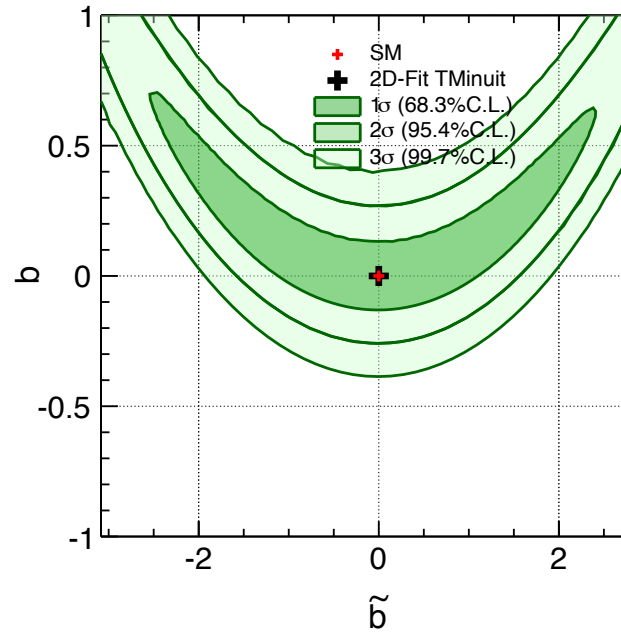
N is the number of expected events after Bkg suppression (ϵ : efficiency).

$\delta\sigma$ is evaluated by full-simu.
It's set 2.5% (250GeV) and 3.0% (500GeV).

Visible Energy 2f_Z_had



250GeV Zh WW→qqqq



250GeV Zh WW→cxcx

