On the parent of b-jets

Stefano Lacaprara

INFN Padova

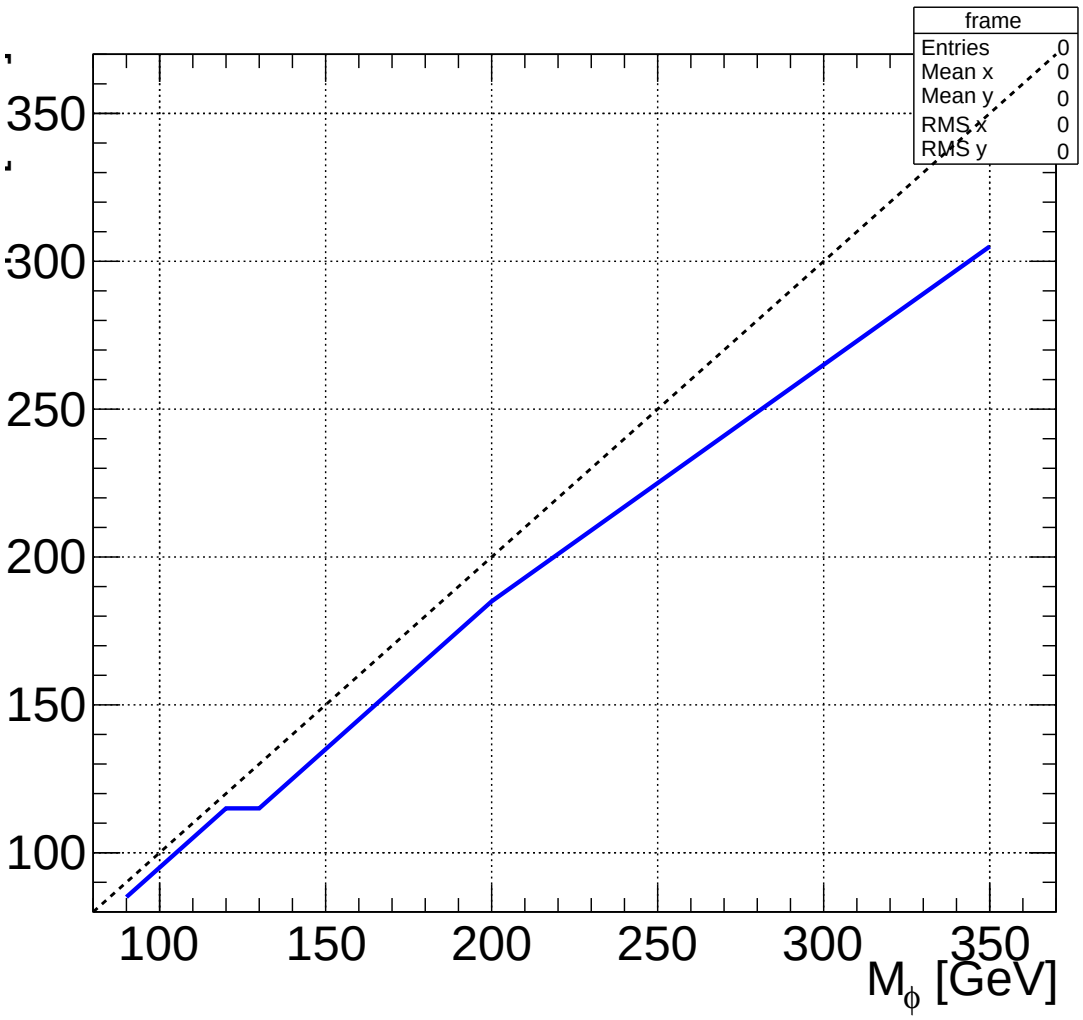
PD meeting,
PD, 16 January 2013

Intro

Request raised at Final Reading

- You use M_{12} as discriminant variable (first two jets ordered by p_T). How often these two bjets are the one coming from the ϕ decay?
- Answer: it depends strongly on the mass
- From 15% at $M_\phi = 90\ GeV$ to 85% for $M_\phi = 350\ GeV$
- In bulk-region (peak$\pm$RMS) From 60% to 93%
- in the following slides the distribution of M_{12}, M_{13}, and M_{23} for all mass point available;
  - both from ϕ, only the first, only the second, neither, association to gen parton failed.
- After all selections but the cut on likelihood discriminator (both signal and control region)
  - fractions do not change if only signal region is considered.

M_{12}: peak position ϕ vs M_ϕ



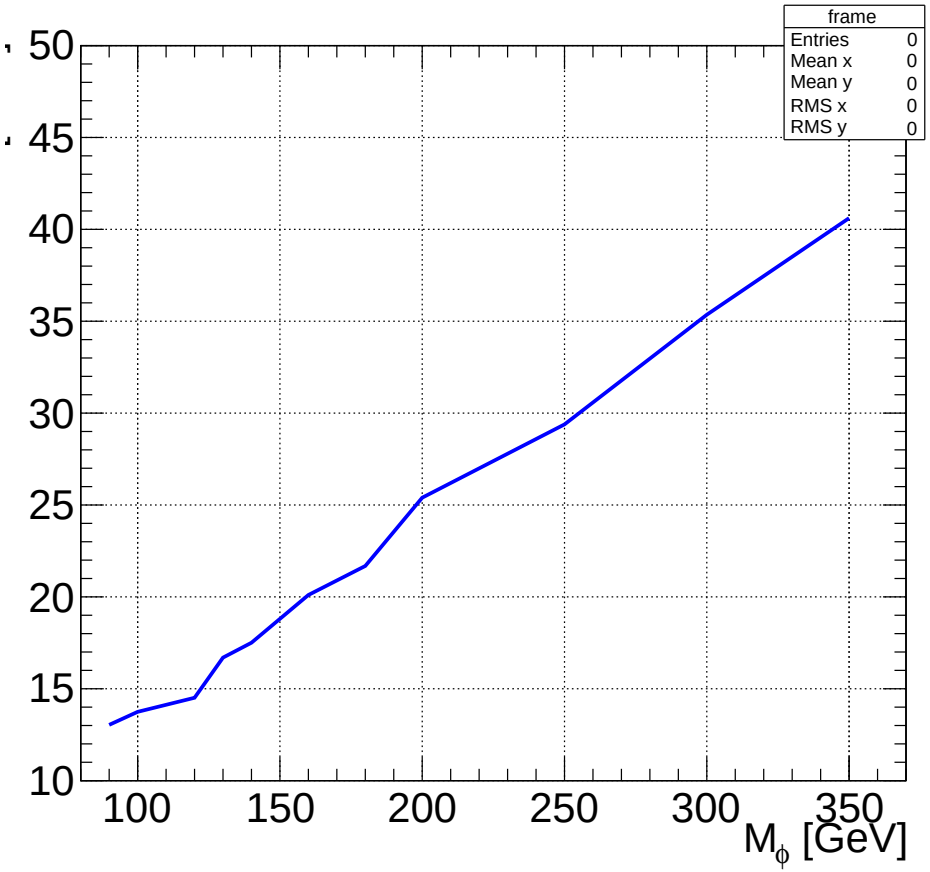
M_{12} Peak position

- Using only events where both bjets from ϕ
- Use `TSpectrum` to find the peak

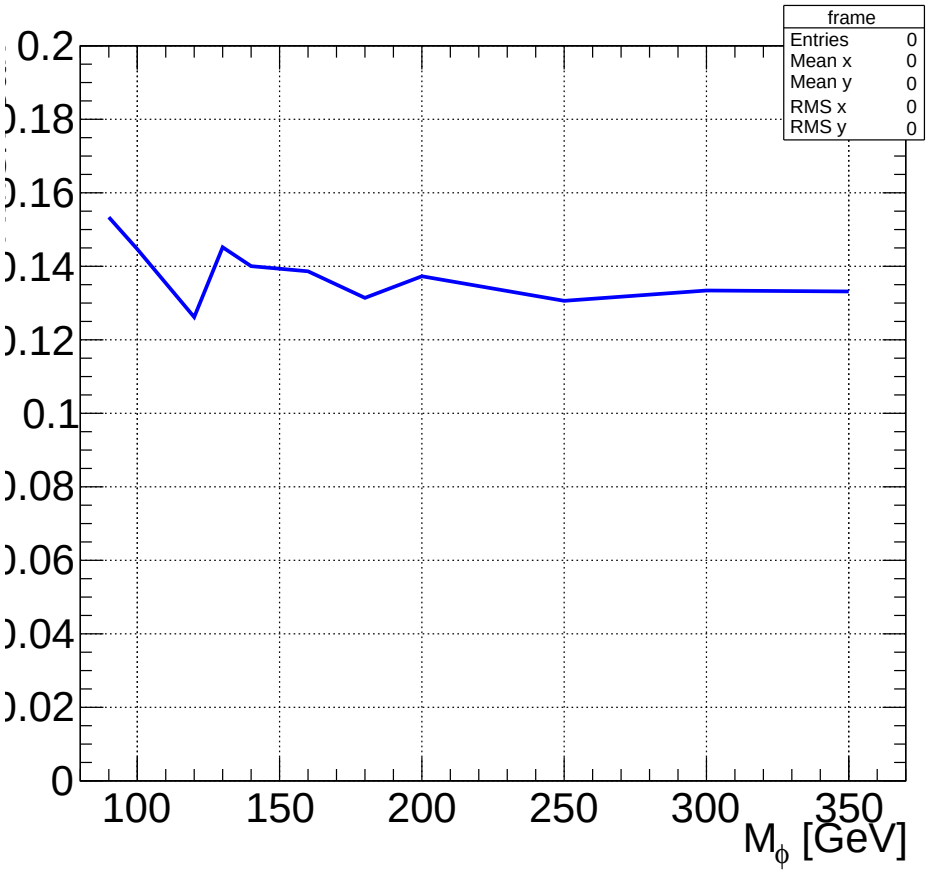
M_{12}: RMS vs M_ϕ

Using only events where both bjets come from ϕ

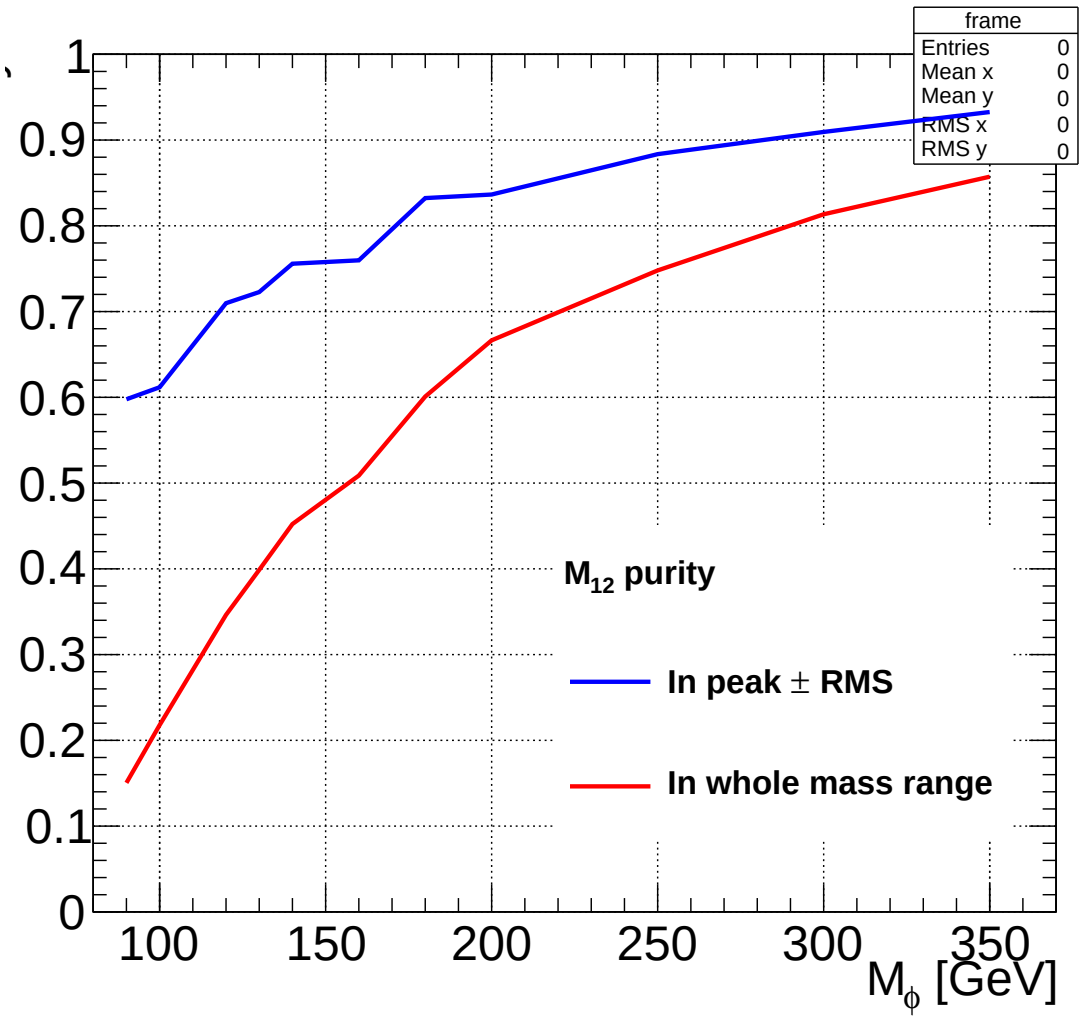
Absolute RMS



Relative RMS: RMS/Peak



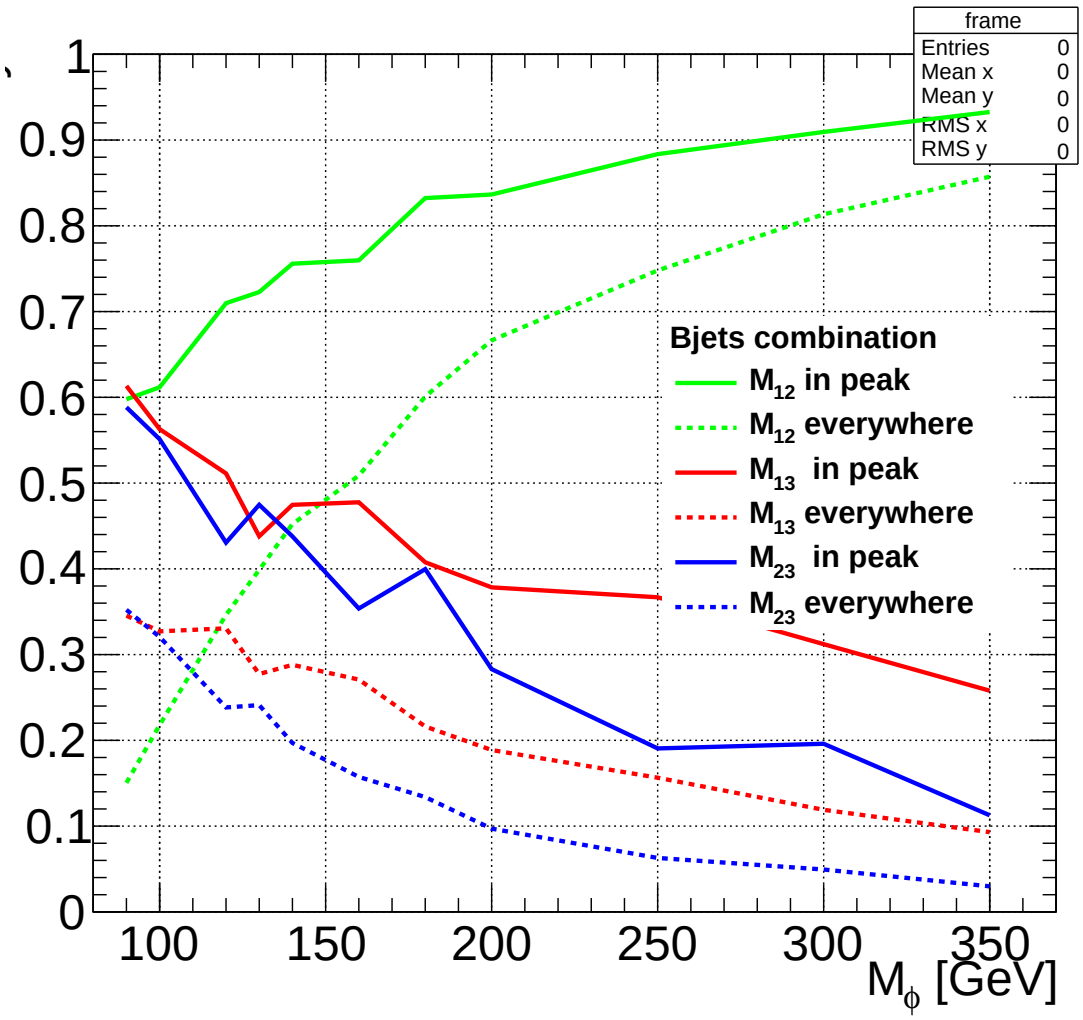
M_{12}: fraction of b-jets from ϕ vs M_ϕ



Purity of bb from ϕ

- Purity= (#ev bj_1&bj_2 from ϕ)/ (all ev where bj_1&bj_2 associated to a genPart)
- Using the first two bjets
- for whole region (dotted line)
- only under the peak±RMS (solid line)

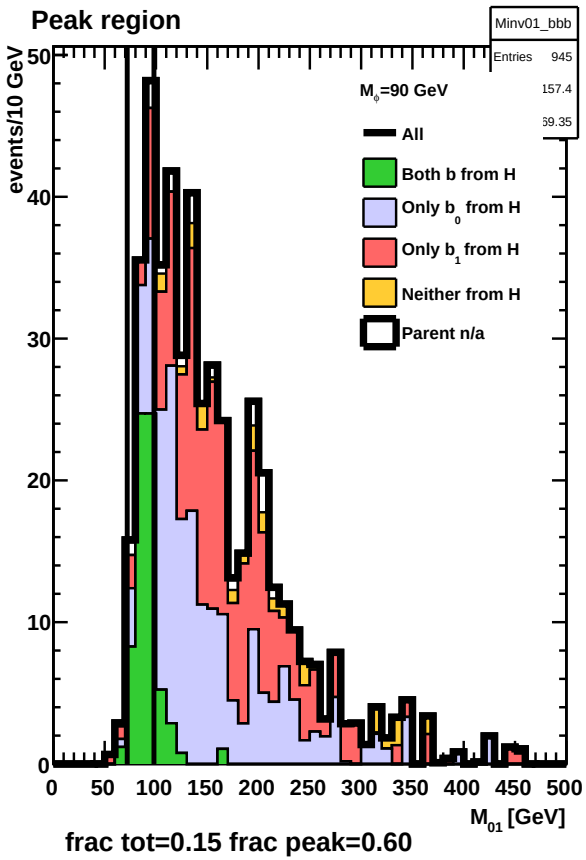
M_{ij}: fraction of b-jets from ϕ vs M_ϕ



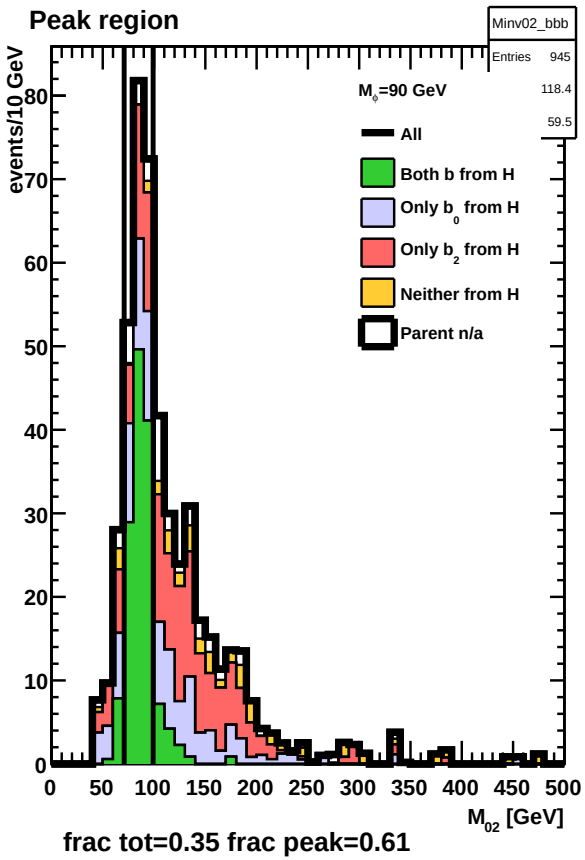
Purity of bb from ϕ

- For all three combination of b-jets (12,13,23)
- for whole region (dotted line)
- only under the peak$\pm$RMS (solid line)

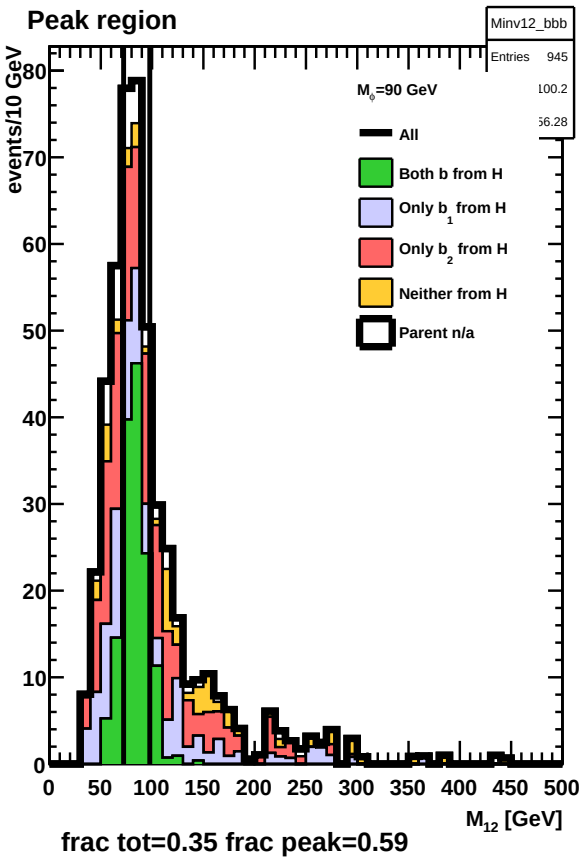
$M_\phi = 90\ GeV$



frac tot=0.15 frac peak=0.60

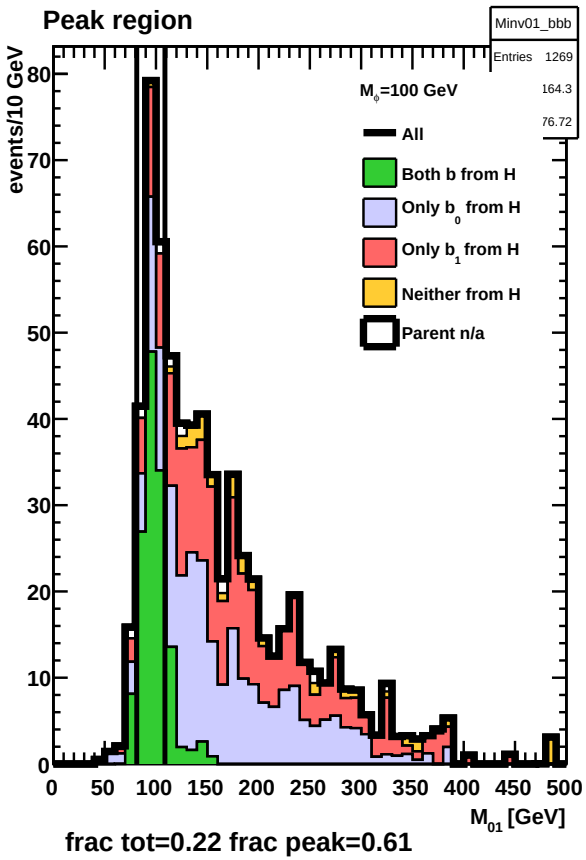


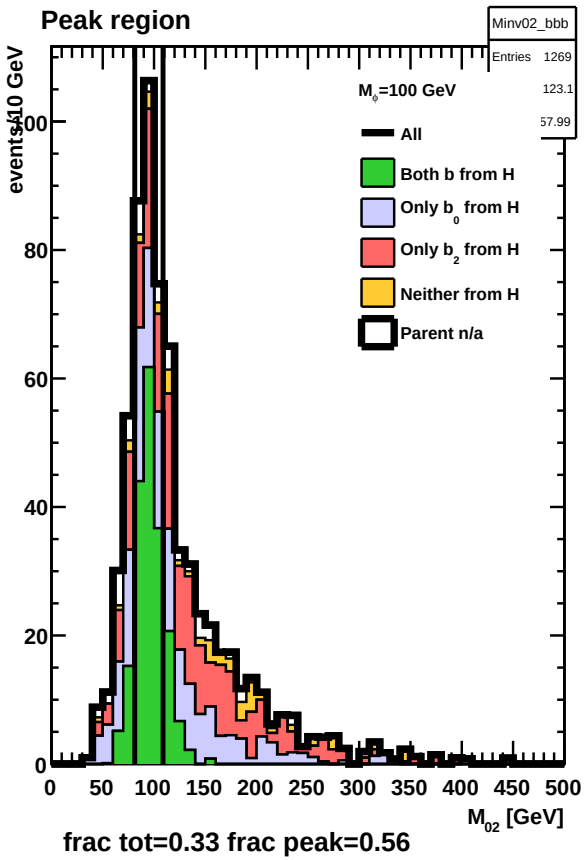
frac tot=0.35 frac peak=0.61

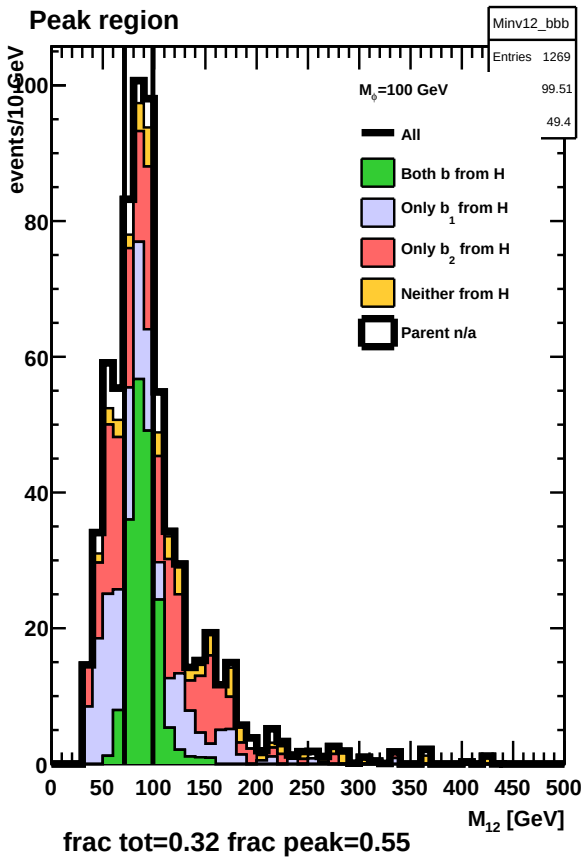


frac tot=0.35 frac peak=0.59

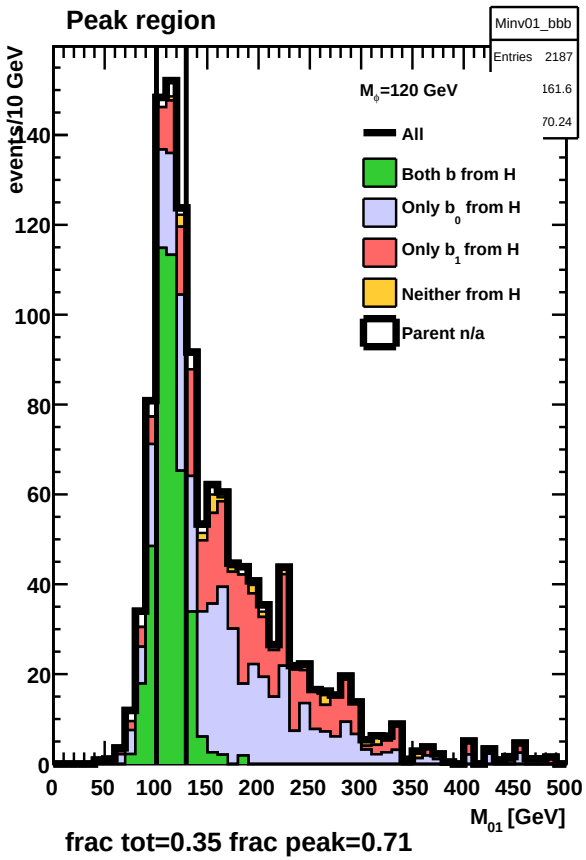
$M_\phi = 100\ GeV$


Peak region
Minv01_bbb
Entries 1269
M_φ=100 GeV
164.3
76.72
All
Both b from H
Only b_0 from H
Only b_1 from H
Neither from H
Parent n/a
events/10 GeV
M_01 [GeV]
frac tot=0.22 frac peak=0.61

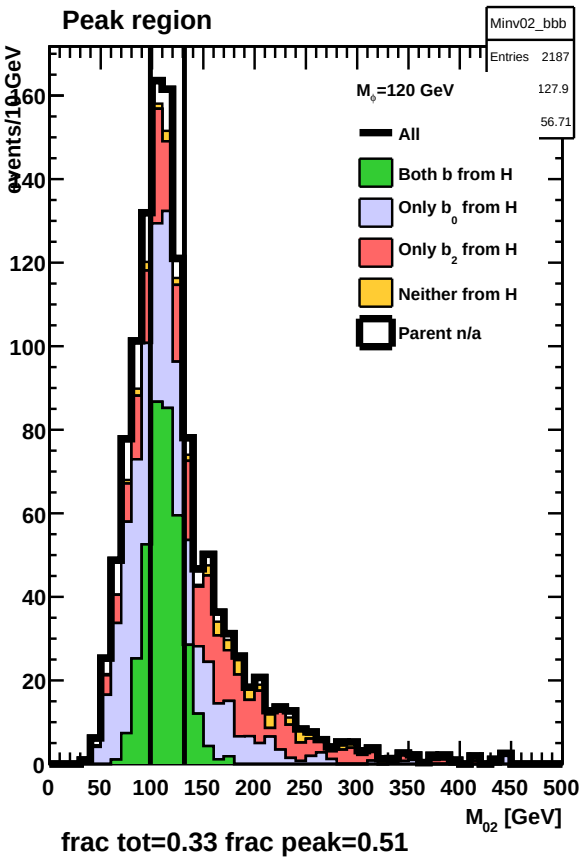

Peak region
Minv02_bbb
Entries 1269
M_φ=100 GeV
123.1
57.99
All
Both b from H
Only b_0 from H
Only b_2 from H
Neither from H
Parent n/a
events/10 GeV
M_02 [GeV]
frac tot=0.33 frac peak=0.56


Peak region
Minv12_bbb
Entries 1269
M_φ=100 GeV
99.51
49.4
All
Both b from H
Only b_1 from H
Only b_2 from H
Neither from H
Parent n/a
events/10 GeV
M_12 [GeV]
frac tot=0.32 frac peak=0.55

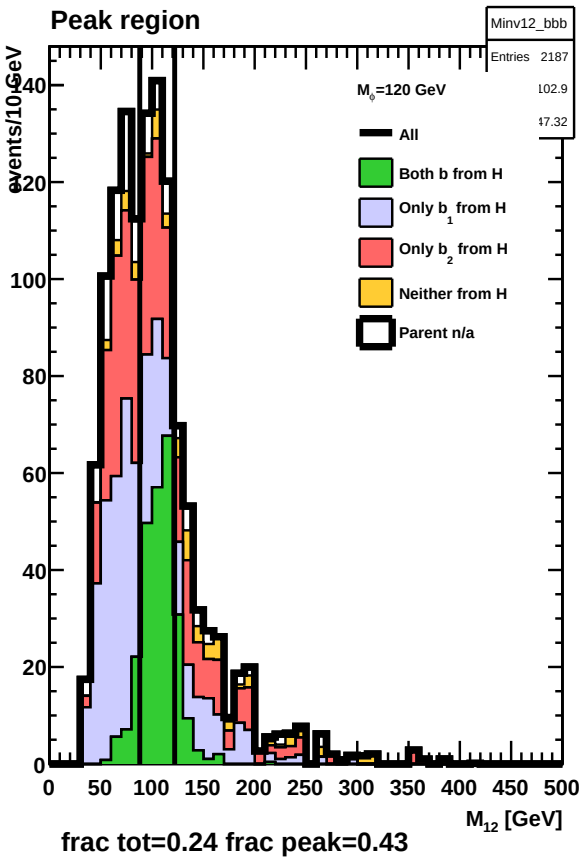
$M_\phi = 120\ GeV$



frac tot=0.35 frac peak=0.71

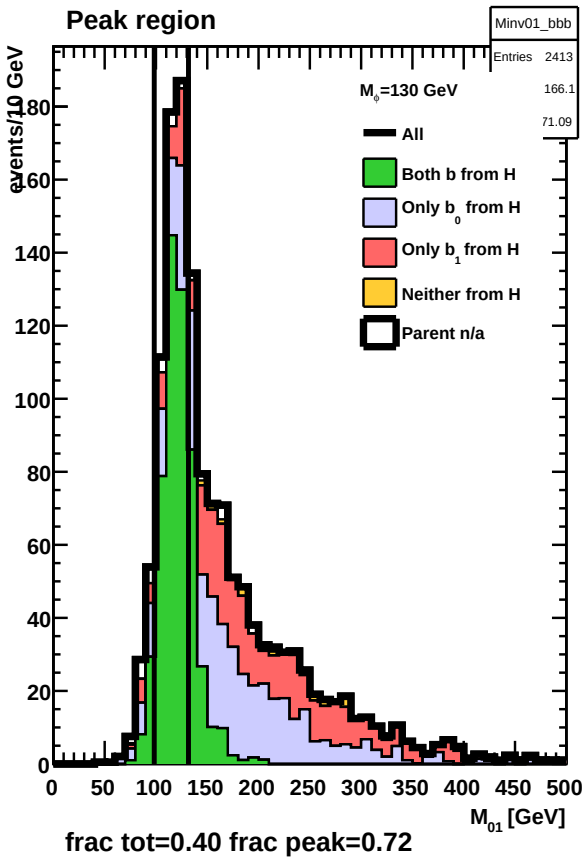


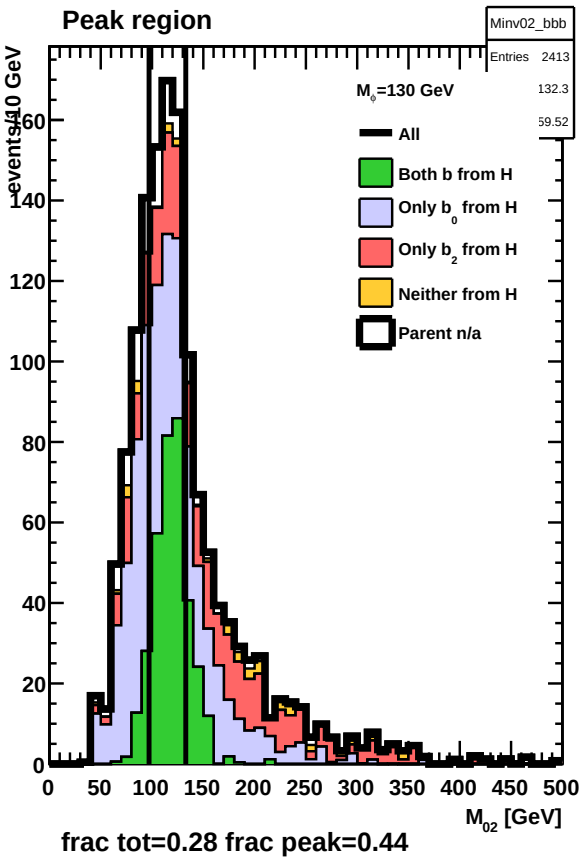
frac tot=0.33 frac peak=0.51

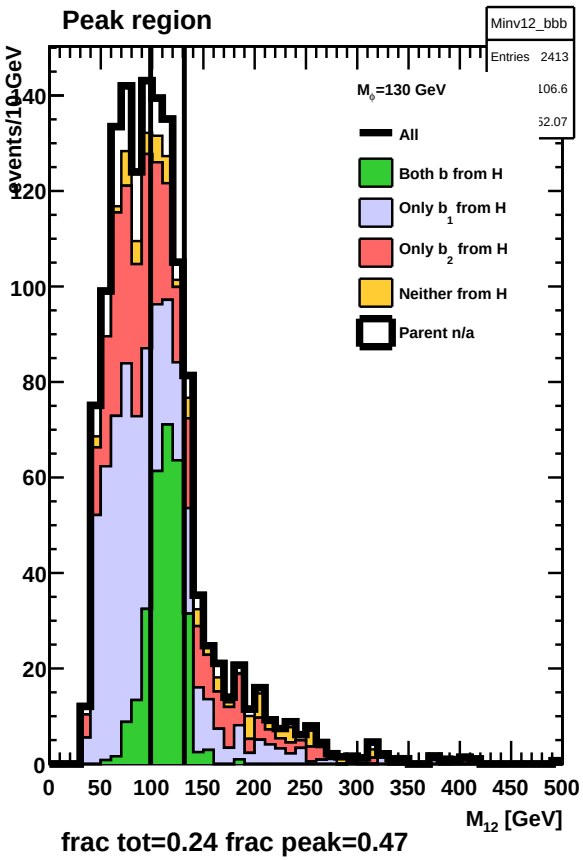


frac tot=0.24 frac peak=0.43

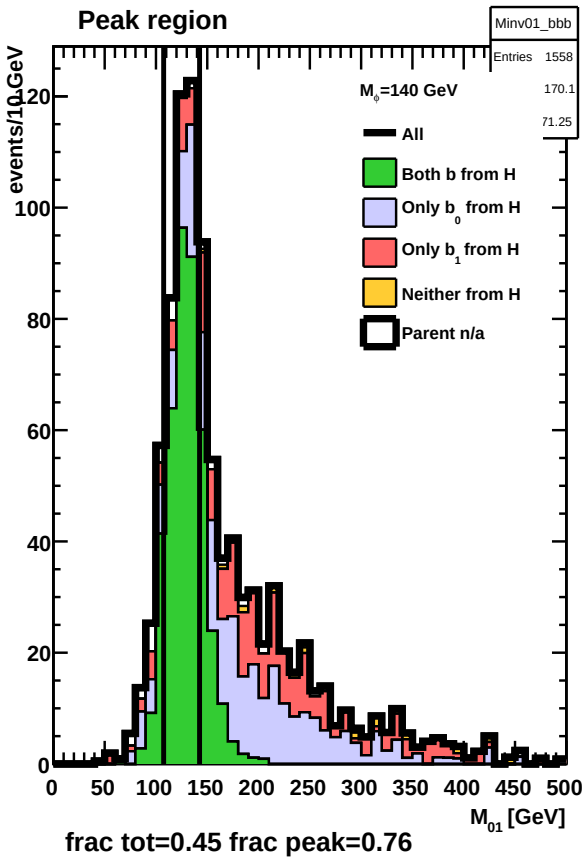
$M_\phi = 130\ GeV$


Peak region
Minv01_bbb
Entries 2413
166.1
71.09
M_ϕ=130 GeV
All
Both b from H
Only b_0 from H
Only b_1 from H
Neither from H
Parent n/a
events/10 GeV
M_{01} [GeV]
frac tot=0.40 frac peak=0.72

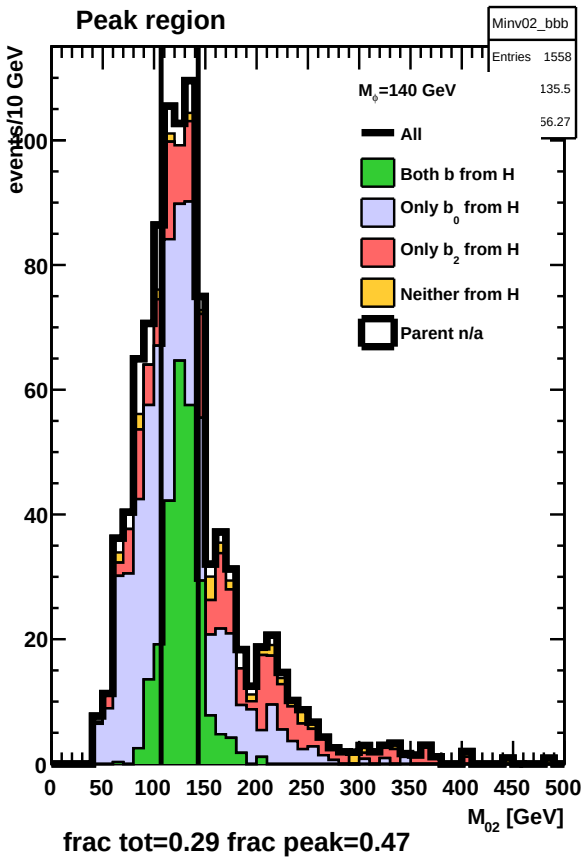

Peak region
Minv02_bbb
Entries 2413
132.3
59.52
M_ϕ=130 GeV
All
Both b from H
Only b_0 from H
Only b_2 from H
Neither from H
Parent n/a
events/10 GeV
M_{02} [GeV]
frac tot=0.28 frac peak=0.44


Peak region
Minv12_bbb
Entries 2413
106.6
52.07
M_ϕ=130 GeV
All
Both b from H
Only b_1 from H
Only b_2 from H
Neither from H
Parent n/a
events/10 GeV
M_{12} [GeV]
frac tot=0.24 frac peak=0.47

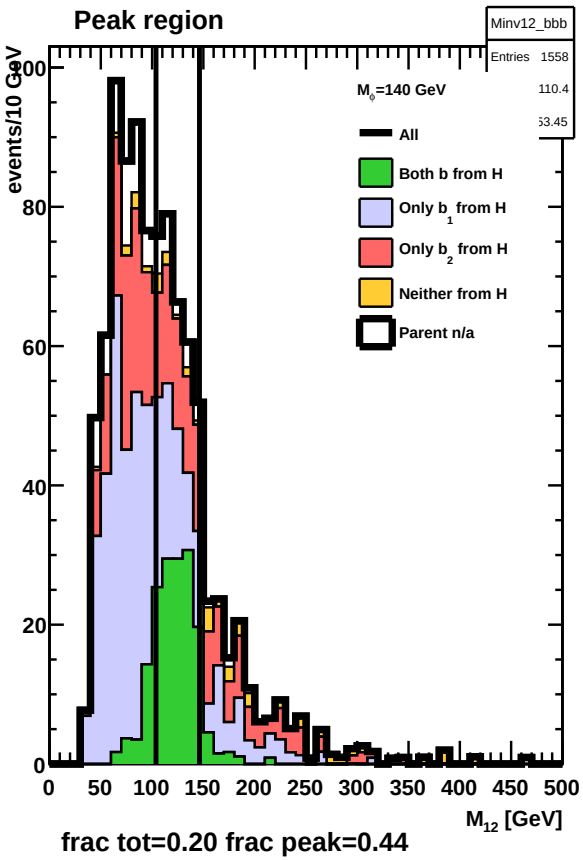
$M_\phi = 140\ GeV$



frac tot=0.45 frac peak=0.76

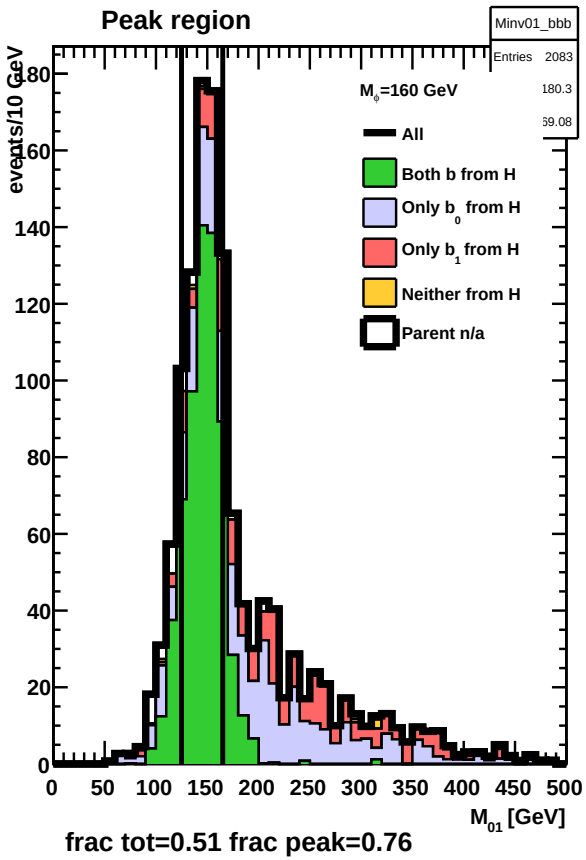


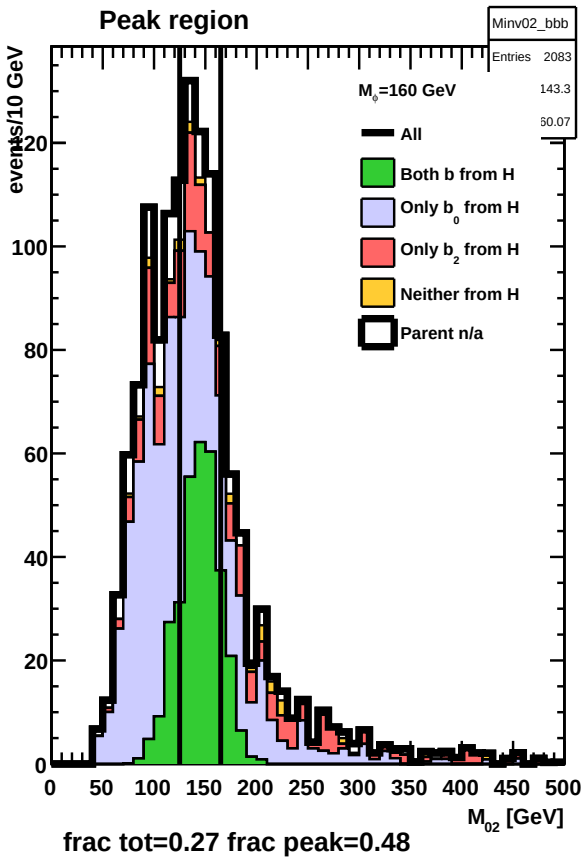
frac tot=0.29 frac peak=0.47

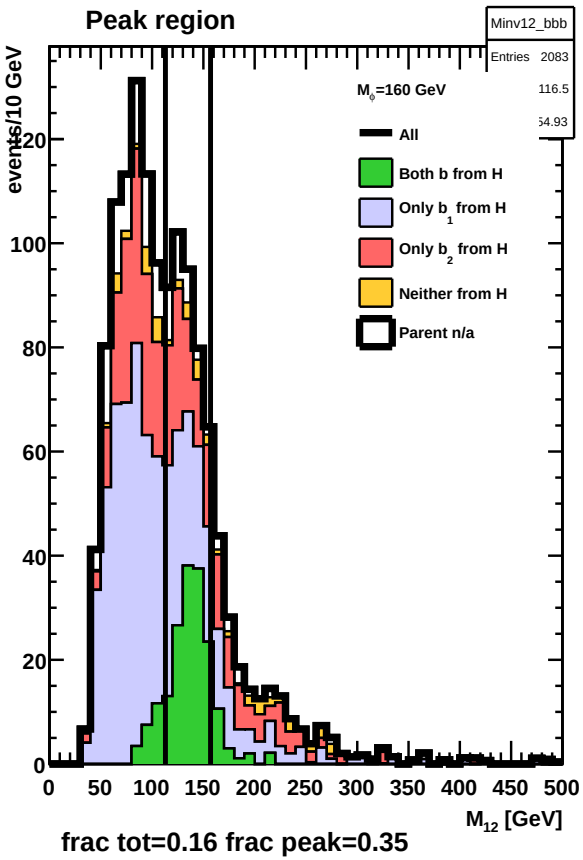


frac tot=0.20 frac peak=0.44

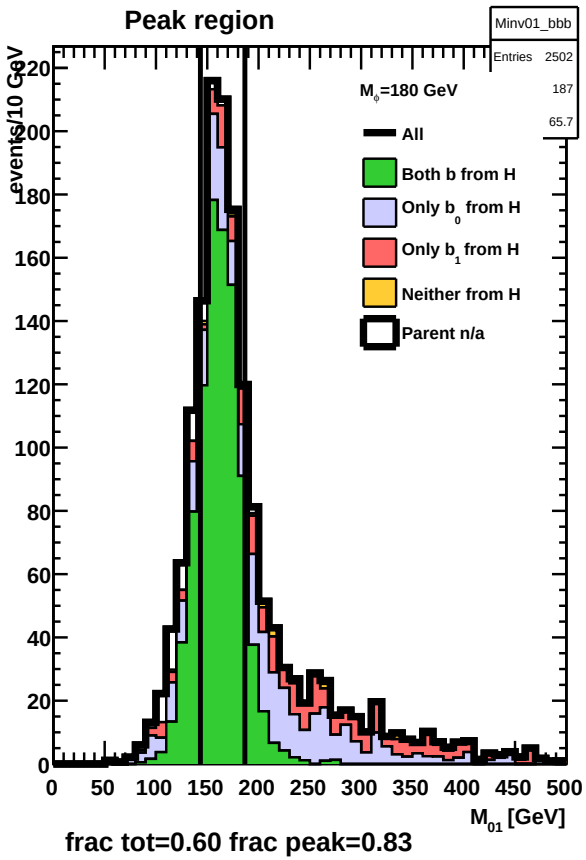
$M_\phi = 160\ GeV$


Peak region
Minv01_bbb
Entries 2083
180.3
59.08
M_ϕ=160 GeV
All
Both b from H
Only b_0 from H
Only b_1 from H
Neither from H
Parent n/a
events/10 GeV
M_{01} [GeV]
frac tot=0.51 frac peak=0.76

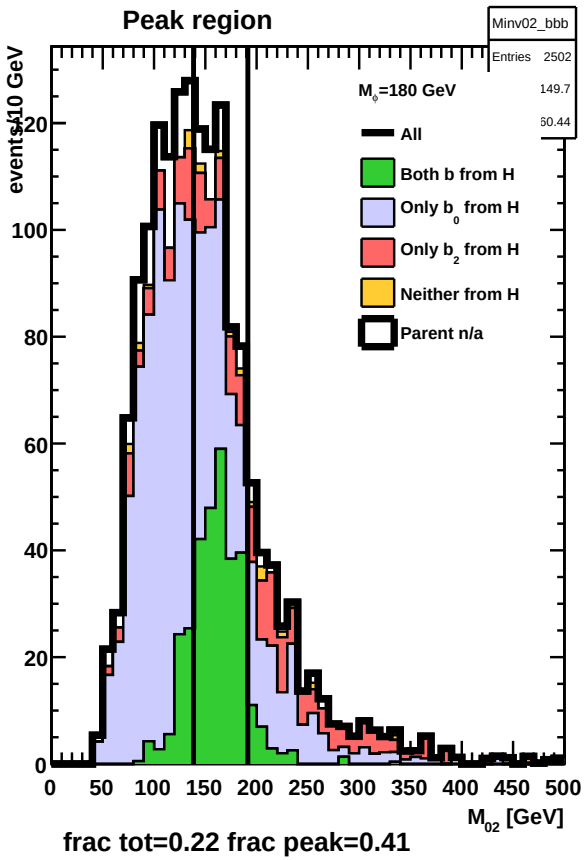

Peak region
Minv02_bbb
Entries 2083
143.3
60.07
M_ϕ=160 GeV
All
Both b from H
Only b_0 from H
Only b_2 from H
Neither from H
Parent n/a
events/10 GeV
M_{02} [GeV]
frac tot=0.27 frac peak=0.48


Peak region
Minv12_bbb
Entries 2083
116.5
54.93
M_ϕ=160 GeV
All
Both b from H
Only b_1 from H
Only b_2 from H
Neither from H
Parent n/a
events/10 GeV
M_{12} [GeV]
frac tot=0.16 frac peak=0.35

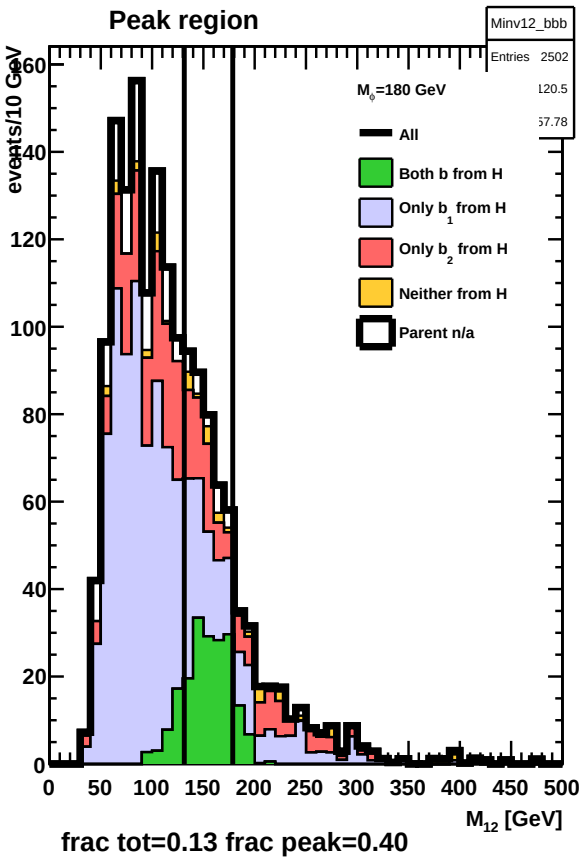
$M_\phi = 180\ GeV$



frac tot=0.60 frac peak=0.83

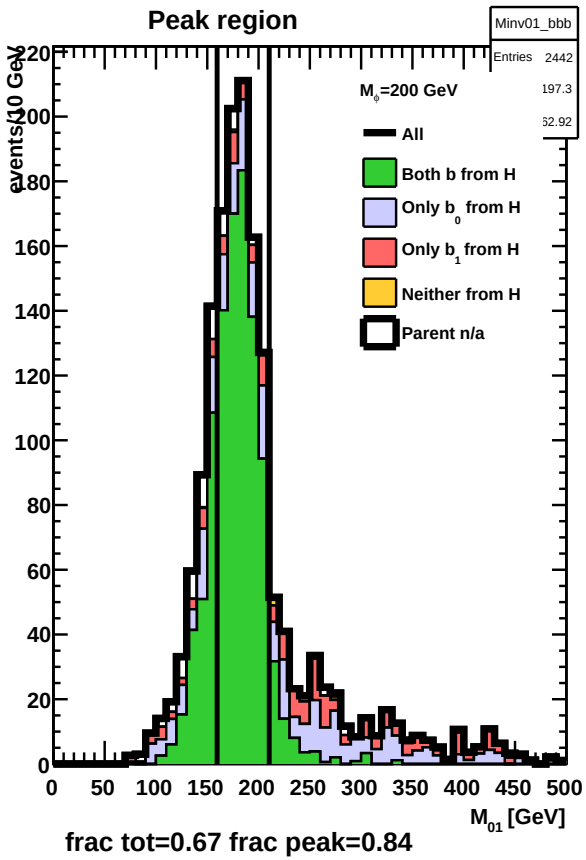


frac tot=0.22 frac peak=0.41

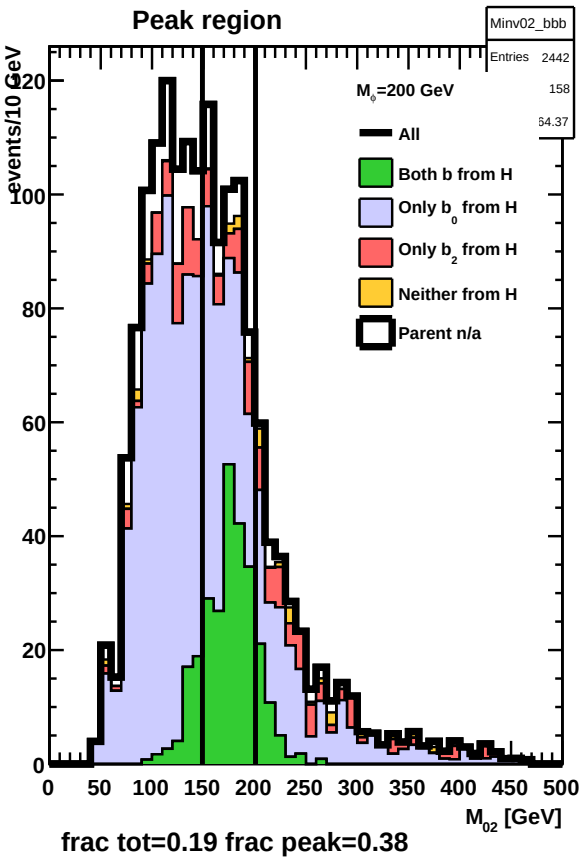


frac tot=0.13 frac peak=0.40

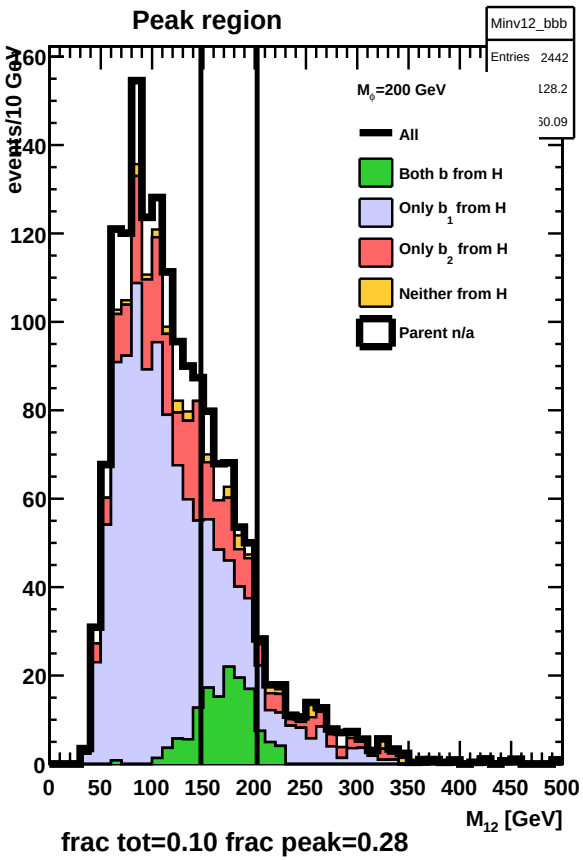
$M_\phi = 200\ GeV$



frac tot=0.67 frac peak=0.84

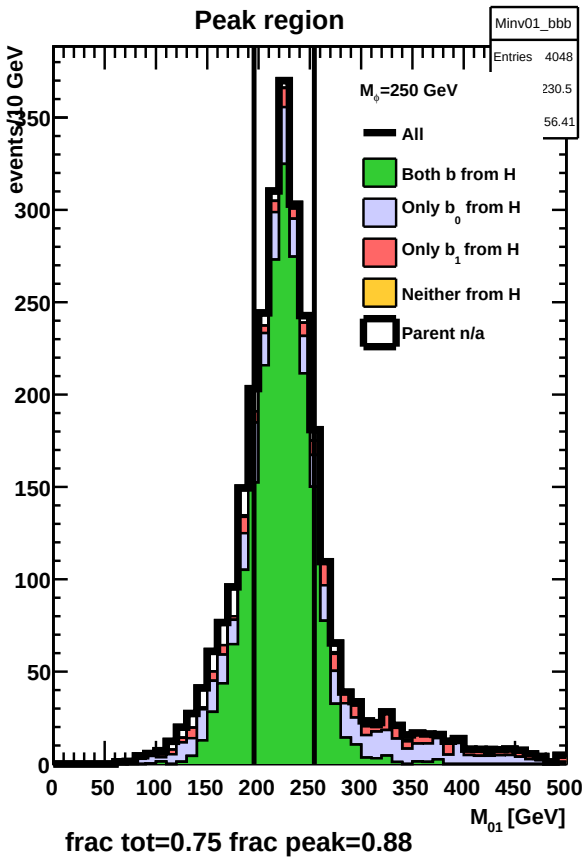


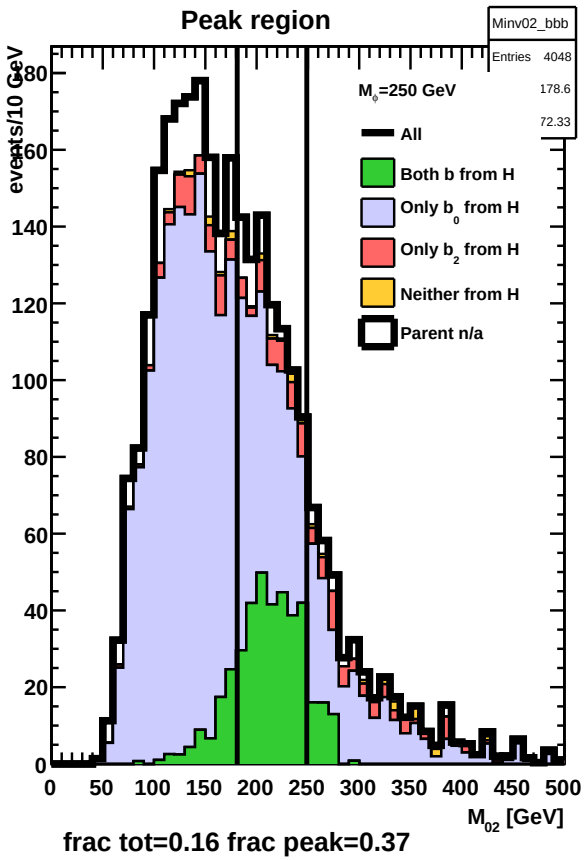
frac tot=0.19 frac peak=0.38

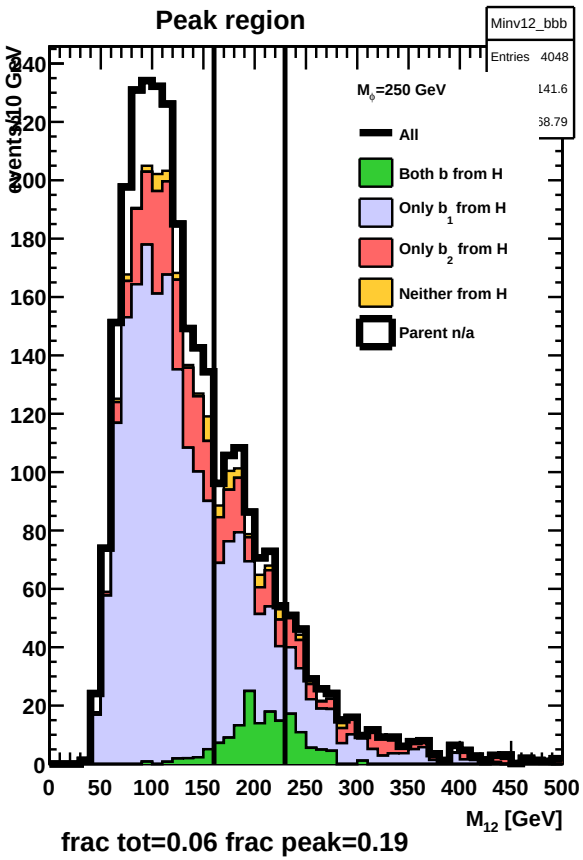


frac tot=0.10 frac peak=0.28

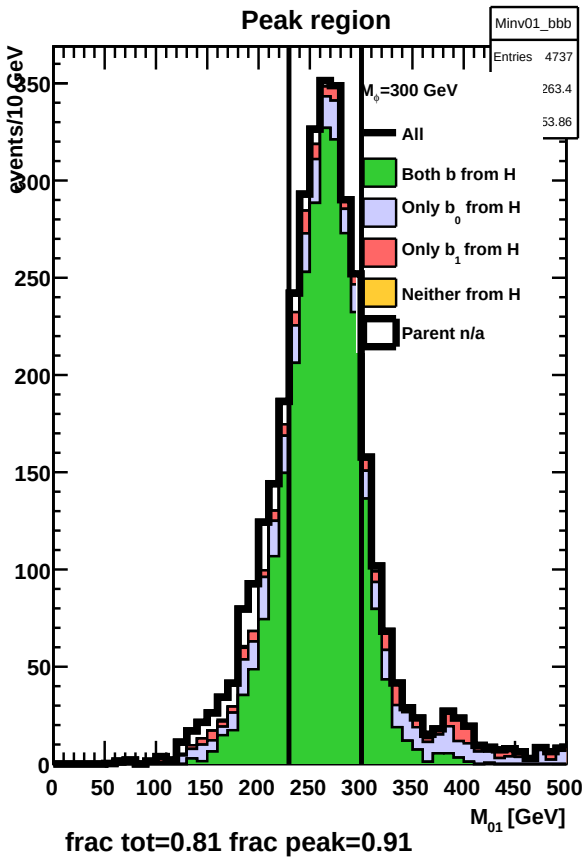
$M_\phi = 250\ GeV$

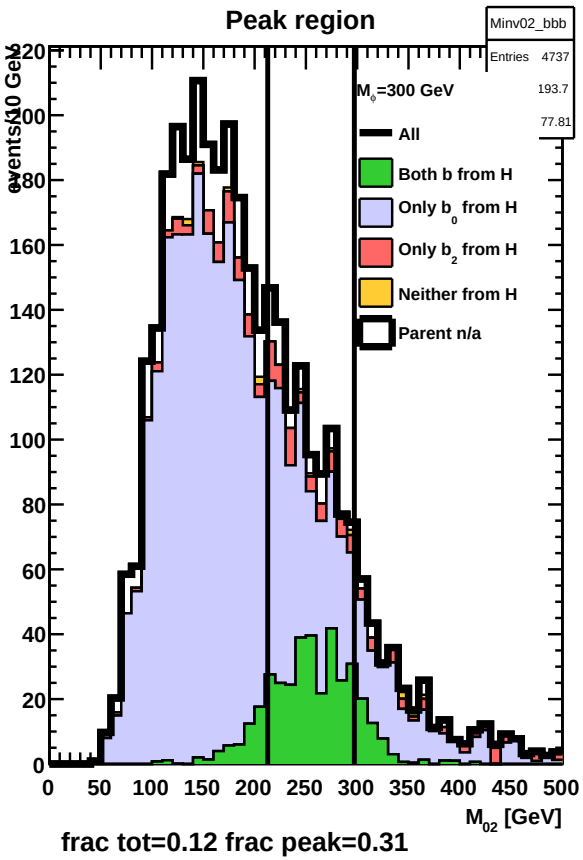

Peak region
Minv01_bbb
Entries 4048
M_φ=250 GeV
All
Both b from H
Only b_0 from H
Only b_1 from H
Neither from H
Parent n/a
events/10 GeV
M_01 [GeV]
frac tot=0.75 frac peak=0.88

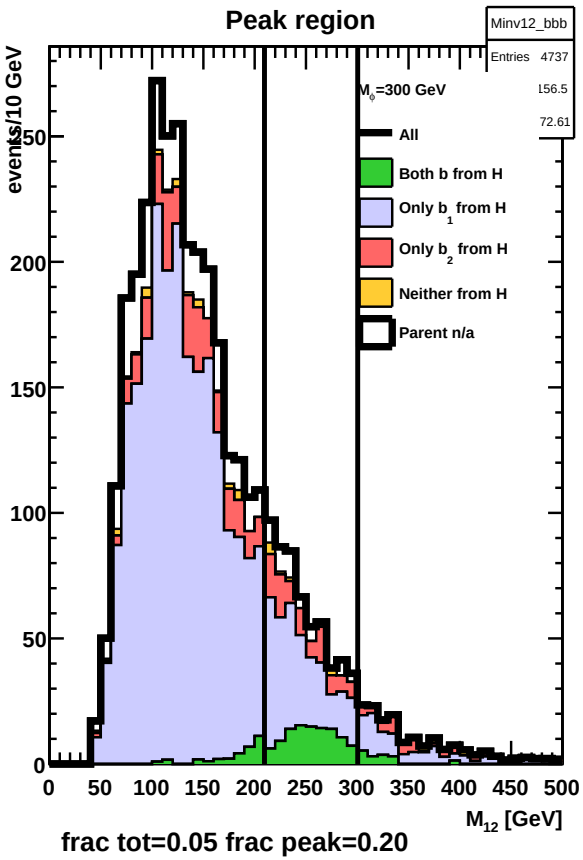

Peak region
Minv02_bbb
Entries 4048
M_φ=250 GeV
All
Both b from H
Only b_0 from H
Only b_2 from H
Neither from H
Parent n/a
events/10 GeV
M_02 [GeV]
frac tot=0.16 frac peak=0.37


Peak region
Minv12_bbb
Entries 4048
M_φ=250 GeV
All
Both b from H
Only b_1 from H
Only b_2 from H
Neither from H
Parent n/a
events/10 GeV
M_12 [GeV]
frac tot=0.06 frac peak=0.19

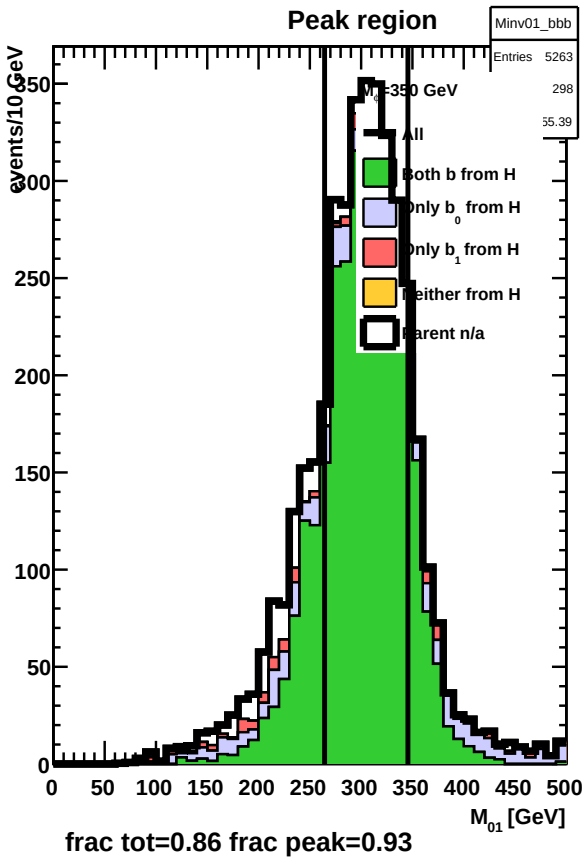
$M_\phi = 300\ GeV$


Peak region
Minv01_bbb
Entries 4737
M_φ=300 GeV
All
Both b from H
Only b_0 from H
Only b_1 from H
Neither from H
Parent n/a
events/10 GeV
M_01 [GeV]
frac tot=0.81 frac peak=0.91

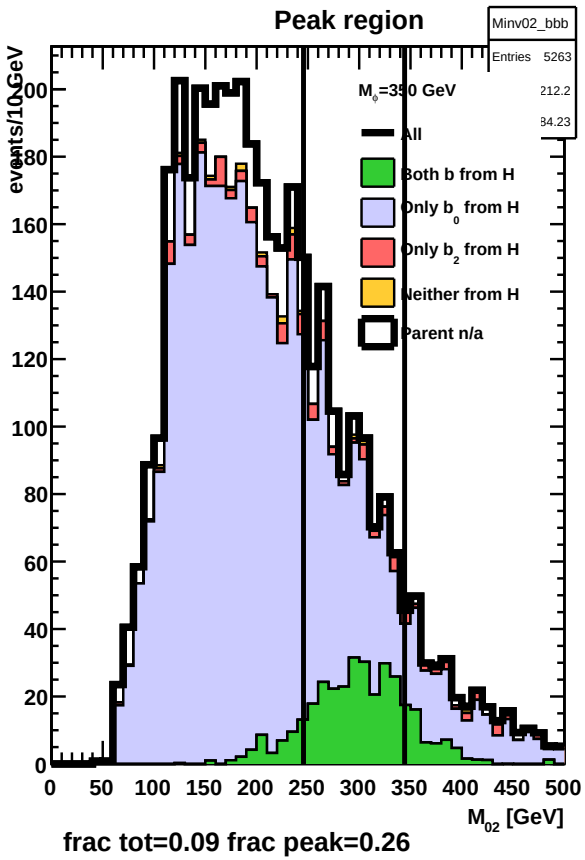

Peak region
Minv02_bbb
Entries 4737
M_φ=300 GeV
All
Both b from H
Only b_0 from H
Only b_2 from H
Neither from H
Parent n/a
events/10 GeV
M_02 [GeV]
frac tot=0.12 frac peak=0.31


Peak region
Minv12_bbb
Entries 4737
M_φ=300 GeV
All
Both b from H
Only b_1 from H
Only b_2 from H
Neither from H
Parent n/a
events/10 GeV
M_12 [GeV]
frac tot=0.05 frac peak=0.20

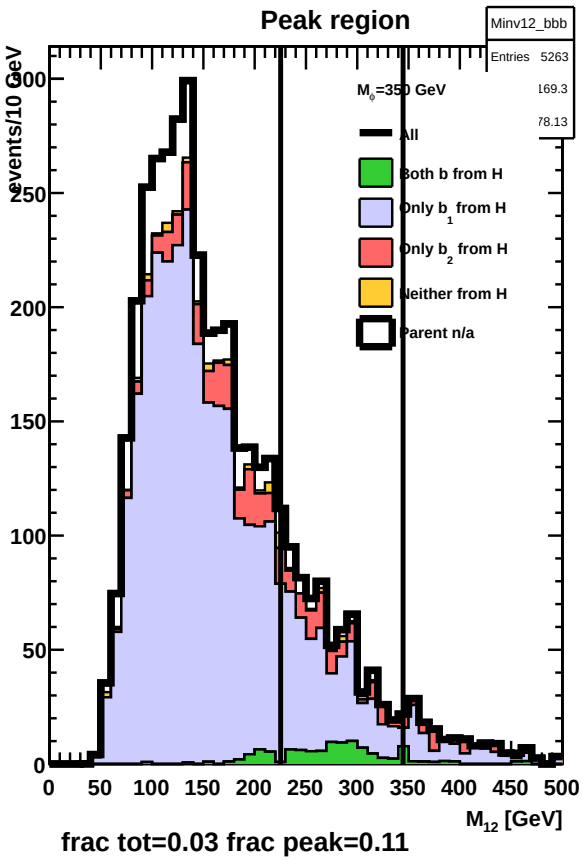
$M_\phi = 350\ GeV$



frac tot=0.86 frac peak=0.93



frac tot=0.09 frac peak=0.26



frac tot=0.03 frac peak=0.11