NMSSM

Benchmarks and physics issues

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Old benchmarks

Point Number	1	2	3	4	5	6	7	8
λ	0.22	0.4	0.22	0.67	0.56	0.39	0.5	0.27
κ	−0.1	−0.35	0.59	0.2	0.1	0.18	−0.15	0.15
$\tan\beta$	5.	15.	7.8	4.1	2.5	3.5	3.5	2.9
$\mu_{\rm eff}$ (GeV)	−520.	−160.	530.	−200.	−180.	−245.	200.	−753.
A_λ (GeV)	−580.	−580.	−920.	−600.	−440.	−230.	780.	312.
A_κ (GeV)	−2.8	−8.7	−2.1	−30.	172.	−5.	230.	8.4
H masses/cplgs								
m_{h_1} (GeV)	90.	100.	119.	97.	40.	94.	57.	95.
$BR(h_1 \to b\bar{b})$	0.08	0.02	0.01	0.01	0.93	0.01	0.93	0.00
$BR(h_1 \to \tau^+\tau^-)$	0.01	0.00	0.00	0.00	0.07			
$BR(h_1 \to a_1 a_1)$	0.91	0.97	0.99	0.99	0.00	0.94	0.00	1.00
m_{h_2} (GeV)	479.	288.	1431.	150.	125.	239.	125.	483.
$BR(h_2 \to a_1 a_1)$	0.04	0.44	0.00	0.97	0.00			
$BR(h_2 \to h_1 h_1)$	0.25	0.21	0.00	0.00	0.92	0.32	0.93	0.01
m_{h_3} (GeV)	952.	1016.	2842.	753.	495.	562.	731.	821.
m_{a_1} (GeV)	10.	20.	31.	45.	144.	40.	188.	1.
$BR(a_1 \to b\bar{b})$	0.00	0.94	0.93	0.93	0.85	0.47	0.31	0.39
$BR(a_1 \to \tau^+\tau^-)$	0.83	0.06	0.07	0.07	0.08	0.00	0.00	0.95
$BR(a_1 \to jj)$	0.17	0.00	0.00	0.00	0.01	0.98	0.00	0.00
m_{a_2} (GeV)	952.	1018.	1434.	750.	495.	558.	736.	493.
$m_{h^\pm}$ (GeV)	954.	1017.	1432.	742.	487.	560.	727.	485.
$m_{\tilde{\chi}_1^0}$	453.	136.	476.	113.	82.	211.	81.	500.

Points 1 and 2

```
1)
Delta M_chi = 35.33 (493 - 458)
mh = 87.64
ma = 9.49
ma < Delta < mh, mZ
* Omega h^2 FAILS

2)
Delta M_chi = 33.09 (173 - 140)
mh = 98.73
ma = 20.24
ma < Delta < mh, mZ
* excluded by ee -> hZ, h -> AA -> 4b's
```

Points 3 and 4

```
3)
Delta M_chi = 62.54 (539 - 476)
mh = 121.67
ma = 31.12
ma < Delta < mh, mZ
* Omega h^2 FAILS

4)
Delta M_chi = 113.74 (230 - 116)
mh = 93.79
ma = 44.96
ma, mh, mZ < Delta
* excluded by ee -> hZ, h -> AA -> 4b's
```

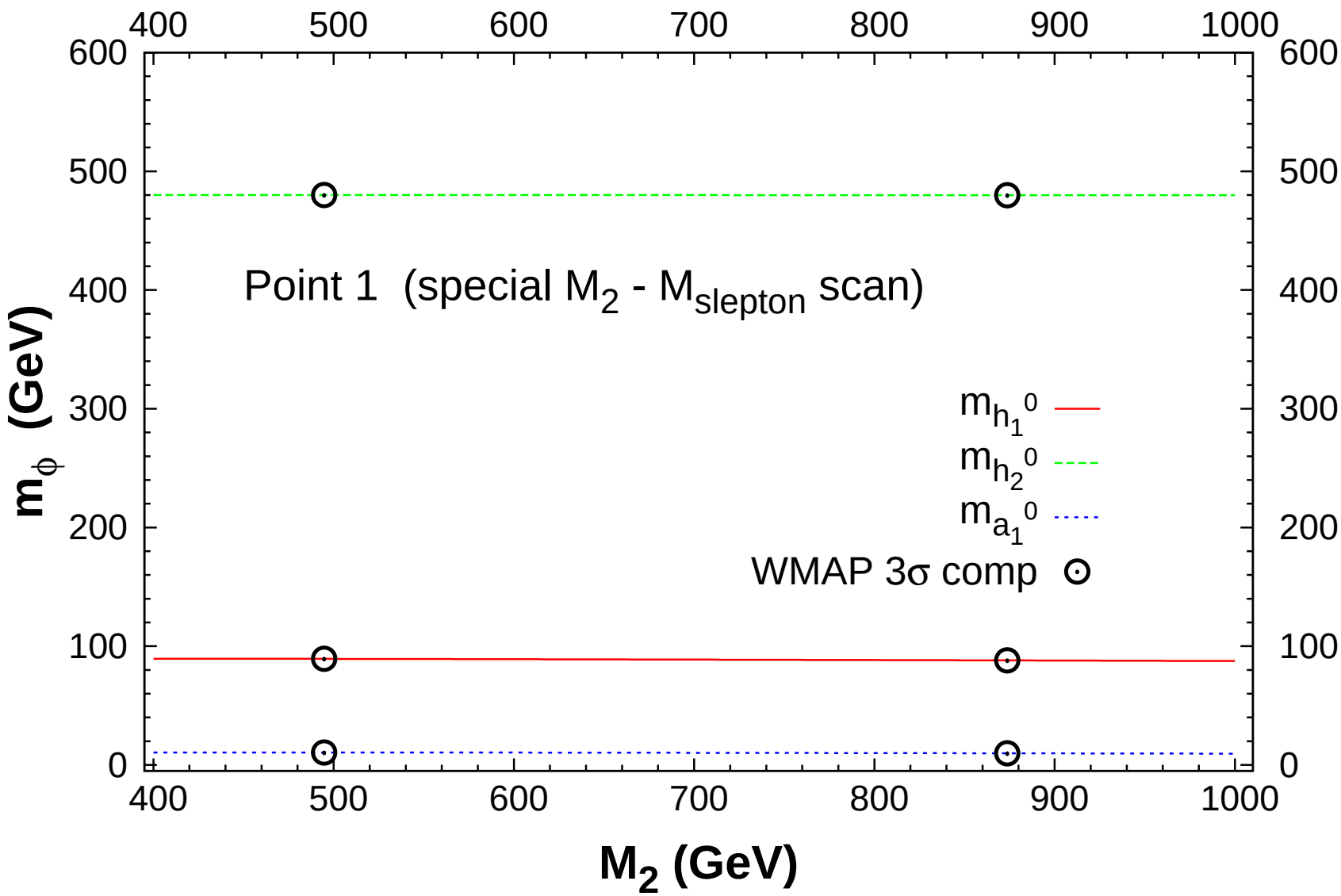
Points 5 and 6

```
5)
Delta M_chi = 119.76 (203 - 83)
mh = 55.61
ma = 144.47
mh, mZ < Delta < ma
* Omega h^2 FAILS

6)
Delta M_chi = 40.17 (253 - 213)
mh = 90.54
ma = 40.31
Delta < ma, mh, mZ
* excluded by ee -> hZ, h -> AA -> 4b's
```

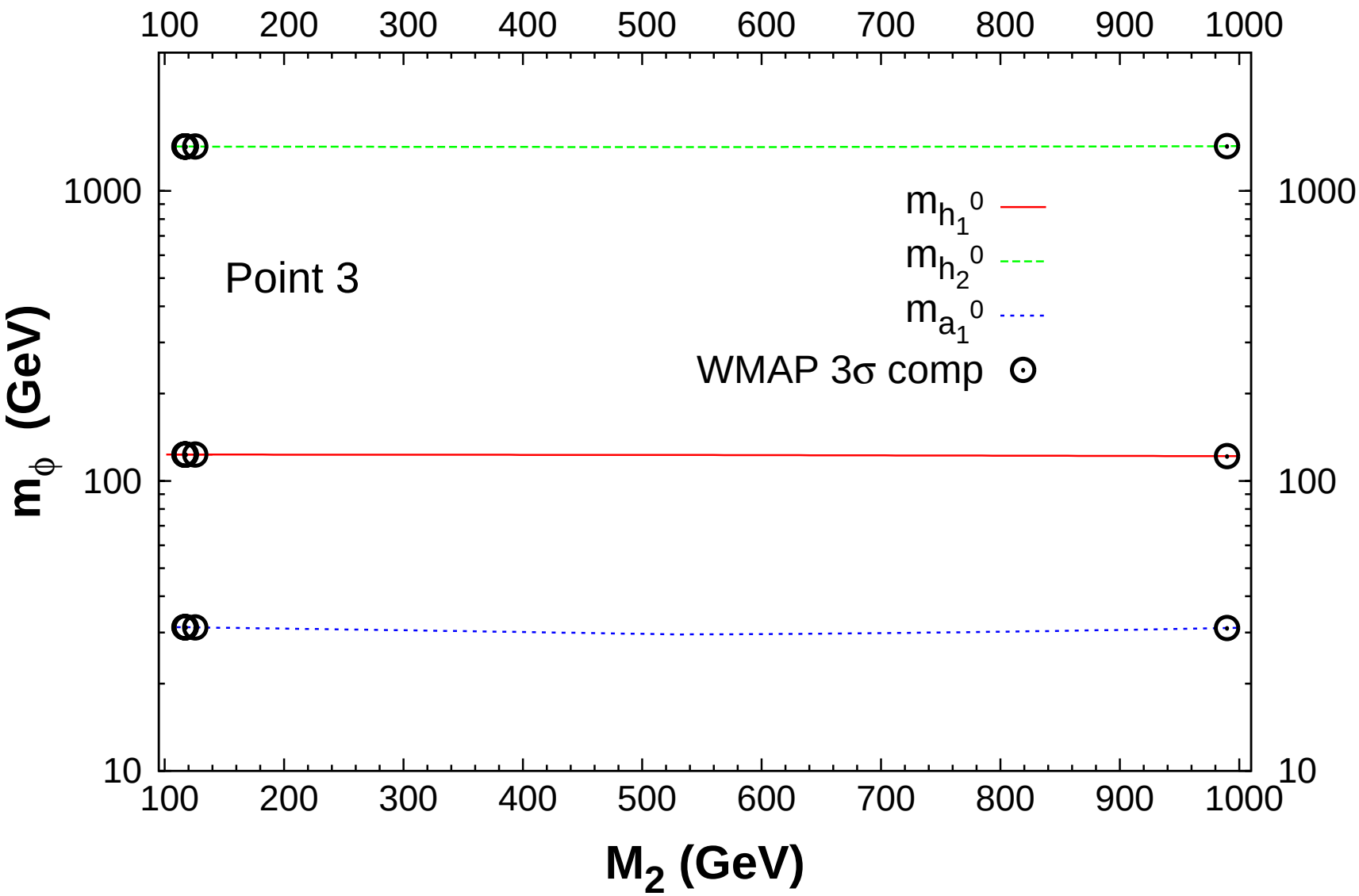
Points 7 and 8

```
7)
Delta M_chi = 116.79 (200-83)
mh = 61.34
ma = 186.90
mh, mZ < Delta < ma
* excluded by ee -> hZ, h -> bb and ee -> hZ, h -> 2 j

8)
Delta M_chi = 257.26 (754 - 497)
mh = 90.27
ma = 27.5
mh, mZ, ma < Delta
* excluded by ee -> hZ, h -> AA -> 4b's
* \tilde chi^0_1 is not the LSP
```

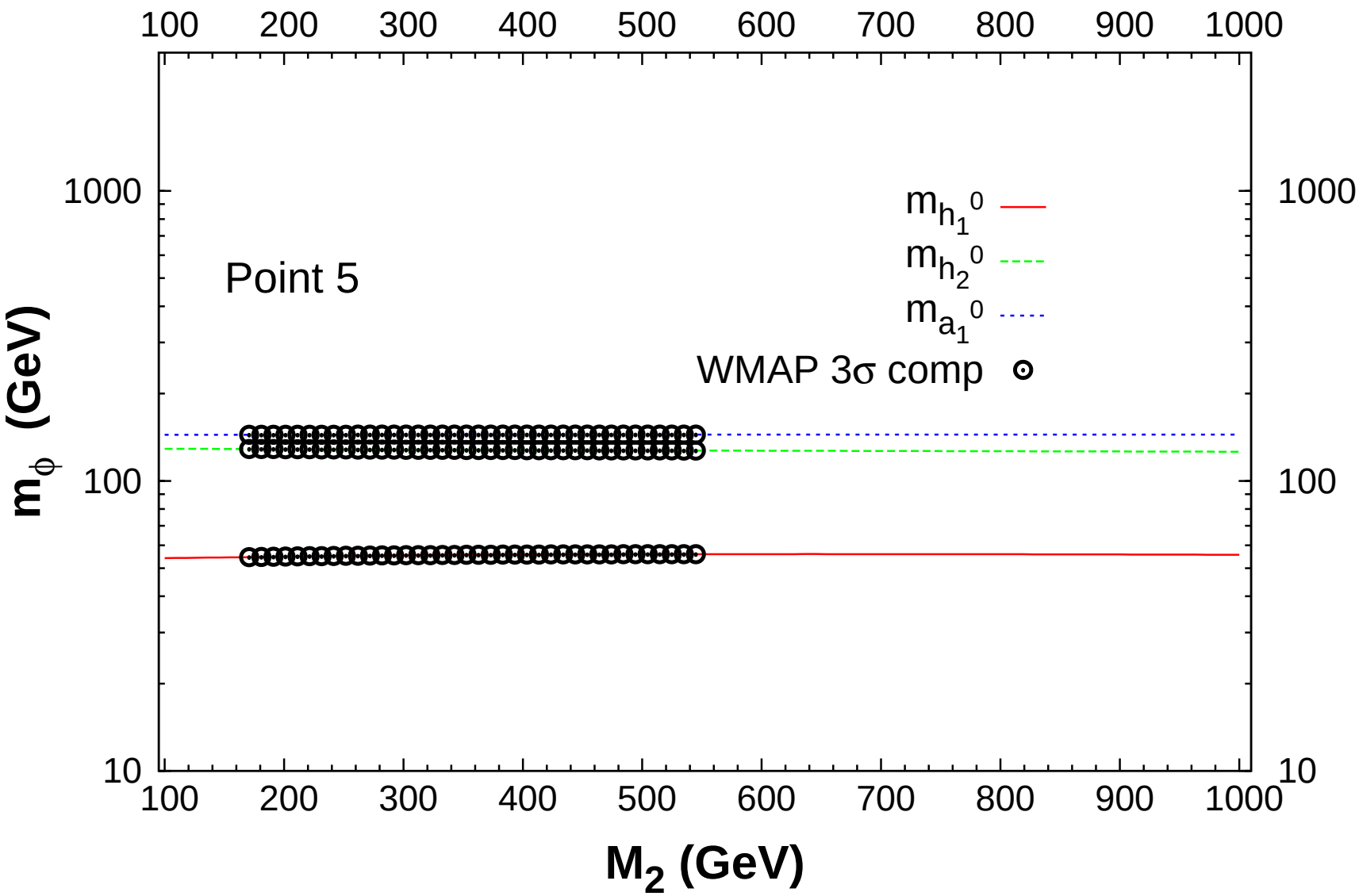
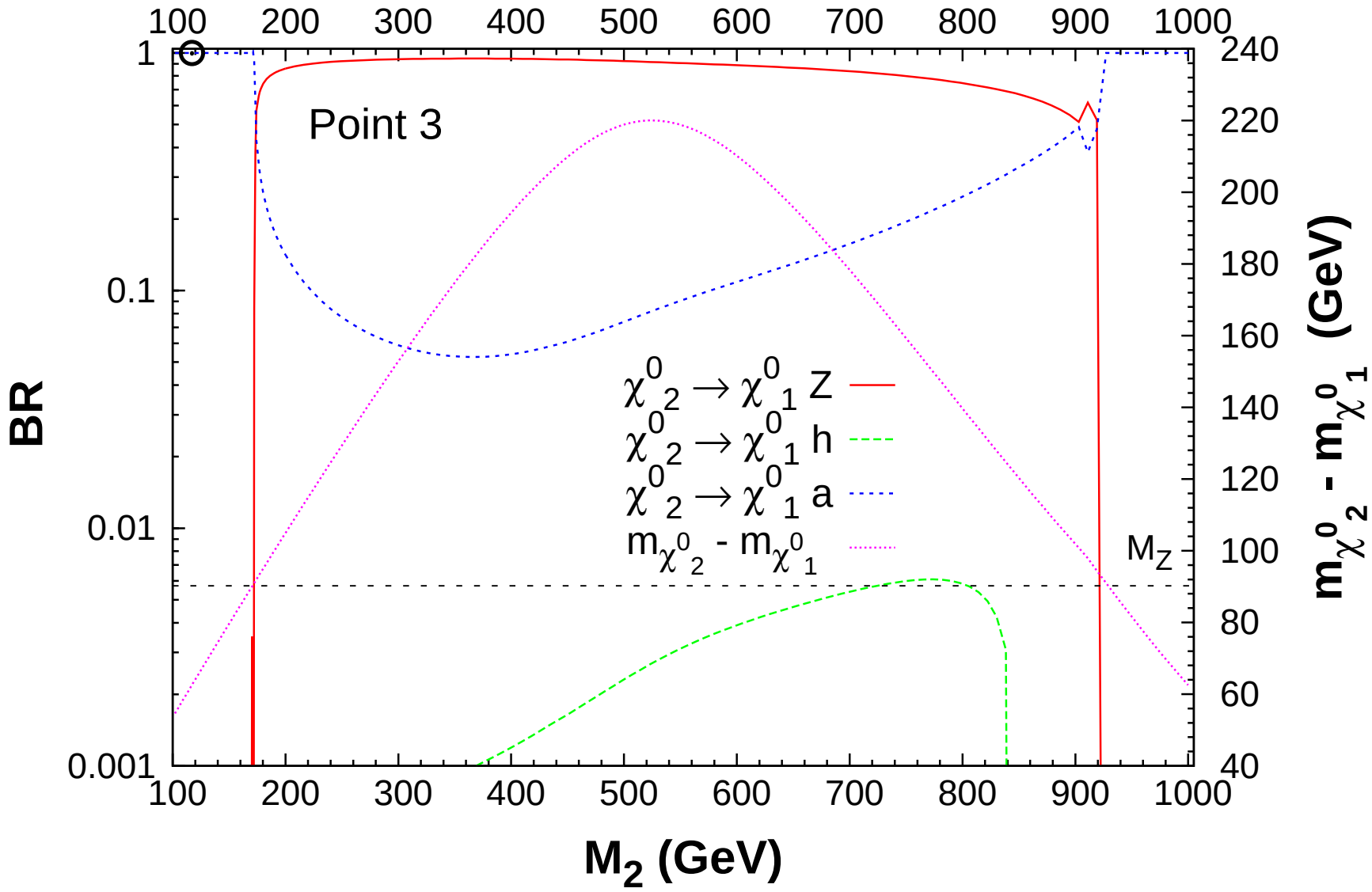
Example point 1



Example point 3



Example point 3



Examples of decays point 3