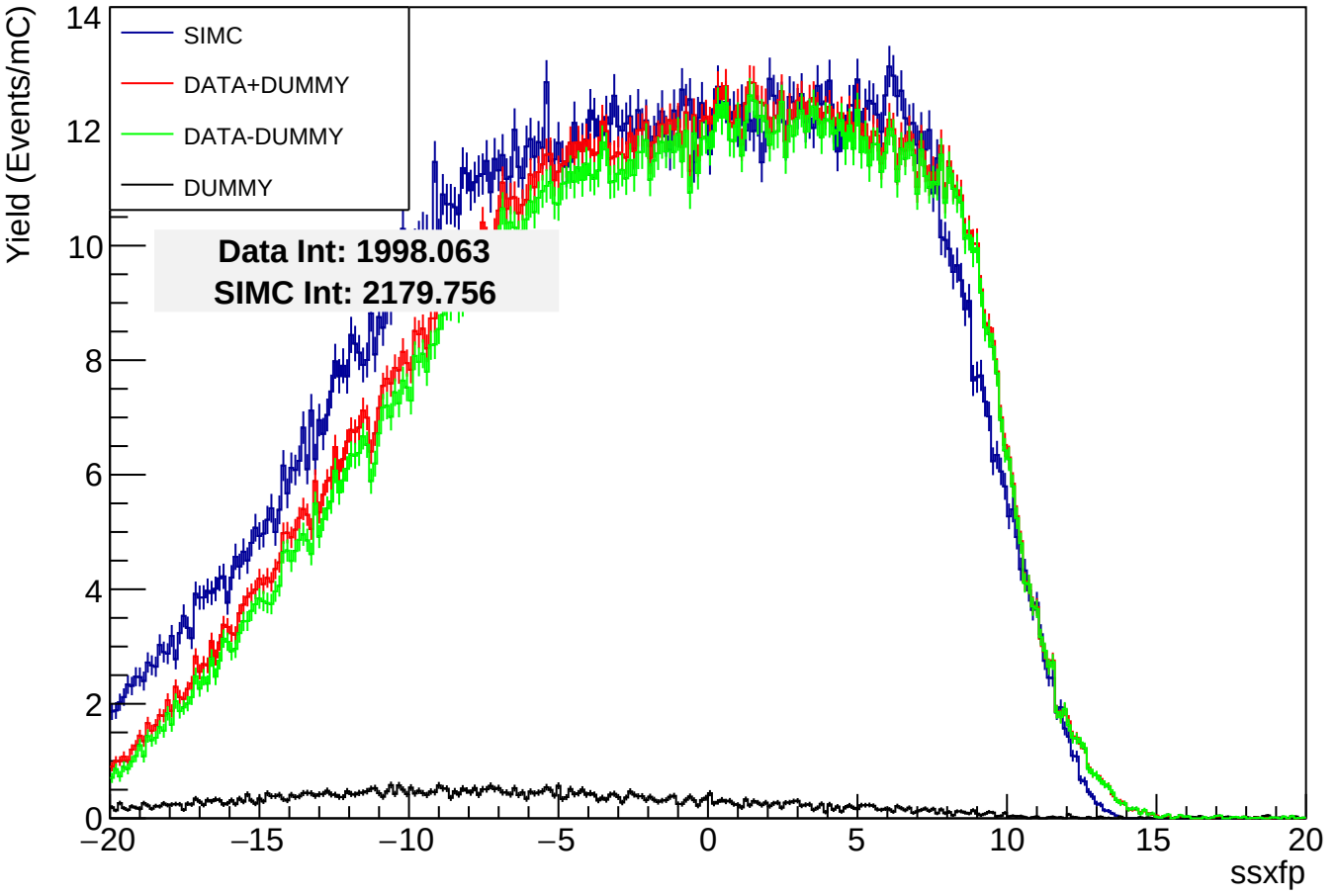
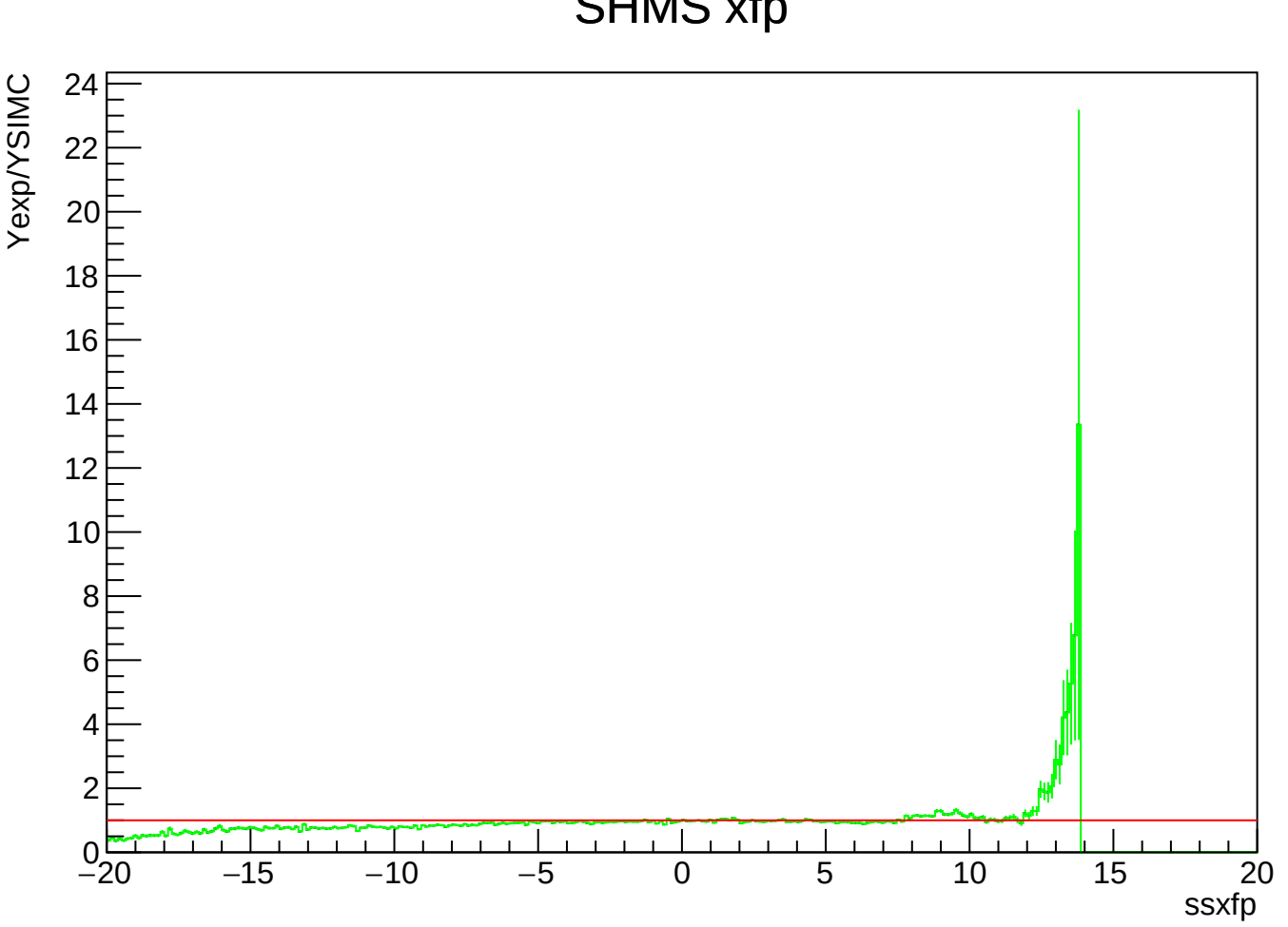
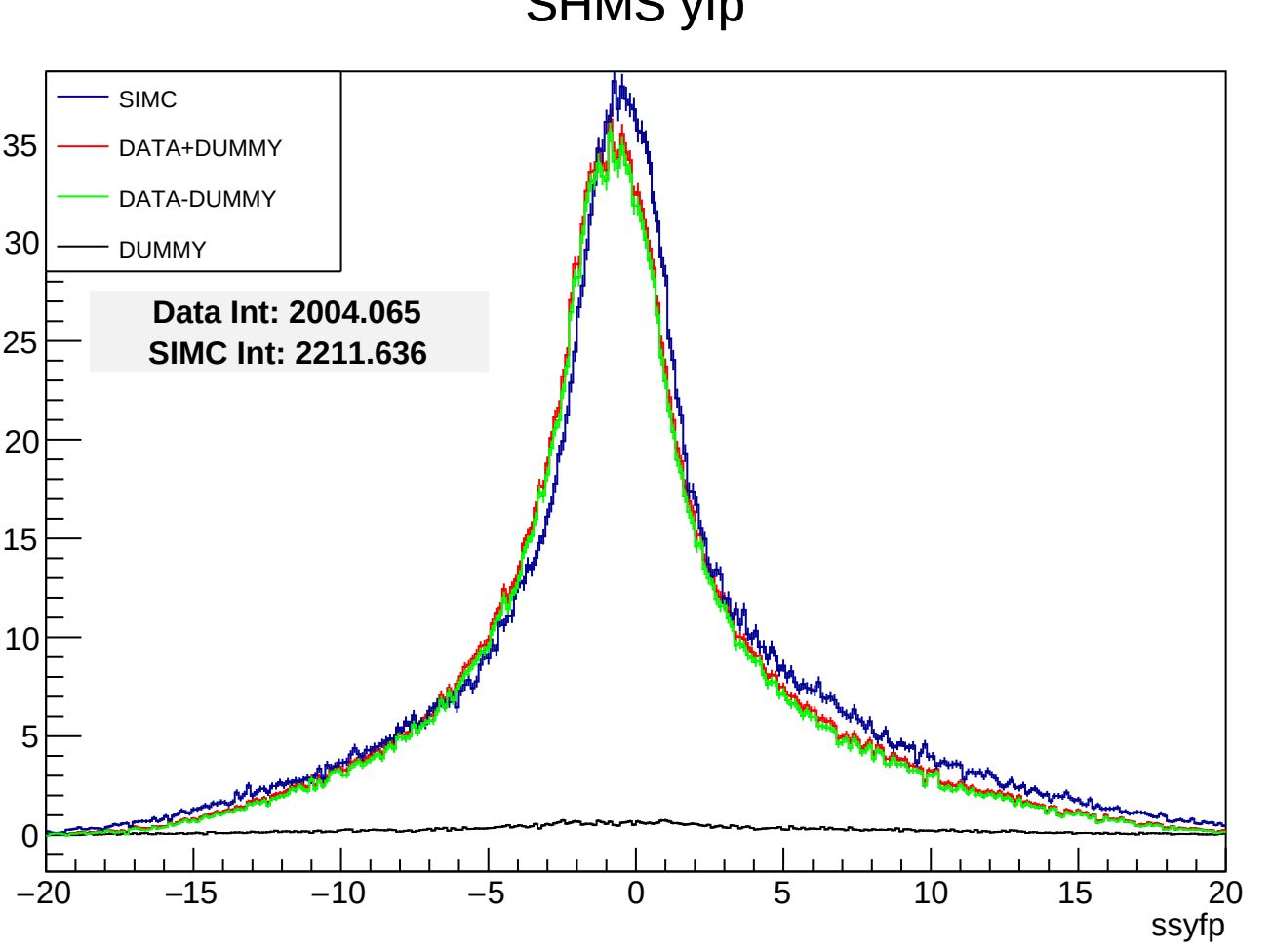
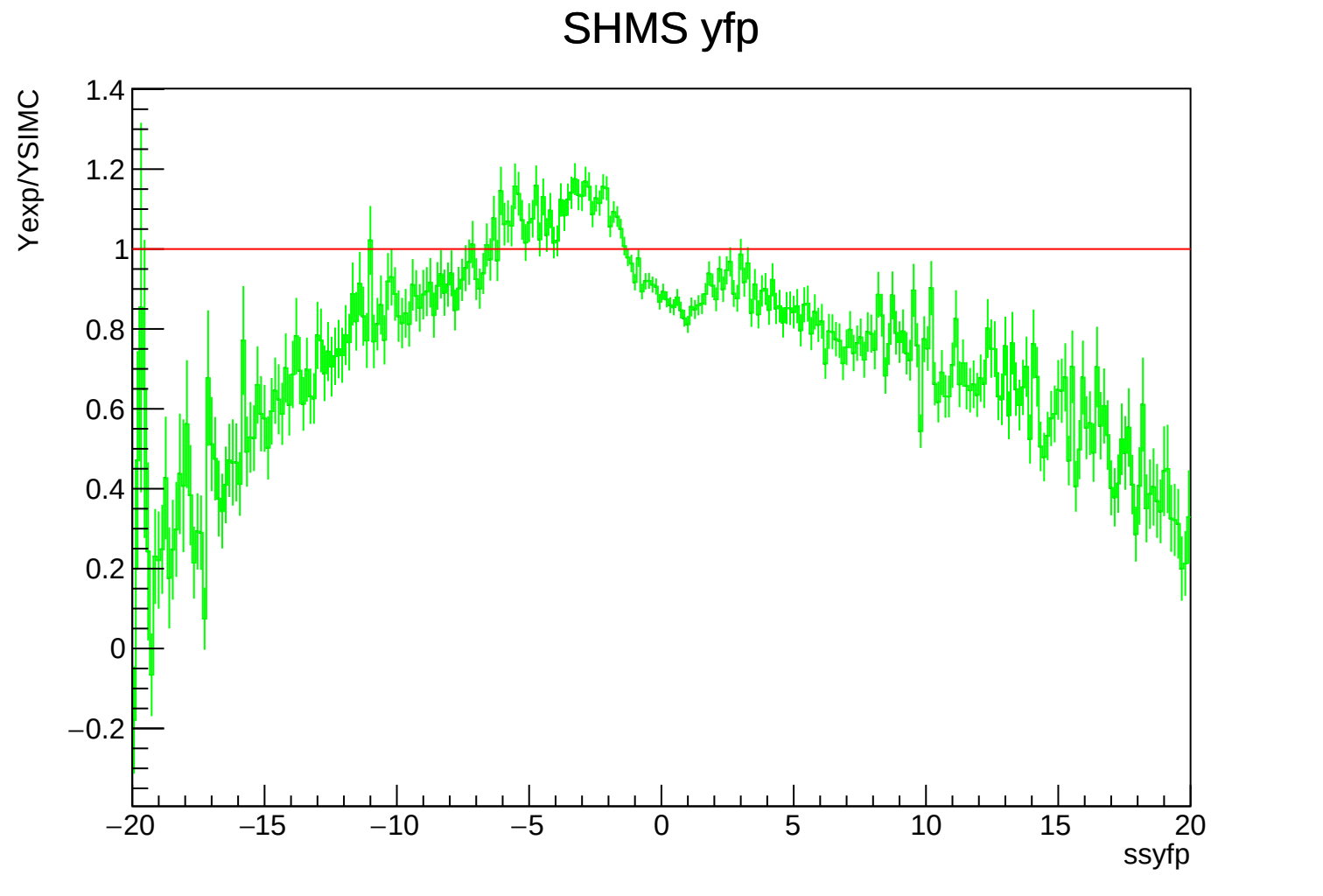
Analysis update: May 3, 2022

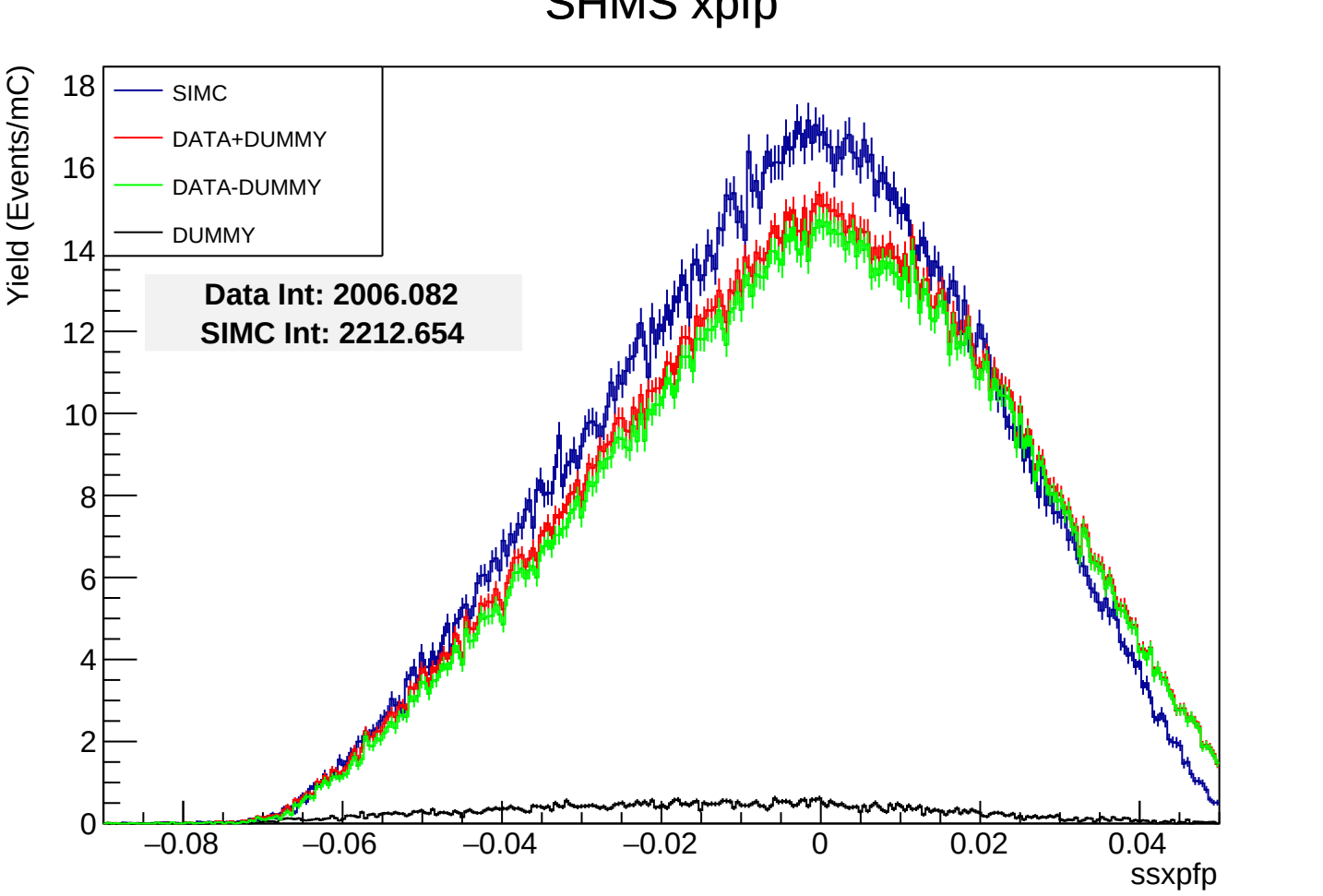
- SIMC simulation:
  - **2.7 GeV PionLT**.
    - **Q^2 = 0.38 GeV², left1, left2** and **center** settings (Ysimc * 0.8). **Done**
    - **Q^2 = 0.42 GeV², left1, left2** and **center** settings (Ysimc * 0.8). **Done**
  - **3.6 GeV PionLT**
    - **Q^2 = 0.38 GeV², left1, left2, right1, right2** and **center** settings. **Done**
    - **Q^2 = 0.42 GeV², left1, left2** and **center** settings. **Done**
  - **4.5 GeV PionLT**
    - **Q^2 = 0.38 GeV², left1, left2, right1** and **center** settings. **Done**
    - **Q^2 = 0.42 GeV², left1, left2, right1, right2** and **center** settings. **Done**
  - An output pdf file of the **4.5 GeV, Q^2 = 0.42 GeV²** and **center** setting is attached below.

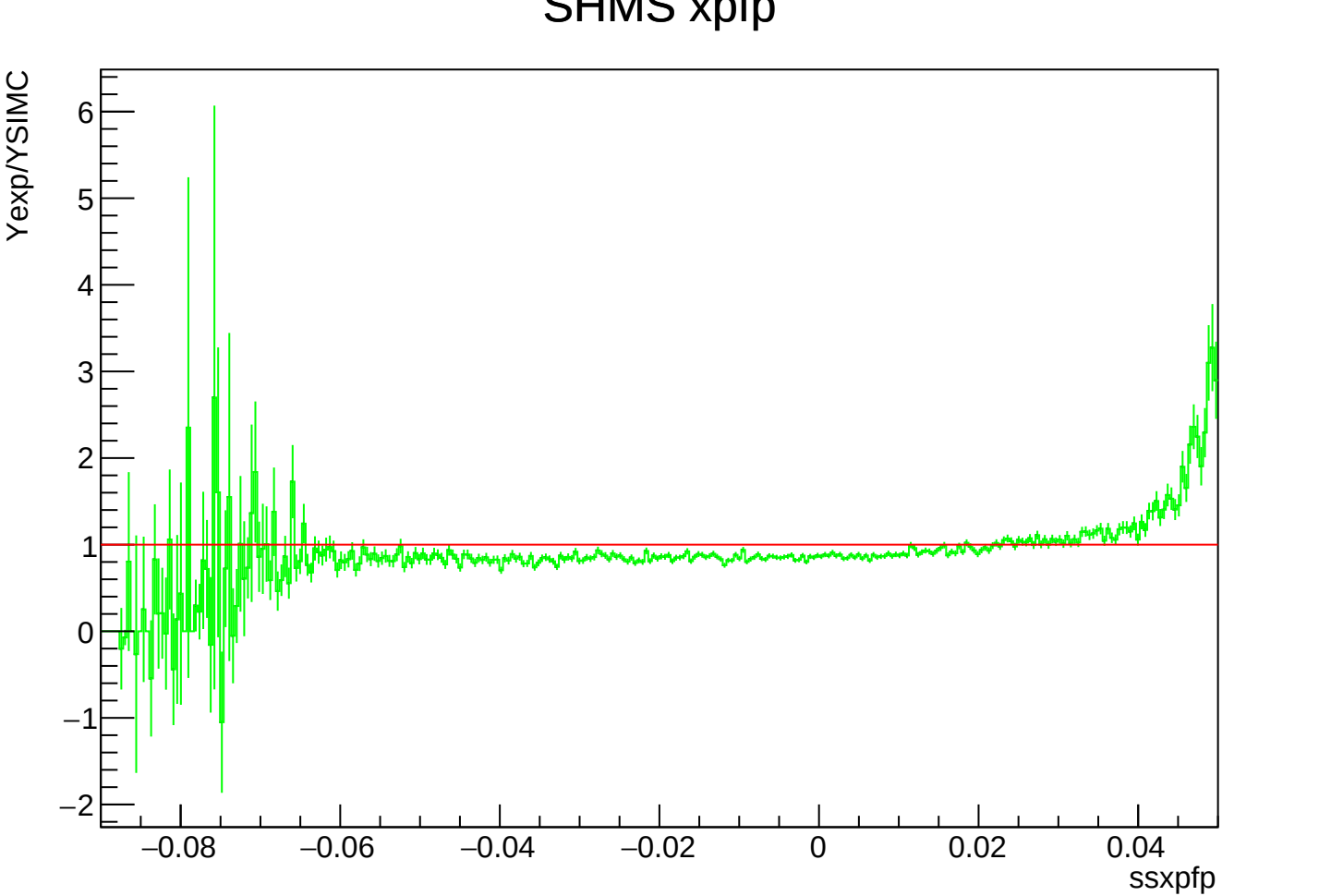

SHMS xfp
SIMC
DATA+DUMMY
DATA-DUMMY
DUMMY
Data Int: 1998.063
SIMC Int: 2179.756
Yield (Events/mC)
ssxfp
0
2
4
6
8
10
12
14
−20
−15
−10
−5
0
5
10
15
20

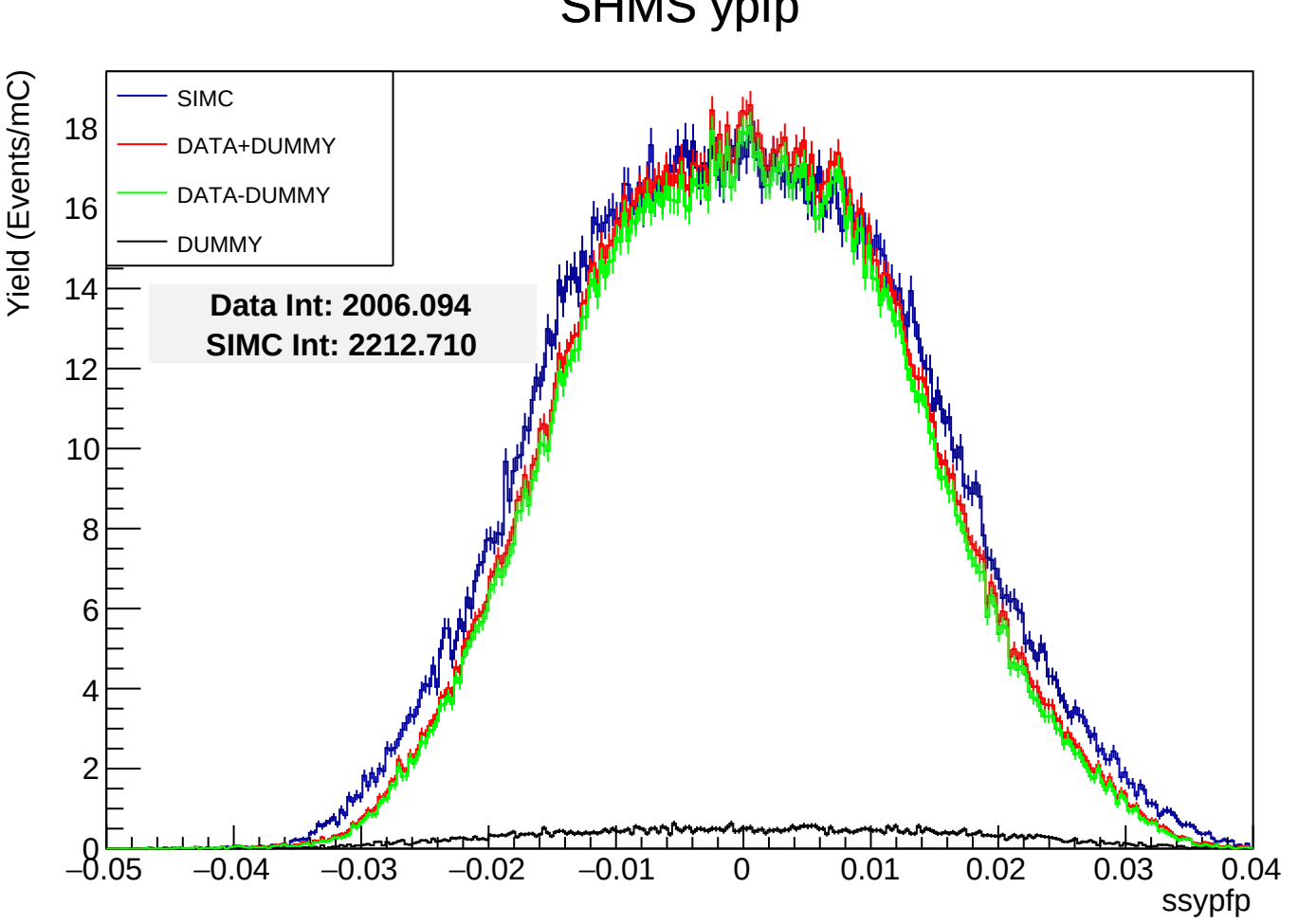

SHMS xfp
Yexp/YSIMC
24
22
20
18
16
14
12
10
8
6
4
2
0
−20
−15
−10
−5
0
5
10
15
20
ssxfp

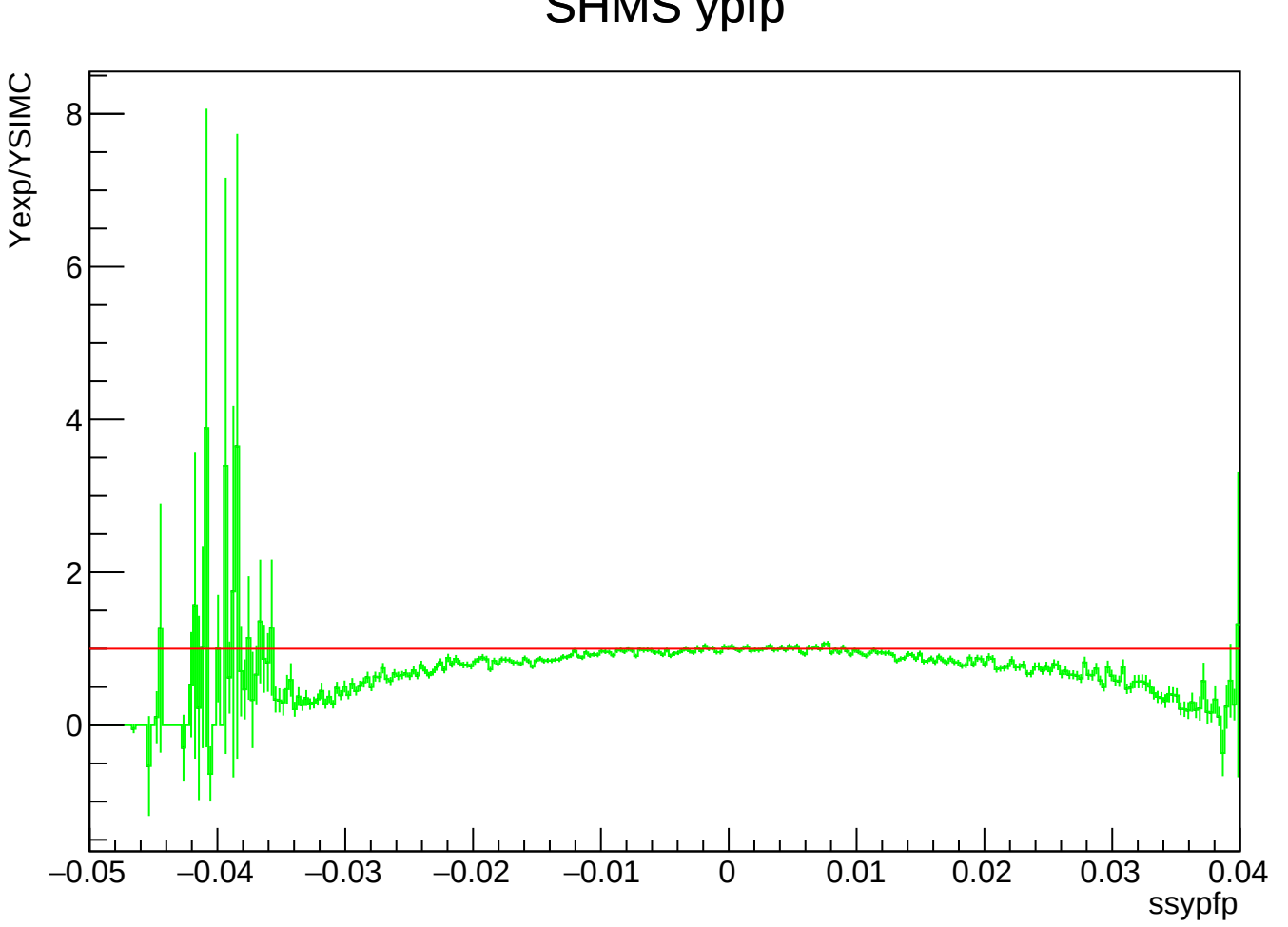

SHMS yfp
SIMC
DATA+DUMMY
DATA-DUMMY
DUMMY
Data Int: 2004.065
SIMC Int: 2211.636
35
30
25
20
15
10
5
0
−20
−15
−10
−5
0
5
10
15
20
ssyfp

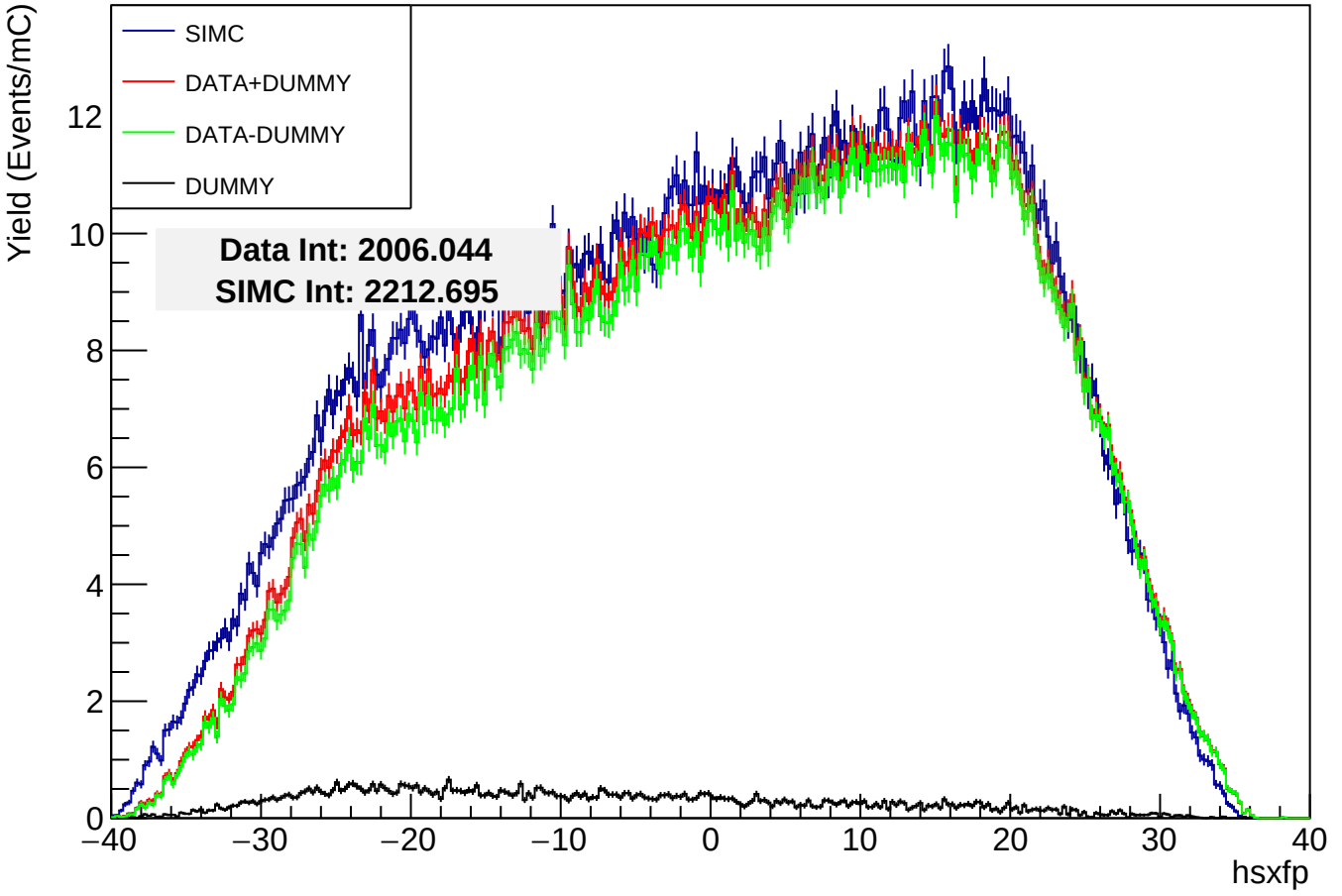

SHMS yfp
Yexp/YSIMC
1.4
1.2
1
0.8
0.6
0.4
0.2
0
−0.2
−20
−15
−10
−5
0
5
10
15
20
ssyfp

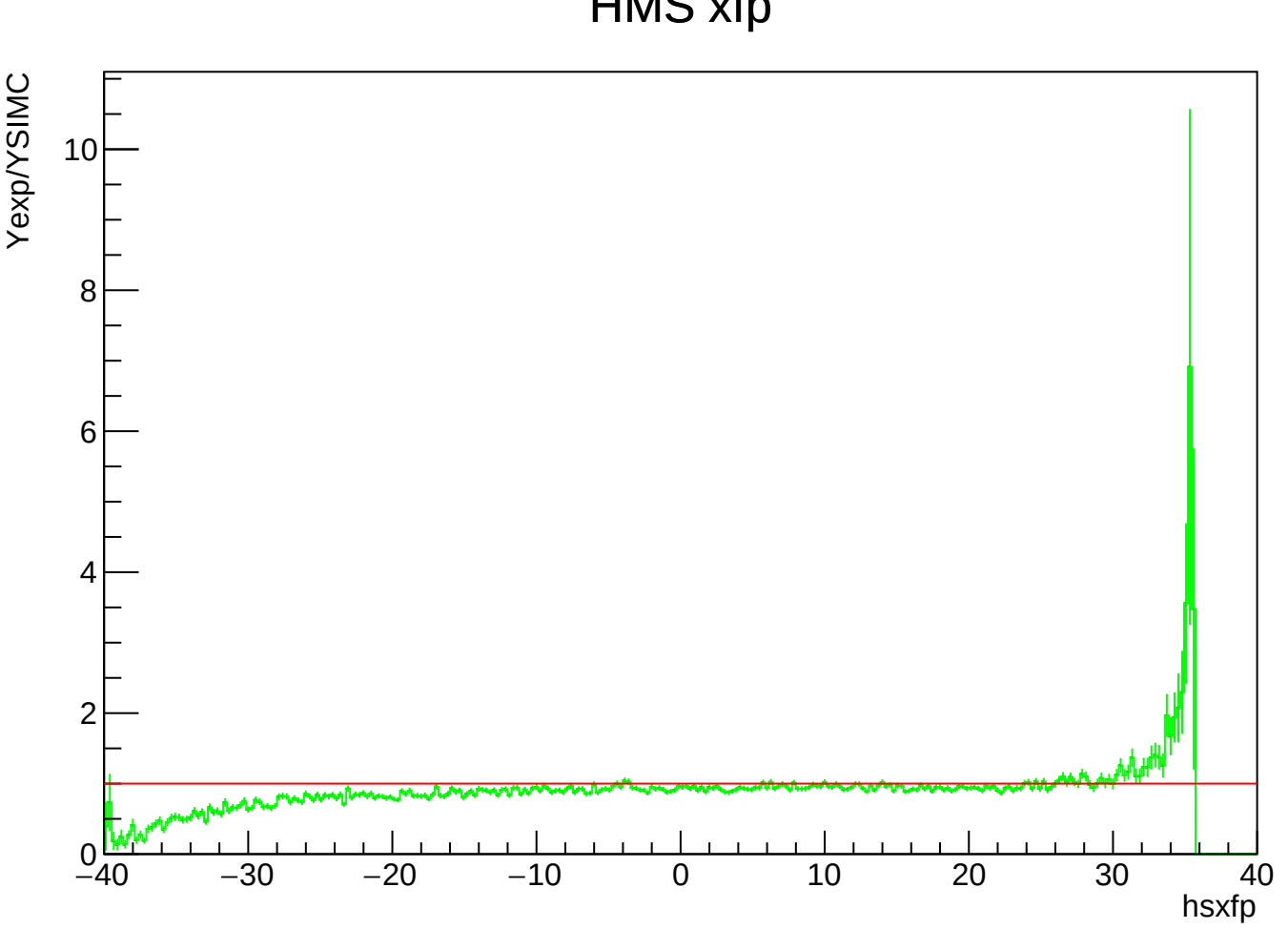

SHMS xpfp
SIMC
DATA+DUMMY
DATA-DUMMY
DUMMY
Data Int: 2006.082
SIMC Int: 2212.654
Yield (Events/mC)
18
16
14
12
10
8
6
4
2
0
–0.08
–0.06
–0.04
–0.02
0
0.02
0.04
ssxpfp

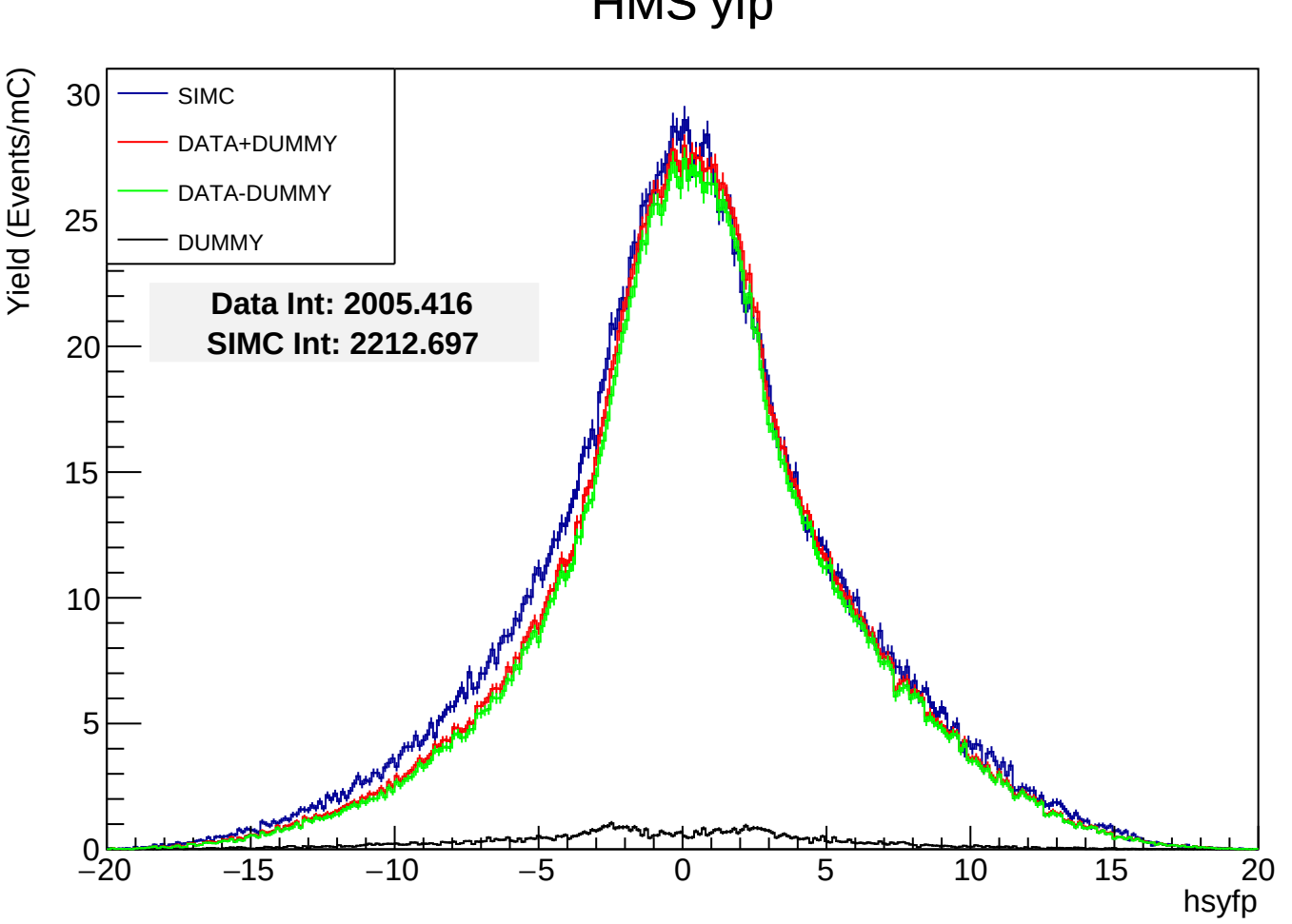

SHMS xpfp
Yexp/YSIMC
6
5
4
3
2
1
0
−1
−2
−0.08
−0.06
−0.04
−0.02
0
0.02
0.04
ssxpfp

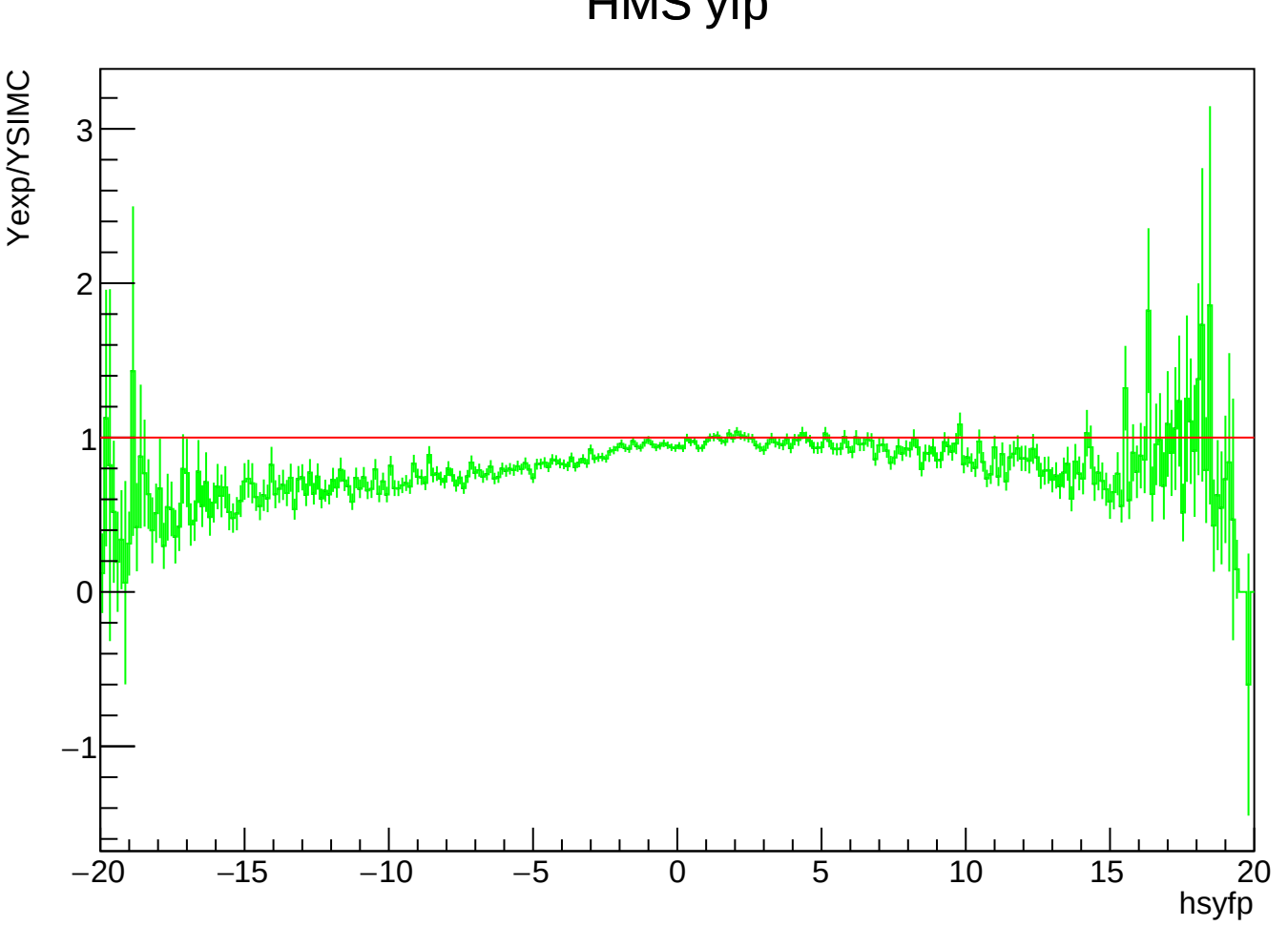

SHMS ypfp
SIMC
DATA+DUMMY
DATA-DUMMY
DUMMY
Data Int: 2006.094
SIMC Int: 2212.710
Yield (Events/mC)
18
16
14
12
10
8
6
4
2
0
–0.05
–0.04
–0.03
–0.02
–0.01
0
0.01
0.02
0.03
0.04
ssypfp

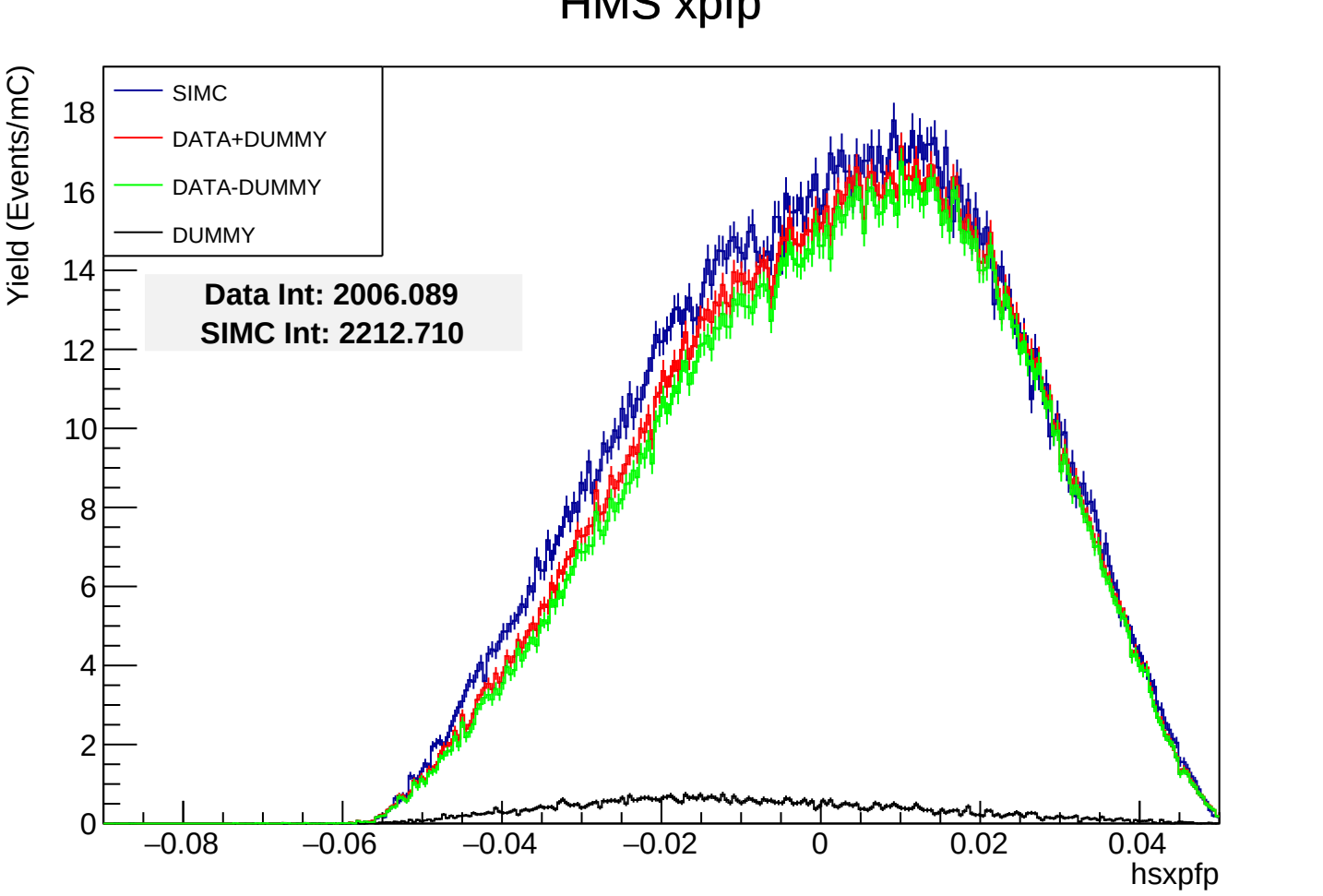

SHMS ypfp
Yexp/YSIMC
8
6
4
2
0
−0.05
−0.04
−0.03
−0.02
−0.01
0
0.01
0.02
0.03
0.04
ssypfp

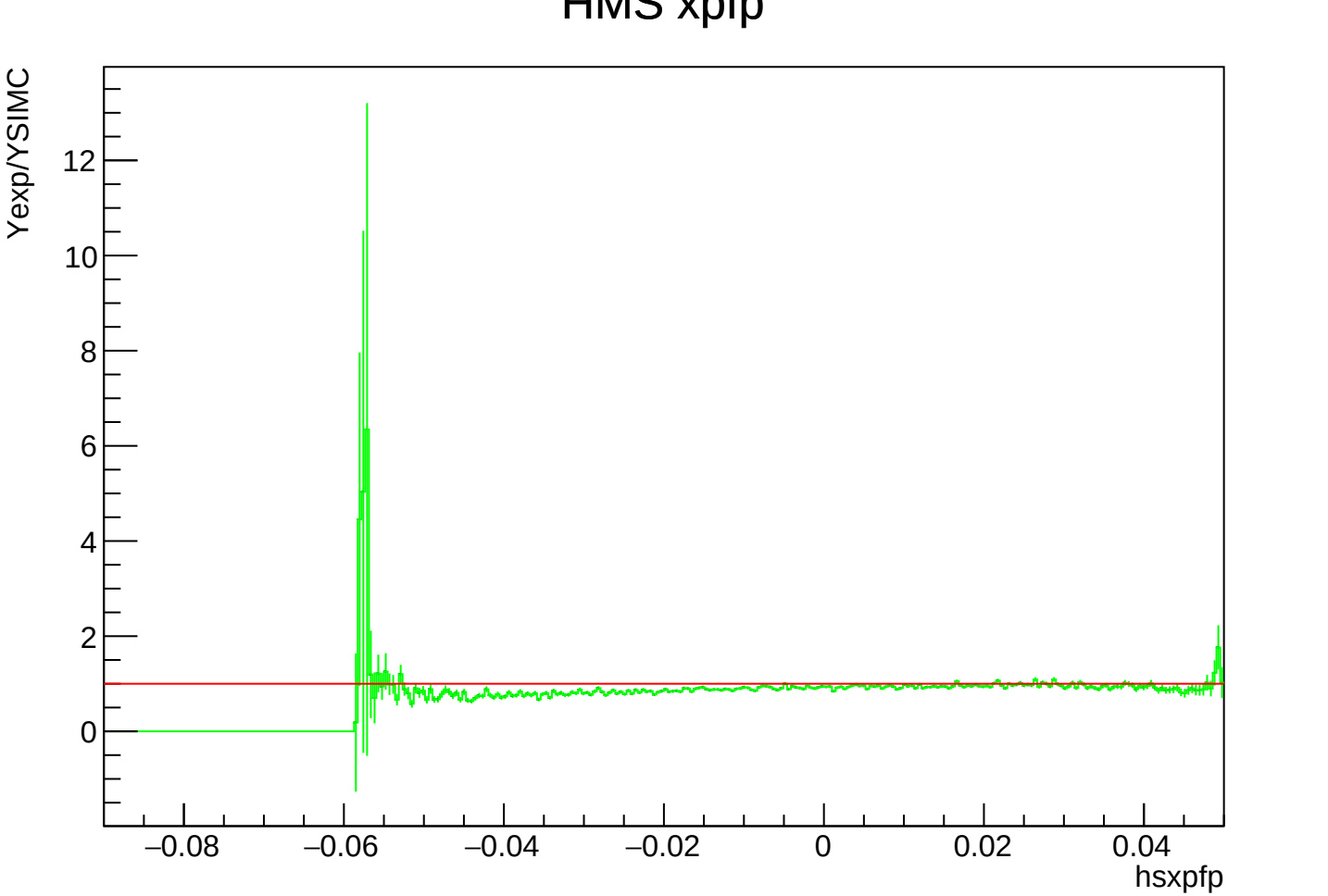

HMS xfp
SIMC
DATA+DUMMY
DATA-DUMMY
DUMMY
Data Int: 2006.044
SIMC Int: 2212.695
Yield (Events/mC)
hsxfp
0
2
4
6
8
10
12
−40
−30
−20
−10
0
10
20
30
40

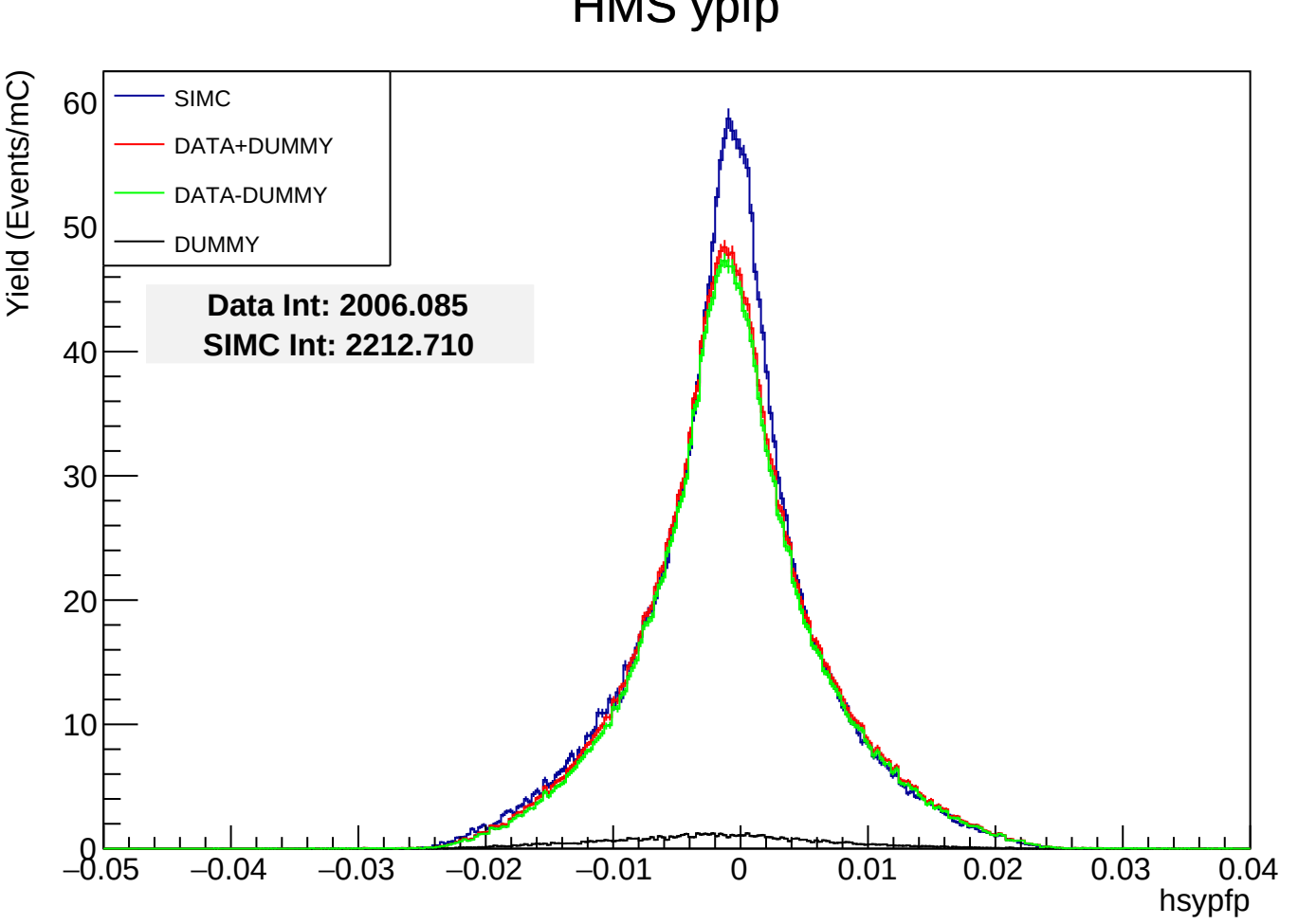

HMS xfp
Yexp/YSIMC
10
8
6
4
2
0
−40
−30
−20
−10
0
10
20
30
40
hsxfp

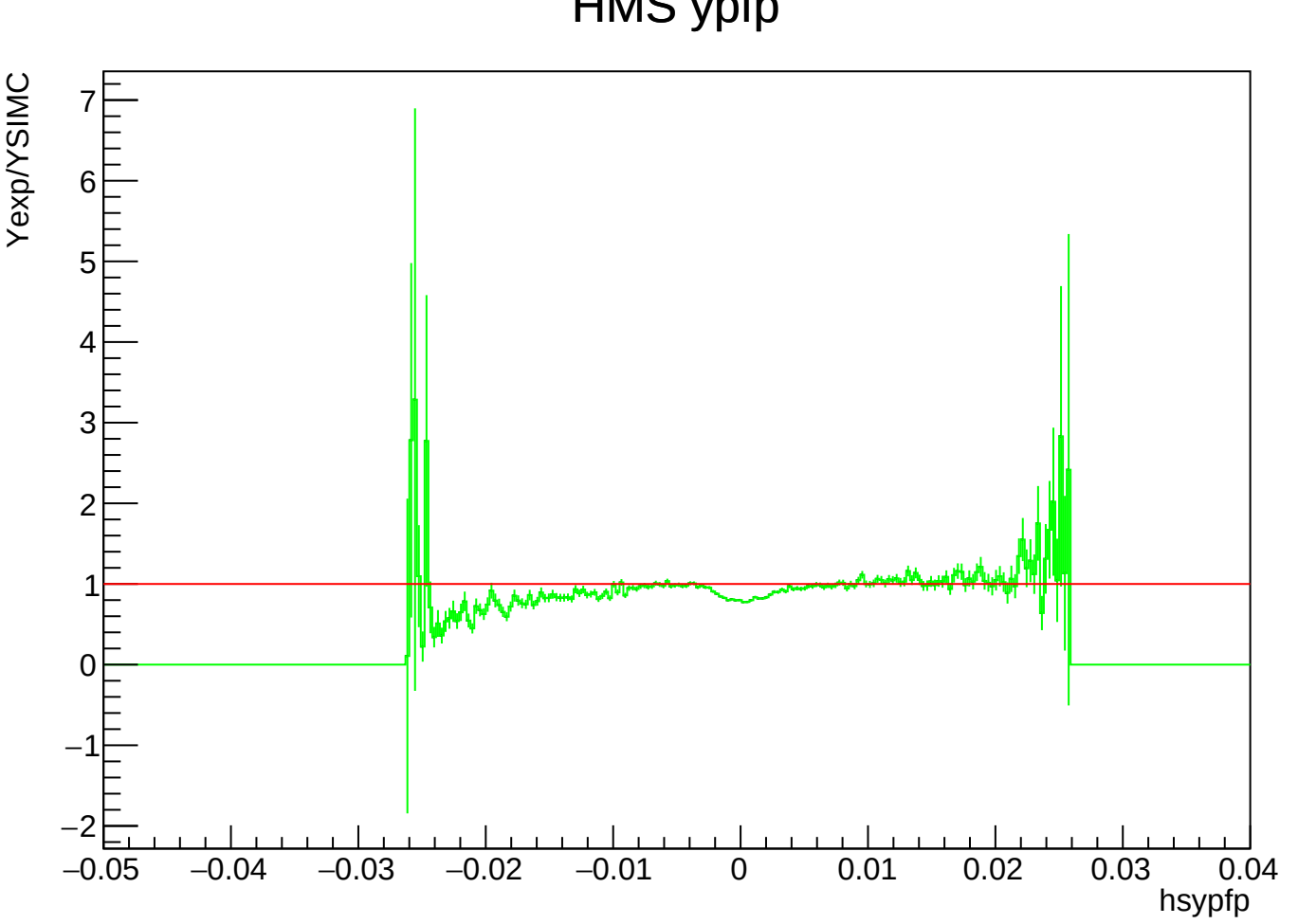

HMS yfp
SIMC
DATA+DUMMY
DATA-DUMMY
DUMMY
Data Int: 2005.416
SIMC Int: 2212.697
Yield (Events/mC)
hsyfp
30
25
20
15
10
5
0
−20
−15
−10
−5
0
5
10
15
20


HMS yfp
Yexp/YSIMC
3
2
1
0
−1
−20
−15
−10
−5
0
5
10
15
20
hsyfp

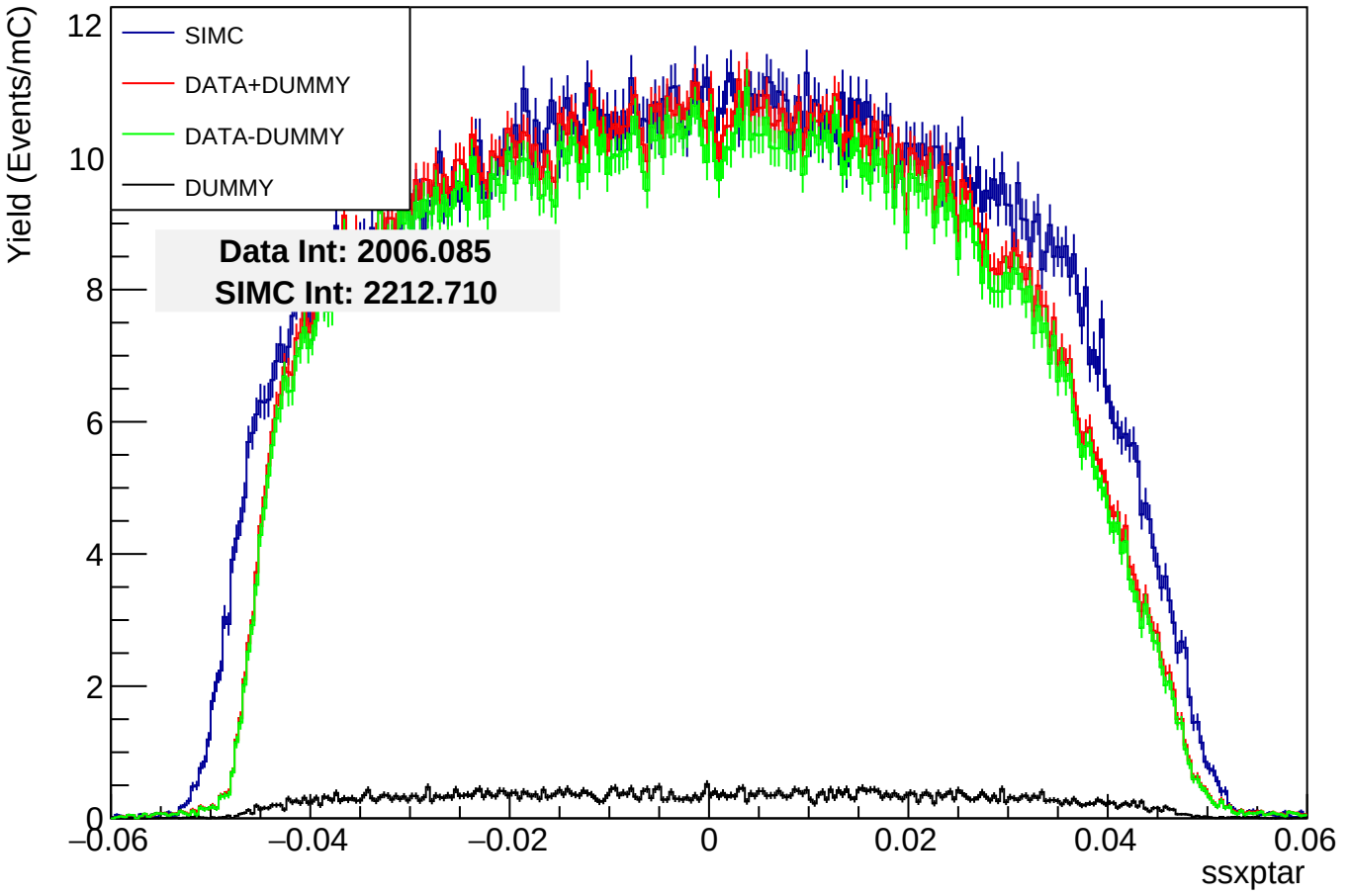

HMS xpfp
SIMC
DATA+DUMMY
DATA-DUMMY
DUMMY
Data Int: 2006.089
SIMC Int: 2212.710
Yield (Events/mC)
hsxpfp
0
2
4
6
8
10
12
14
16
18
–0.08
–0.06
–0.04
–0.02
0
0.02
0.04

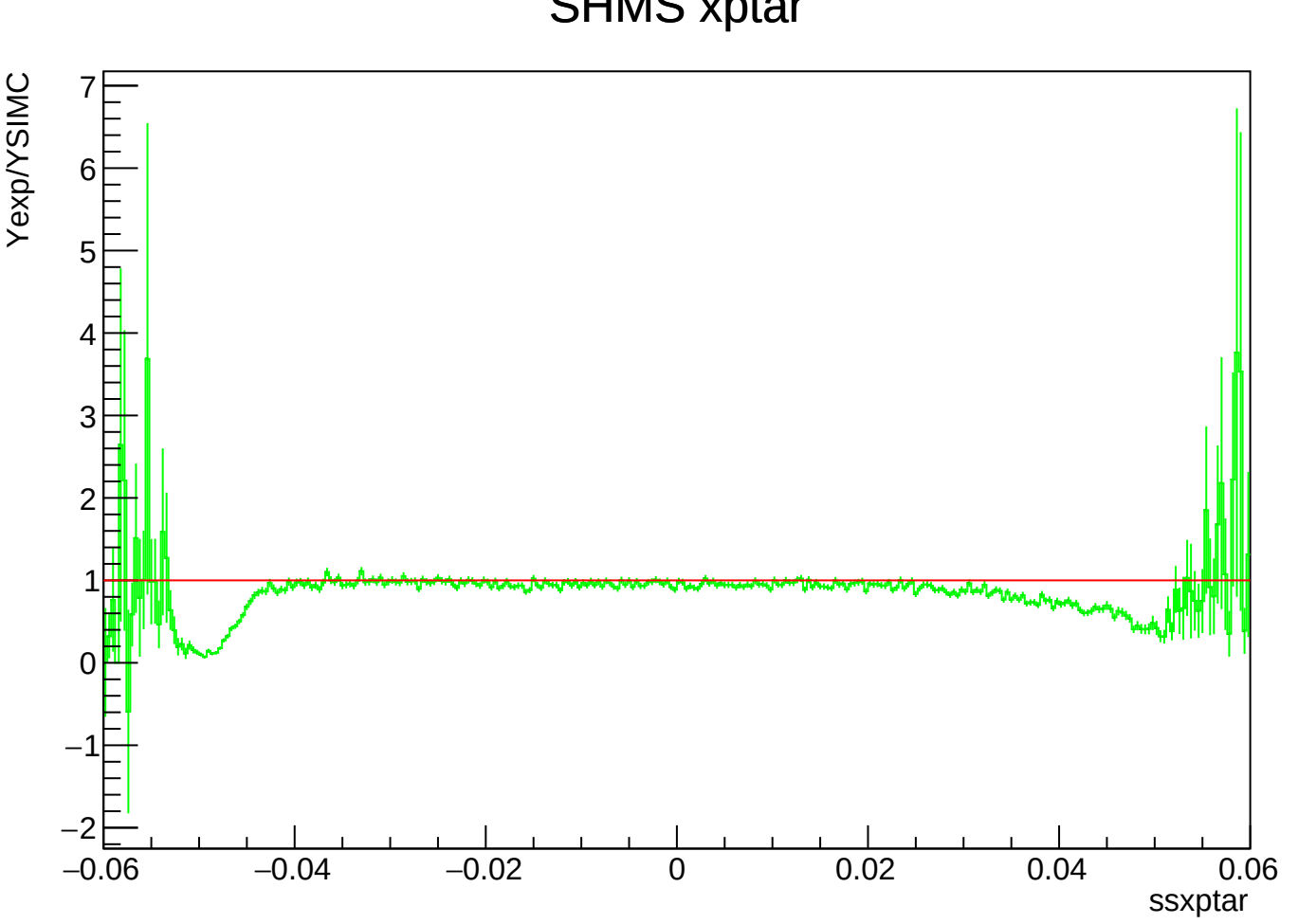

HMS xpfp
Yexp/YSIMC
12
10
8
6
4
2
0
–0.08
–0.06
–0.04
–0.02
0
0.02
0.04
hsxpfp

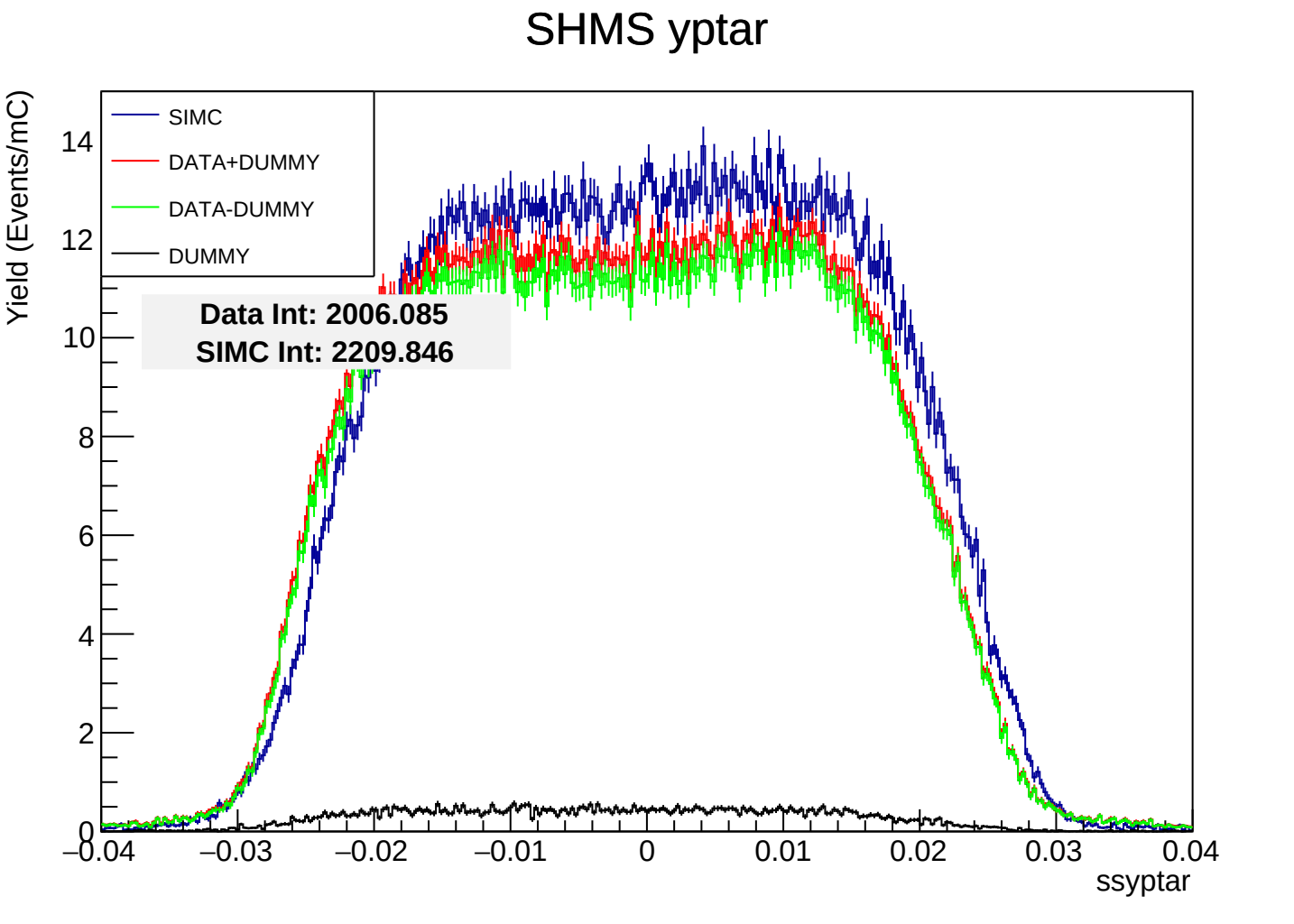

HMS ypfp
SIMC
DATA+DUMMY
DATA-DUMMY
DUMMY
Data Int: 2006.085
SIMC Int: 2212.710
Yield (Events/mC)
60
50
40
30
20
10
0
–0.05
–0.04
–0.03
–0.02
–0.01
0
0.01
0.02
0.03
0.04
hsypfp

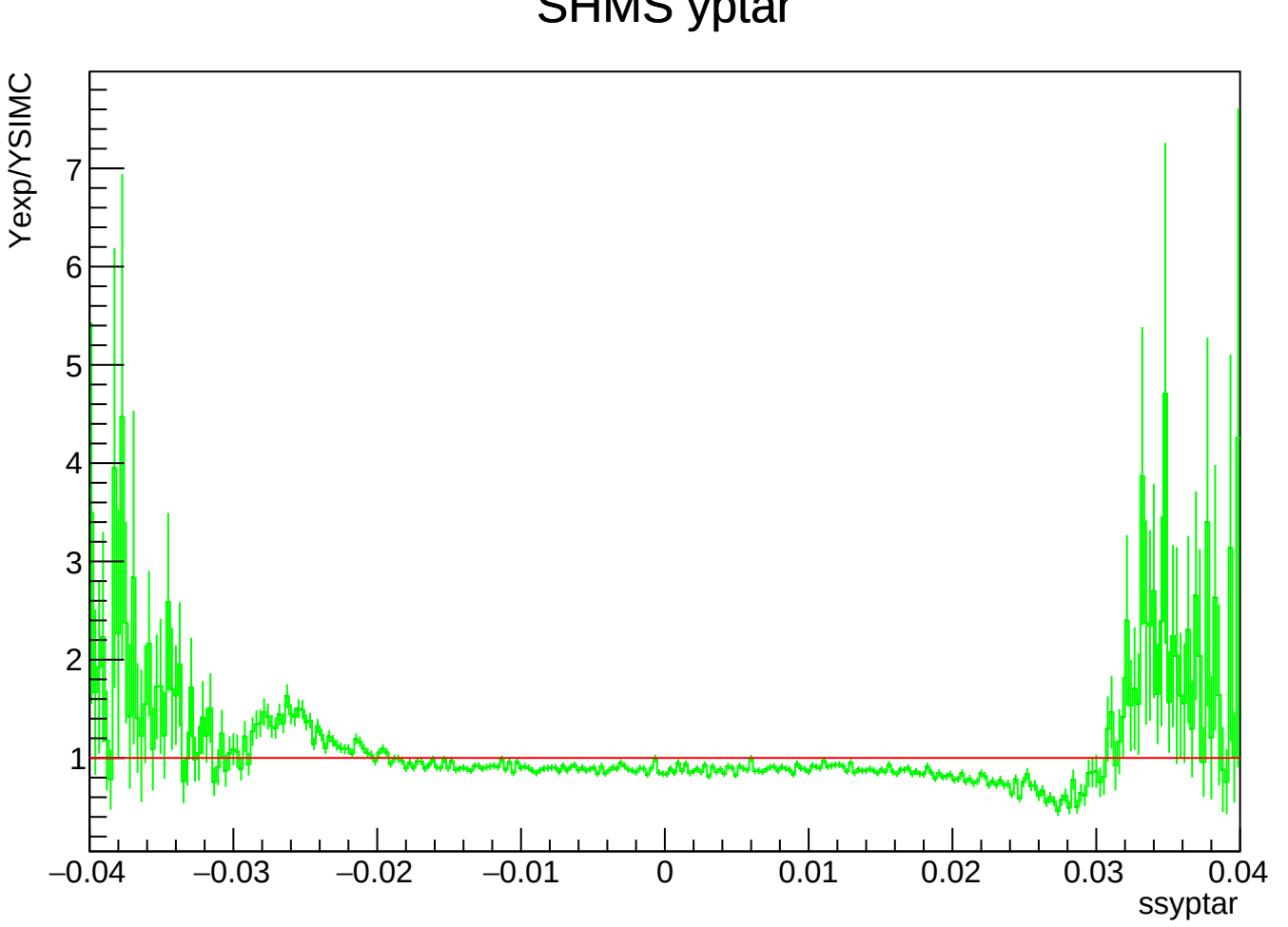

HMS ypfp
Yexp/YSIMC
7
6
5
4
3
2
1
0
−1
−2
−0.05
−0.04
−0.03
−0.02
−0.01
0
0.01
0.02
0.03
0.04
hsypfp

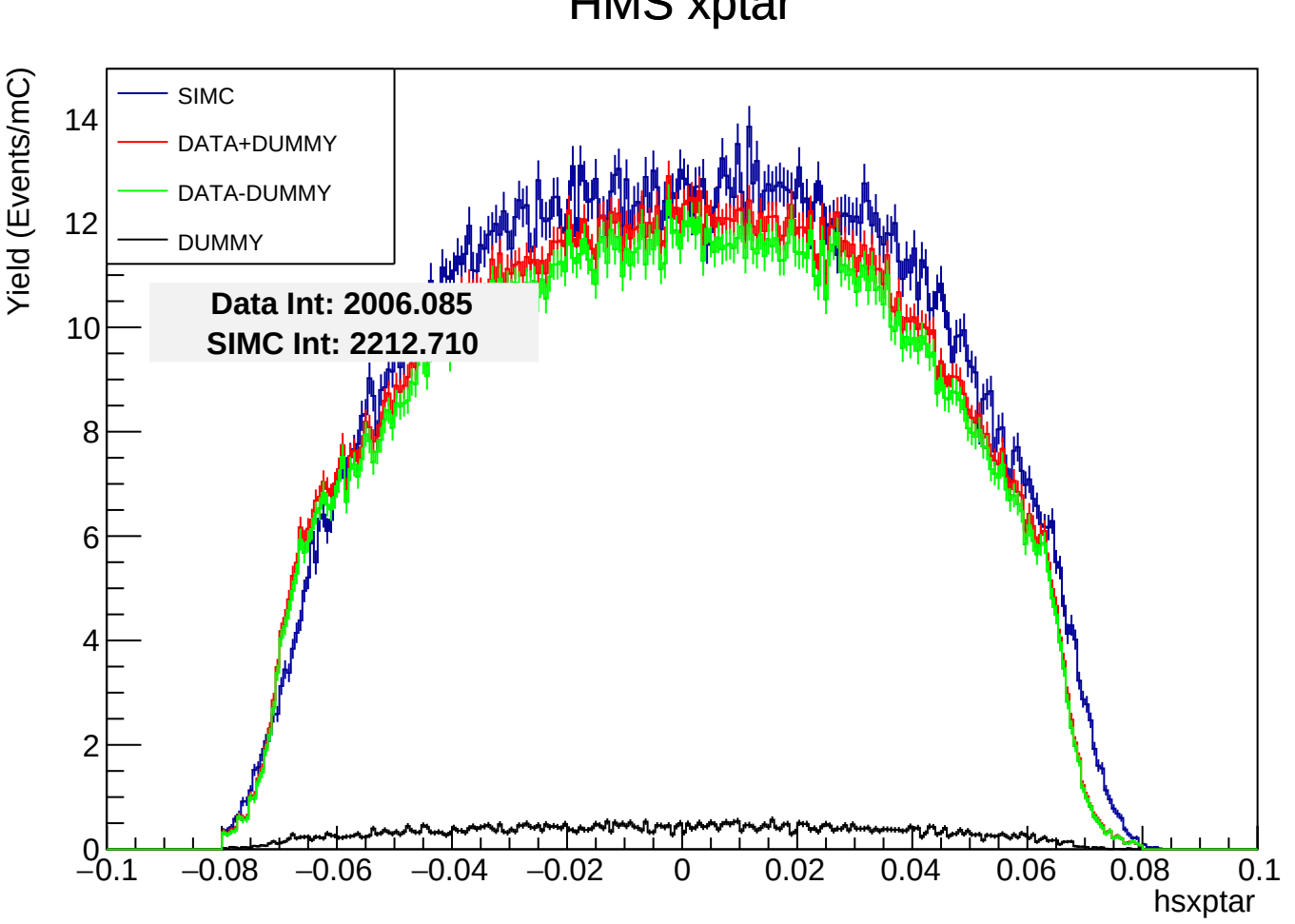
SHMS xptar

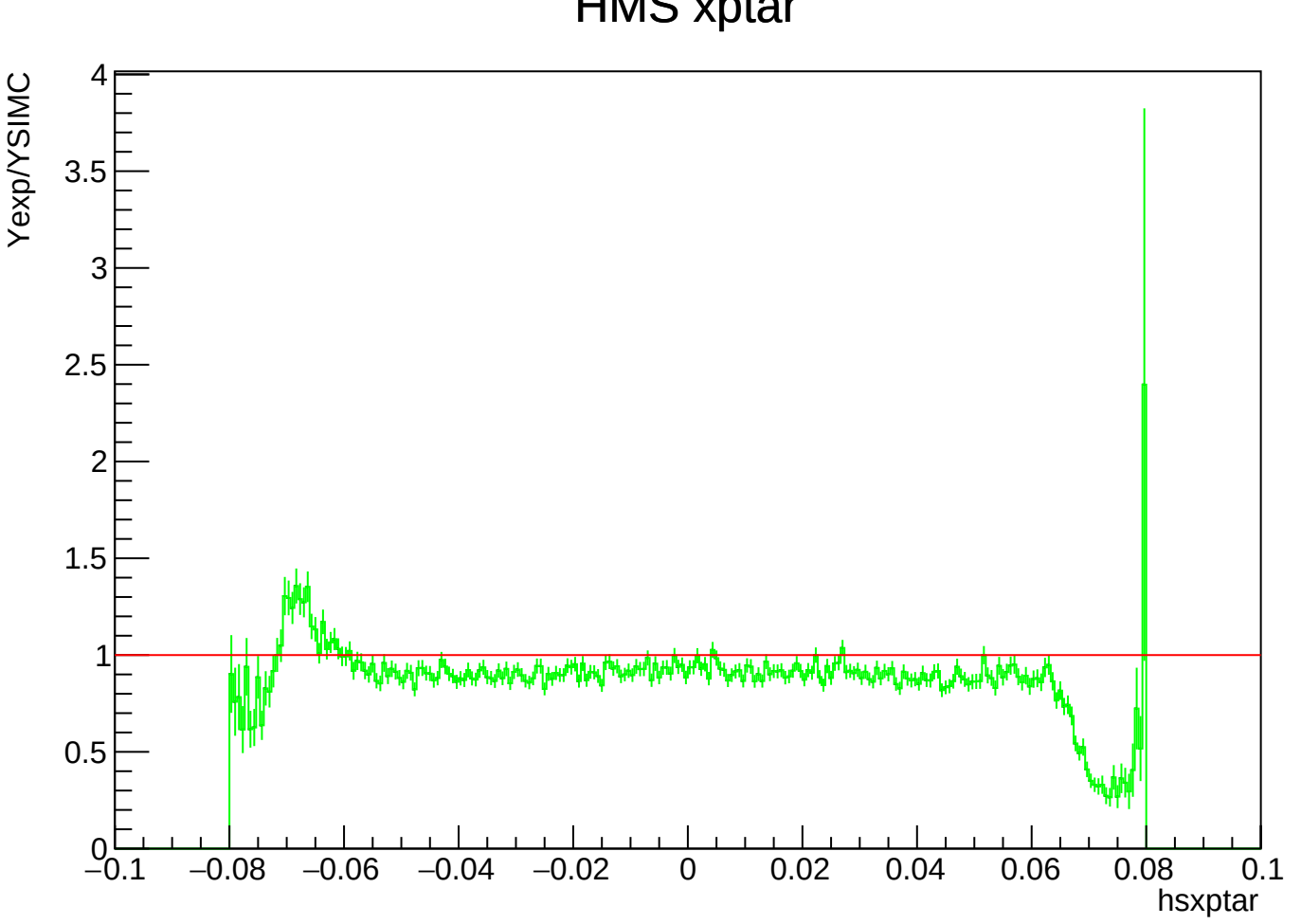

SIMC
DATA+DUMMY
DATA-DUMMY
DUMMY
Data Int: 2006.085
SIMC Int: 2212.710
Yield (Events/mC)
12
10
8
6
4
2
0
–0.06
–0.04
–0.02
0
0.02
0.04
0.06
ssxptar

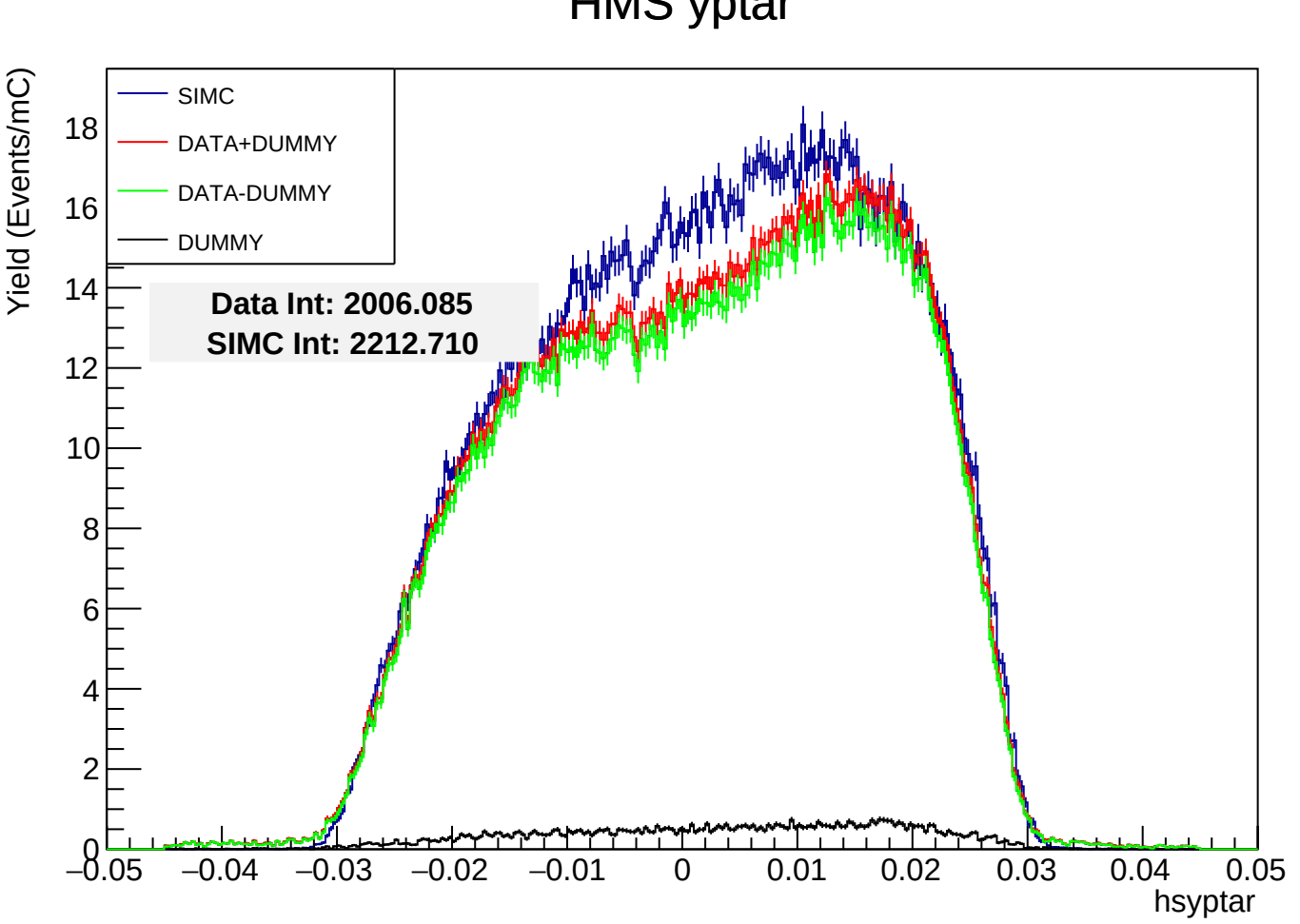

SHMS xptar
Yexp/YSIMC
7
6
5
4
3
2
1
0
−1
−2
−0.06
−0.04
−0.02
0
0.02
0.04
0.06
ssxptar

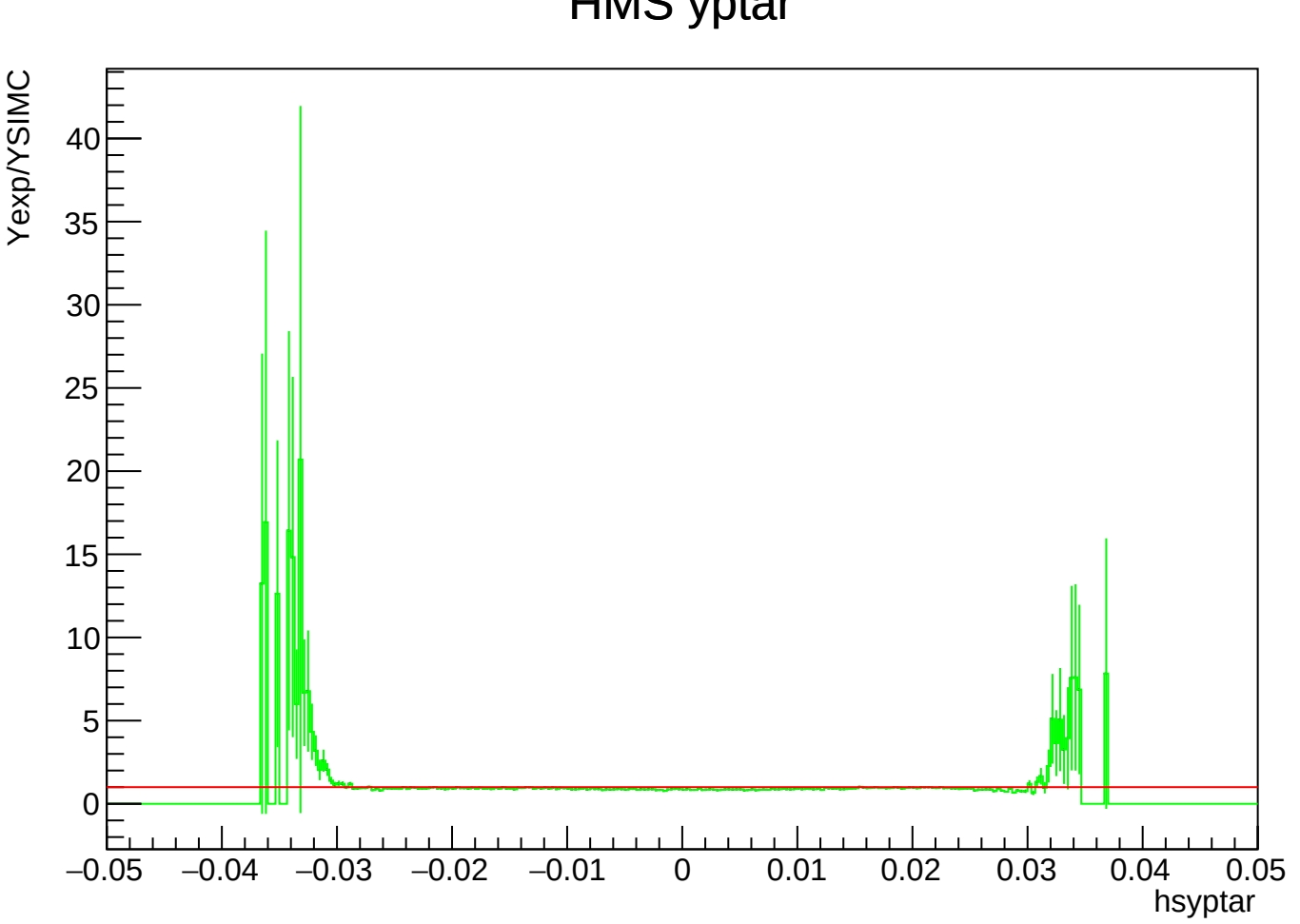

SHMS yptar
SIMC
DATA+DUMMY
DATA-DUMMY
DUMMY
Data Int: 2006.085
SIMC Int: 2209.846
Yield (Events/mC)
14
12
10
8
6
4
2
0
–0.04
–0.03
–0.02
–0.01
0
0.01
0.02
0.03
0.04
ssyptar

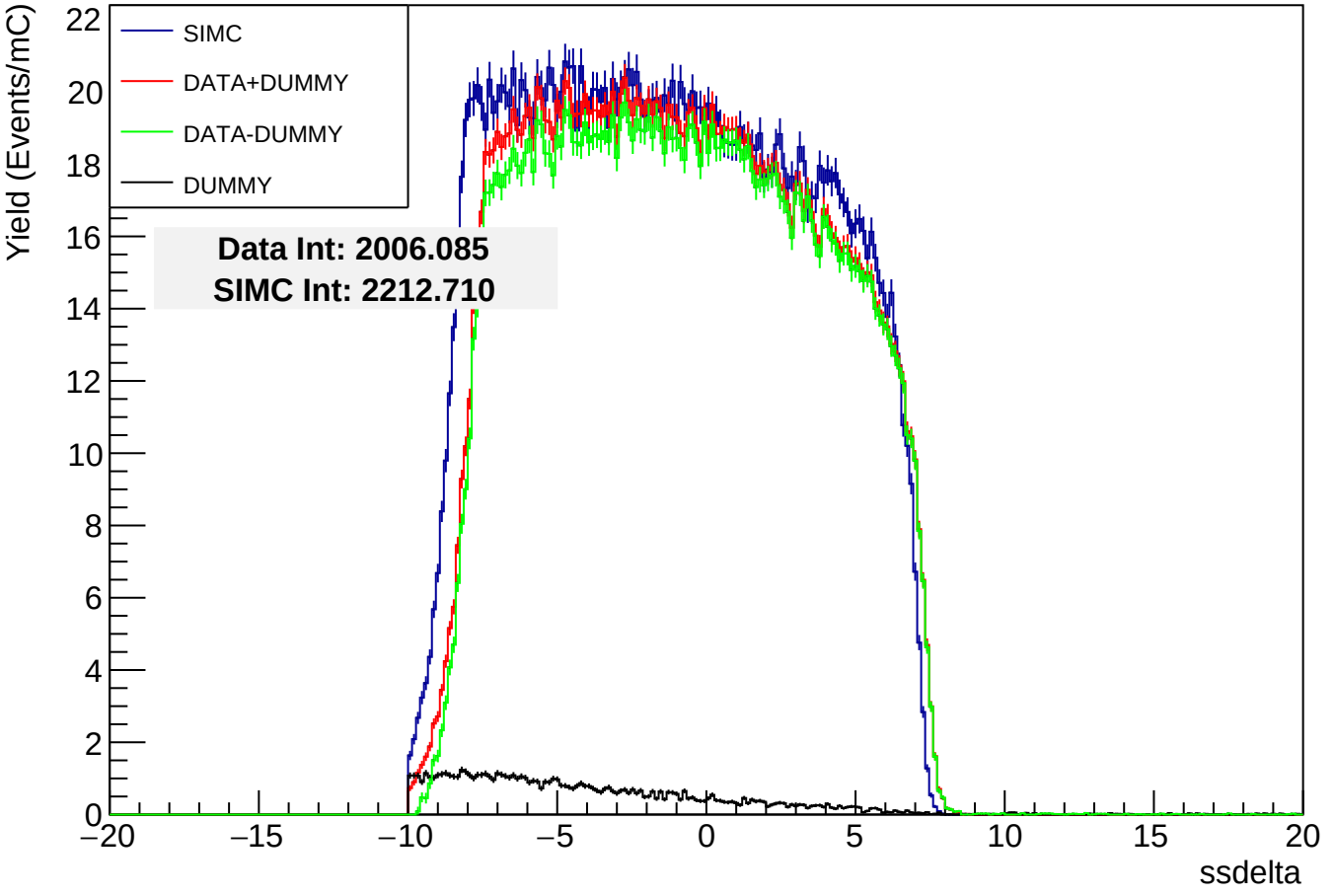

SHMS yptar
Yexp/YSIMC
7
6
5
4
3
2
1
–0.04
–0.03
–0.02
–0.01
0
0.01
0.02
0.03
0.04
ssyptar

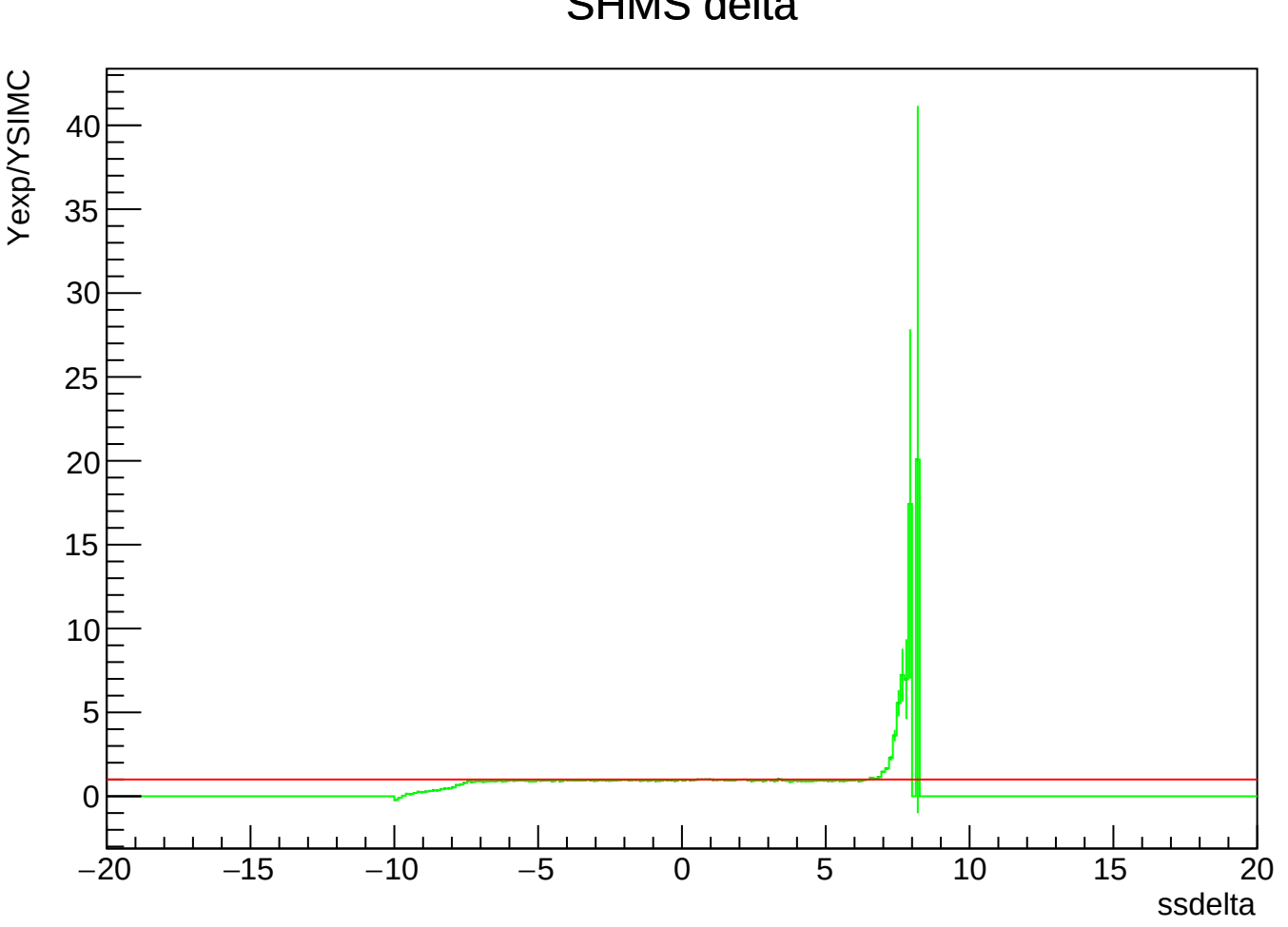

HMS xptar
SIMC
DATA+DUMMY
DATA-DUMMY
DUMMY
Data Int: 2006.085
SIMC Int: 2212.710
Yield (Events/mC)
hsxptar
0
2
4
6
8
10
12
14
–0.1
–0.08
–0.06
–0.04
–0.02
0
0.02
0.04
0.06
0.08
0.1

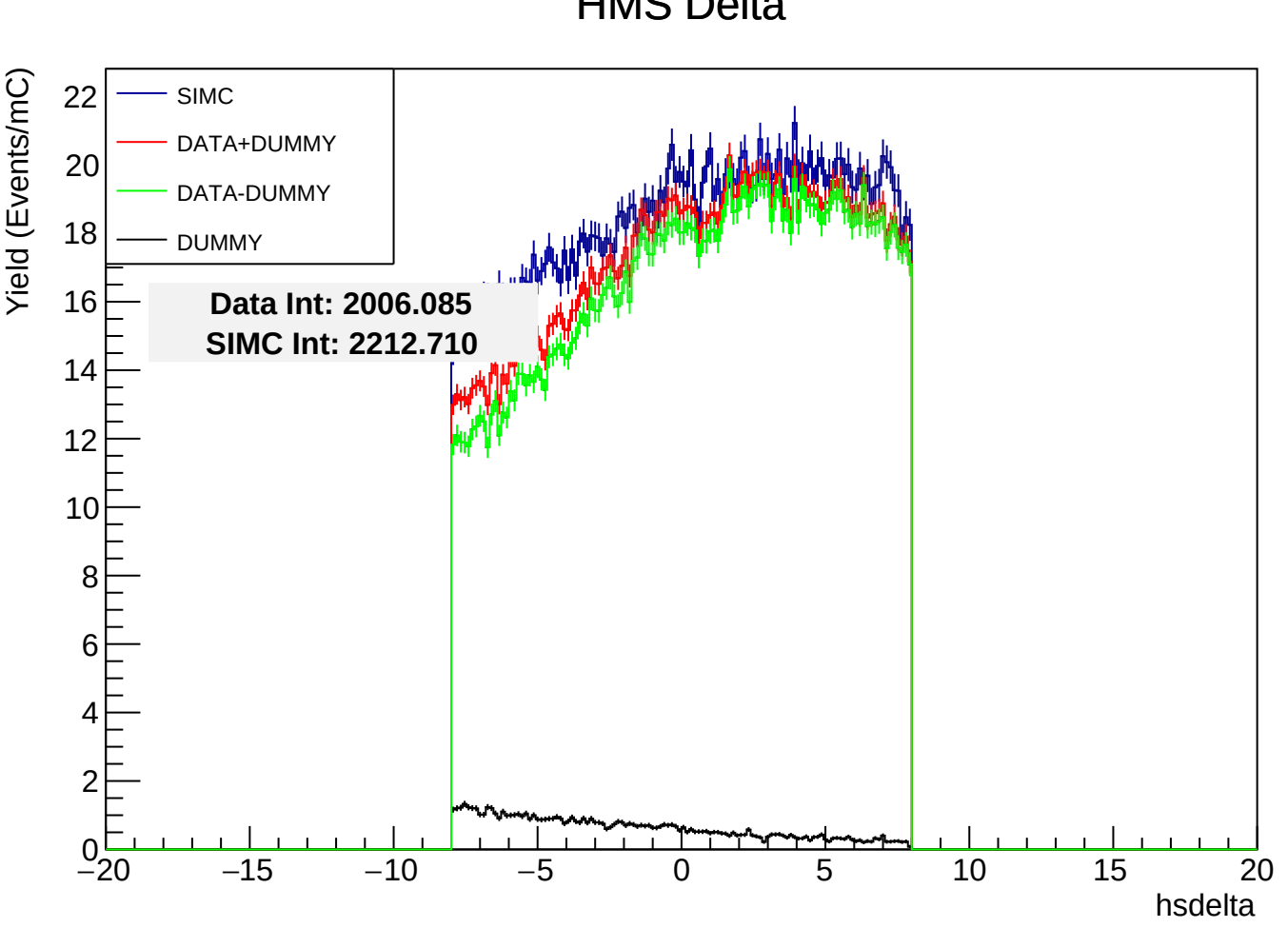

HMS xptar
Yexp/YSIMC
4
3.5
3
2.5
2
1.5
1
0.5
0
−0.1
−0.08
−0.06
−0.04
−0.02
0
0.02
0.04
0.06
0.08
0.1
hsxptar

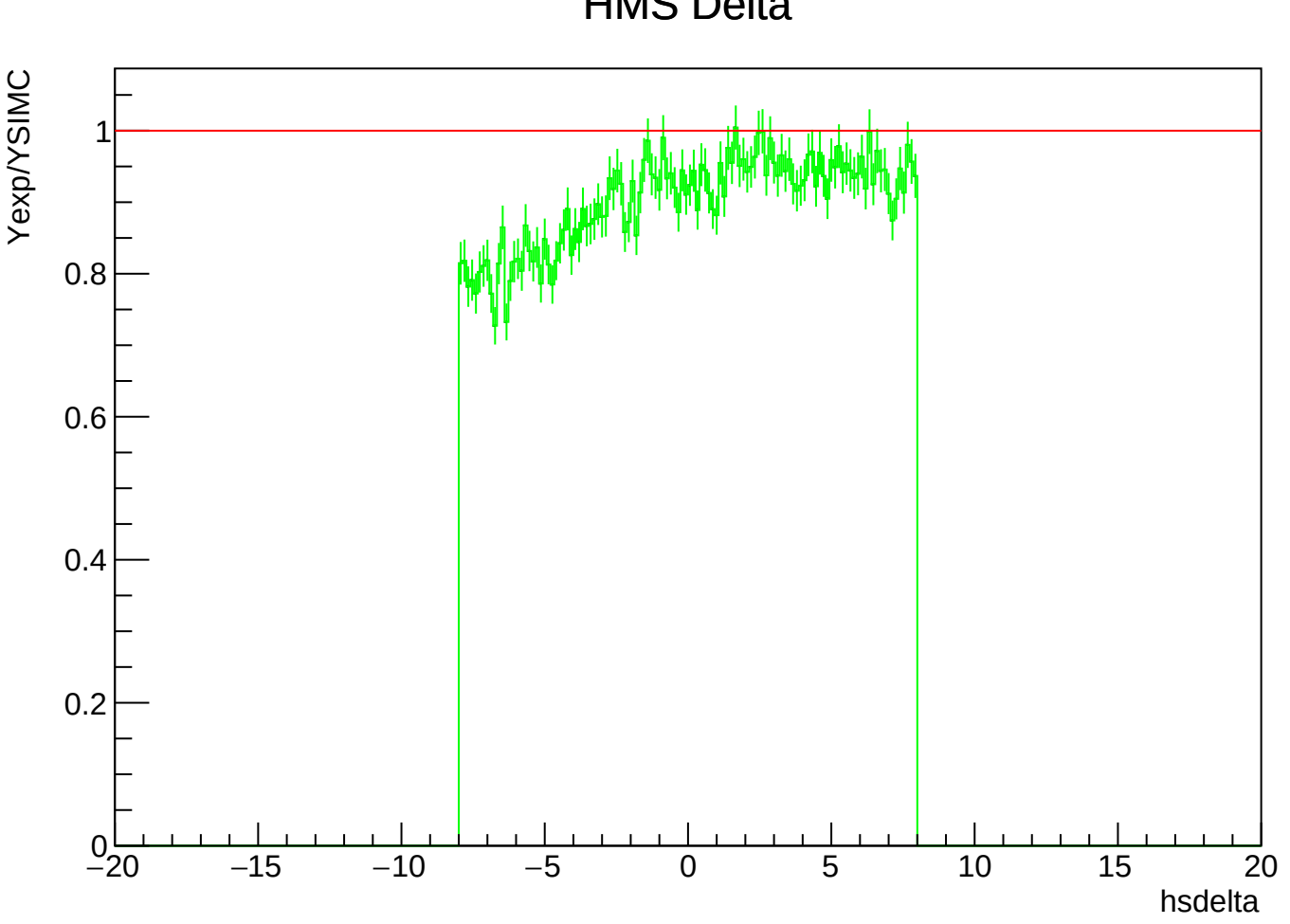

HMS yptar
SIMC
DATA+DUMMY
DATA-DUMMY
DUMMY
Data Int: 2006.085
SIMC Int: 2212.710
Yield (Events/mC)
hsyptar
0
2
4
6
8
10
12
14
16
18
–0.05
–0.04
–0.03
–0.02
–0.01
0
0.01
0.02
0.03
0.04
0.05

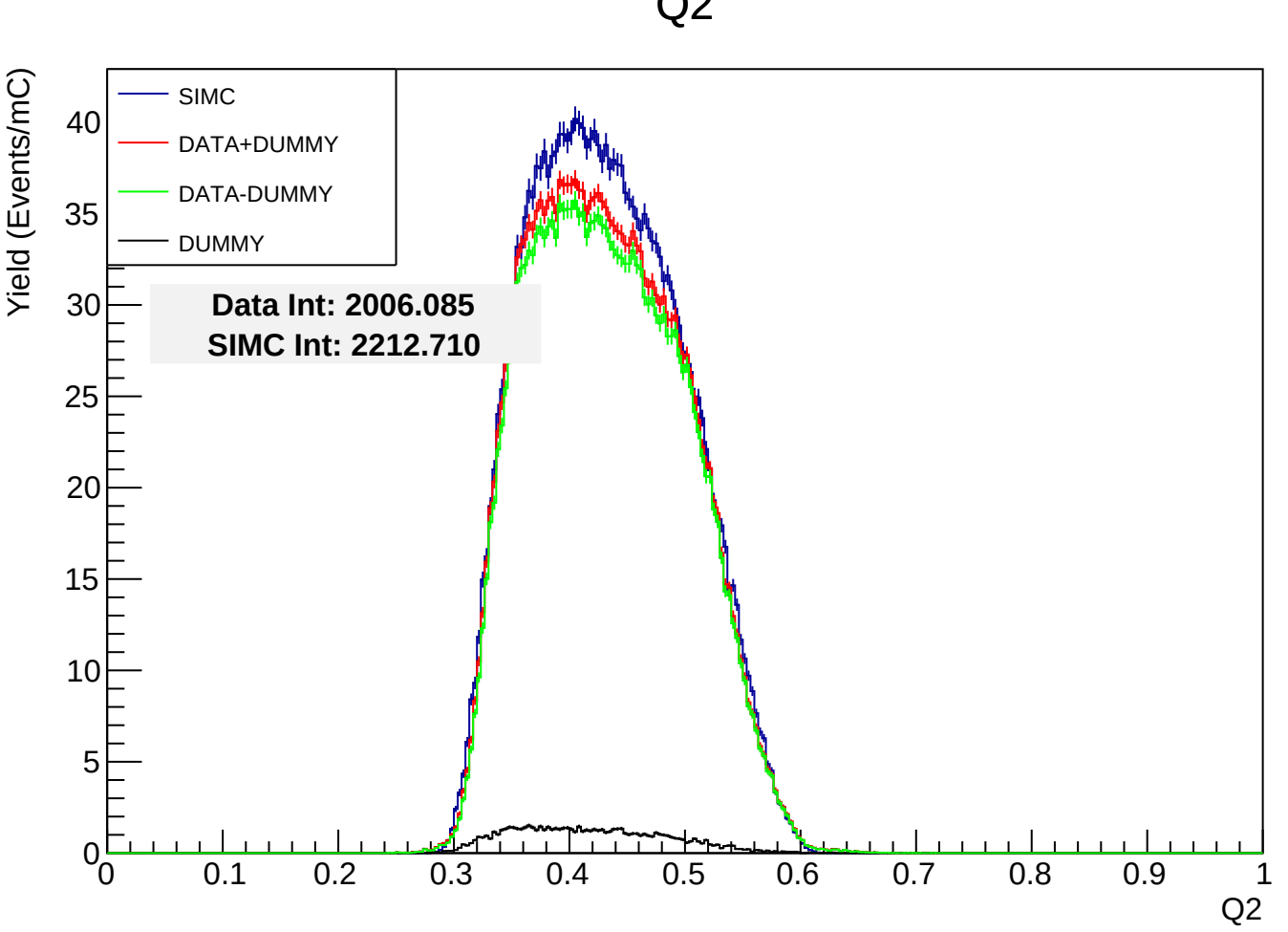

HMS yptar
Yexp/YSIMC
40
35
30
25
20
15
10
5
0
–0.05
–0.04
–0.03
–0.02
–0.01
0
0.01
0.02
0.03
0.04
0.05
hsyptar

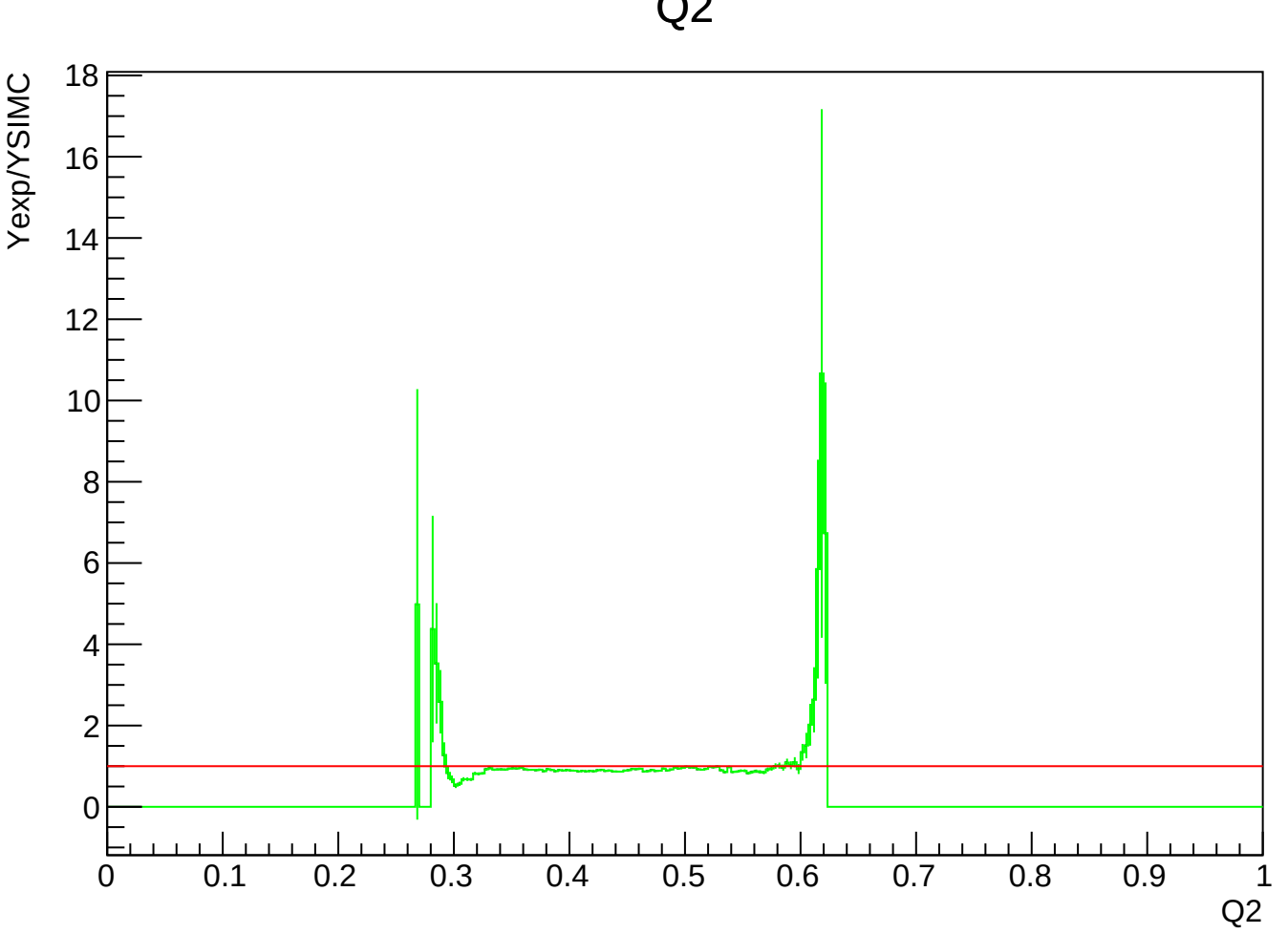

SHMS delta
SIMC
DATA+DUMMY
DATA-DUMMY
DUMMY
Data Int: 2006.085
SIMC Int: 2212.710
Yield (Events/mC)
ssdelta
22
20
18
16
14
12
10
8
6
4
2
0
−20
−15
−10
−5
0
5
10
15
20

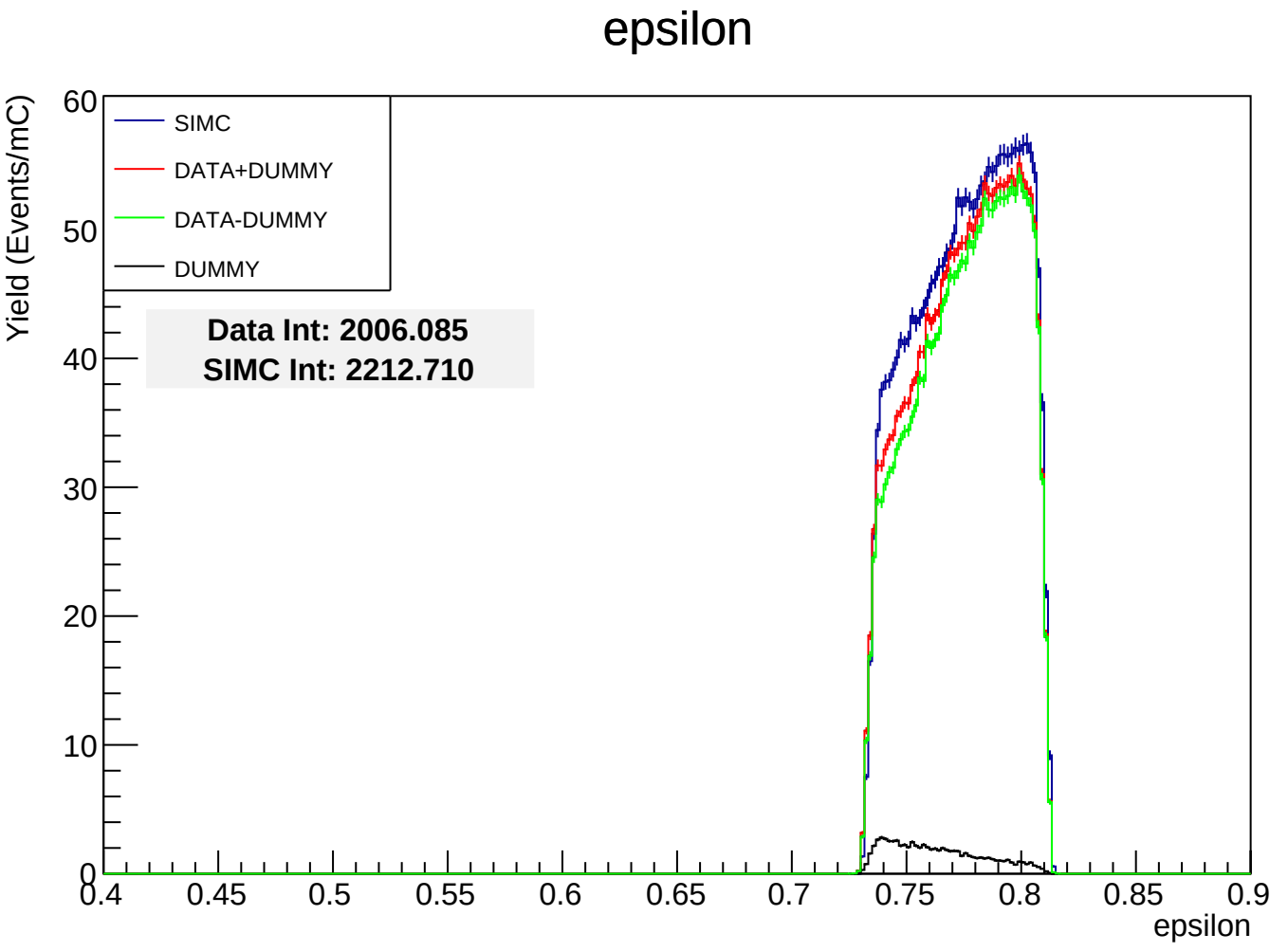

SHMS delta
Yexp/YSIMC
40
35
30
25
20
15
10
5
0
−20
−15
−10
−5
0
5
10
15
20
ssdelta

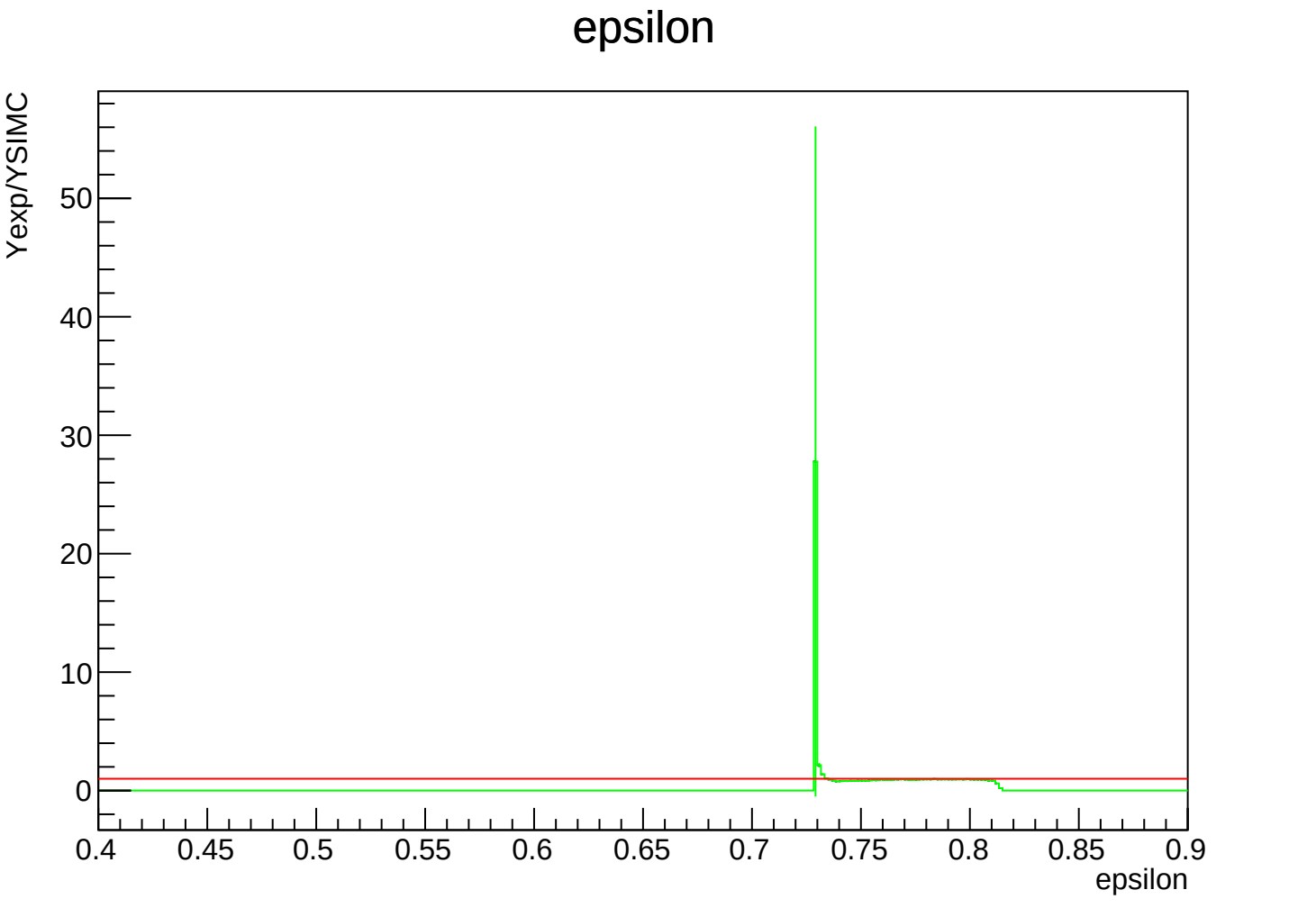

HMS Delta
SIMC
DATA+DUMMY
DATA-DUMMY
DUMMY
Data Int: 2006.085
SIMC Int: 2212.710
Yield (Events/mC)
hsdelta
22
20
18
16
14
12
10
8
6
4
2
0
−20
−15
−10
−5
0
5
10
15
20

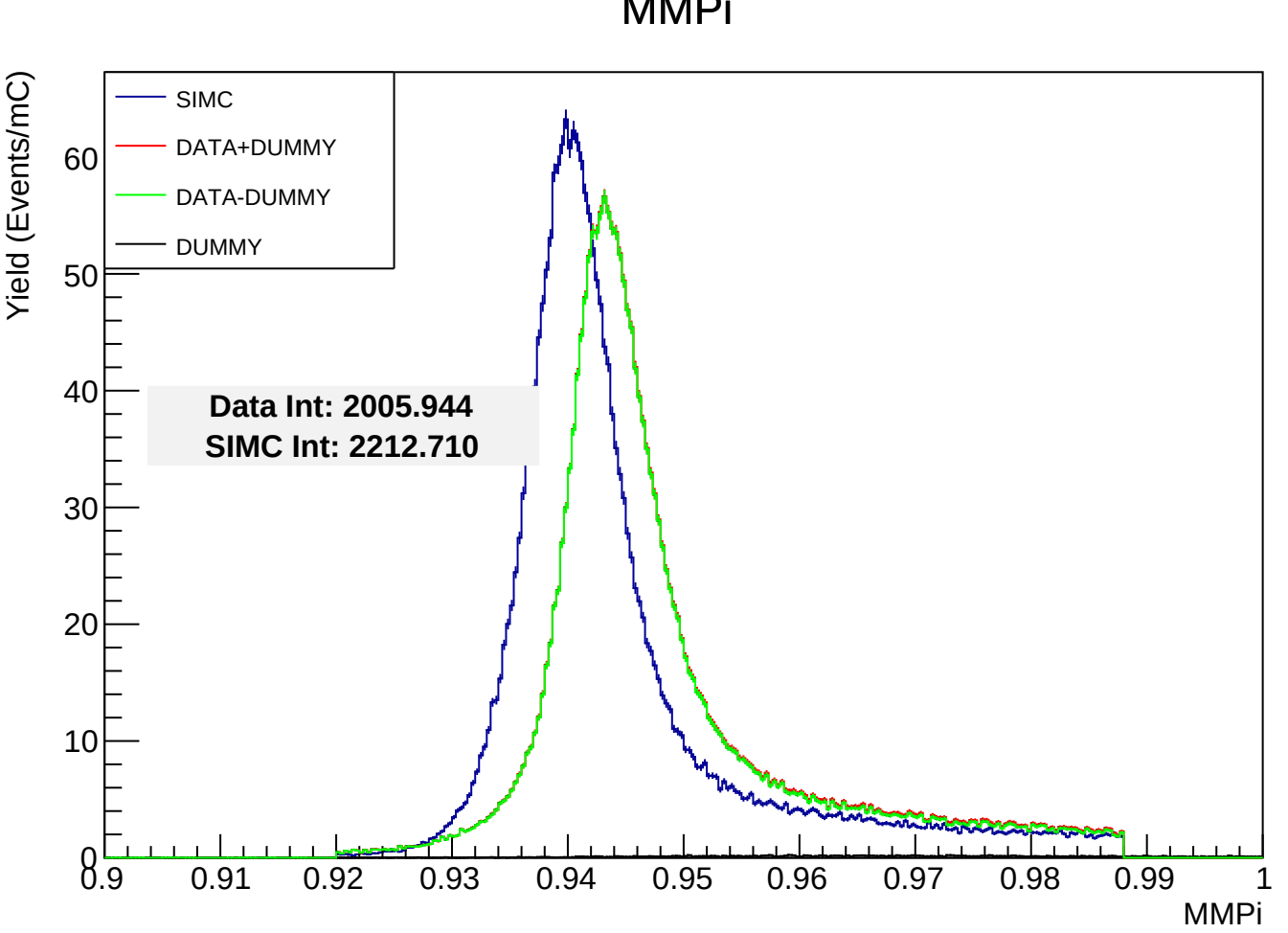

HMS Delta
Yexp/YSIMC
1
0.8
0.6
0.4
0.2
0
−20
−15
−10
−5
0
5
10
15
20
hsdelta

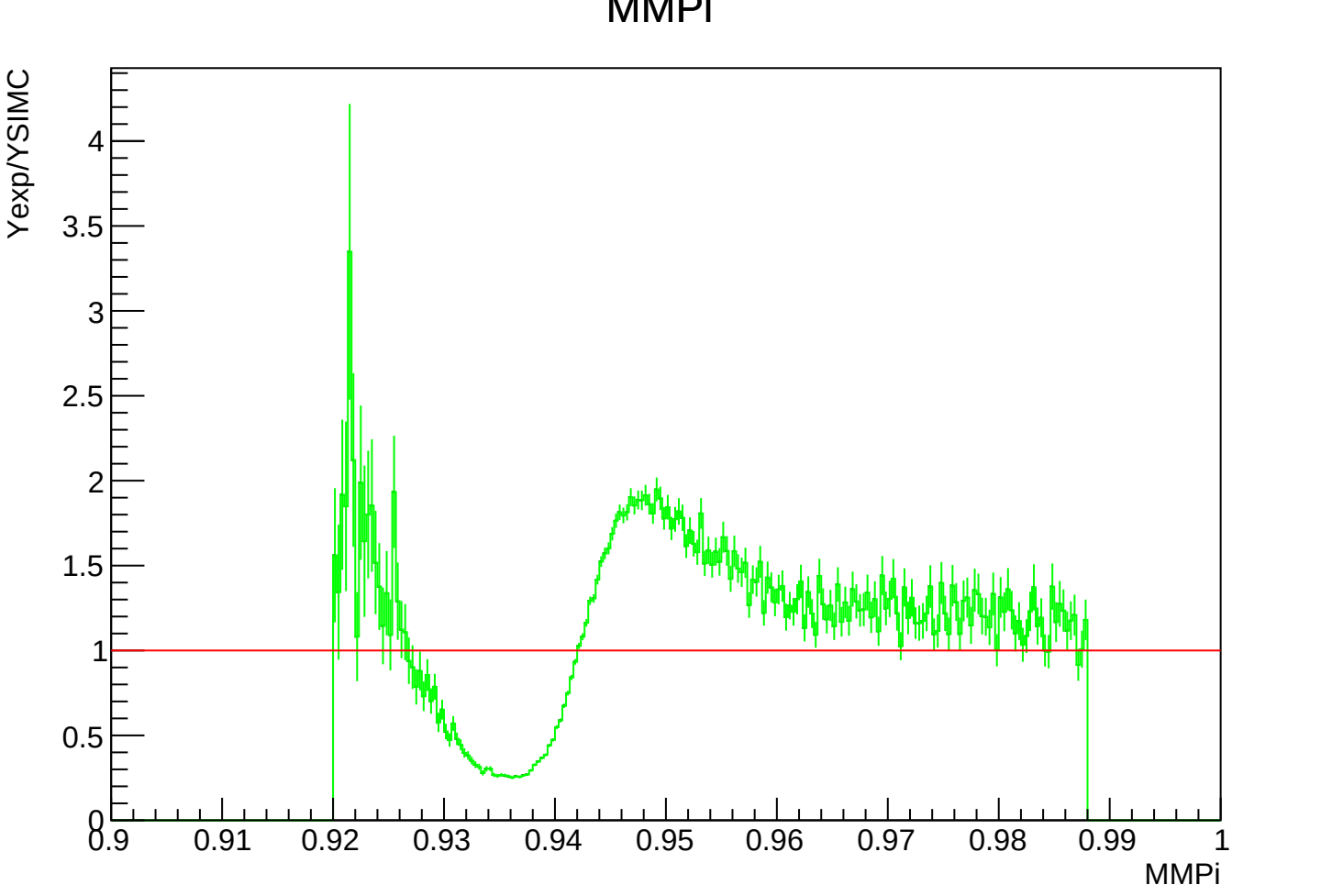

Q2
SIMC
DATA+DUMMY
DATA-DUMMY
DUMMY
Data Int: 2006.085
SIMC Int: 2212.710
Yield (Events/mC)
Q2
0
5
10
15
20
25
30
35
40
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

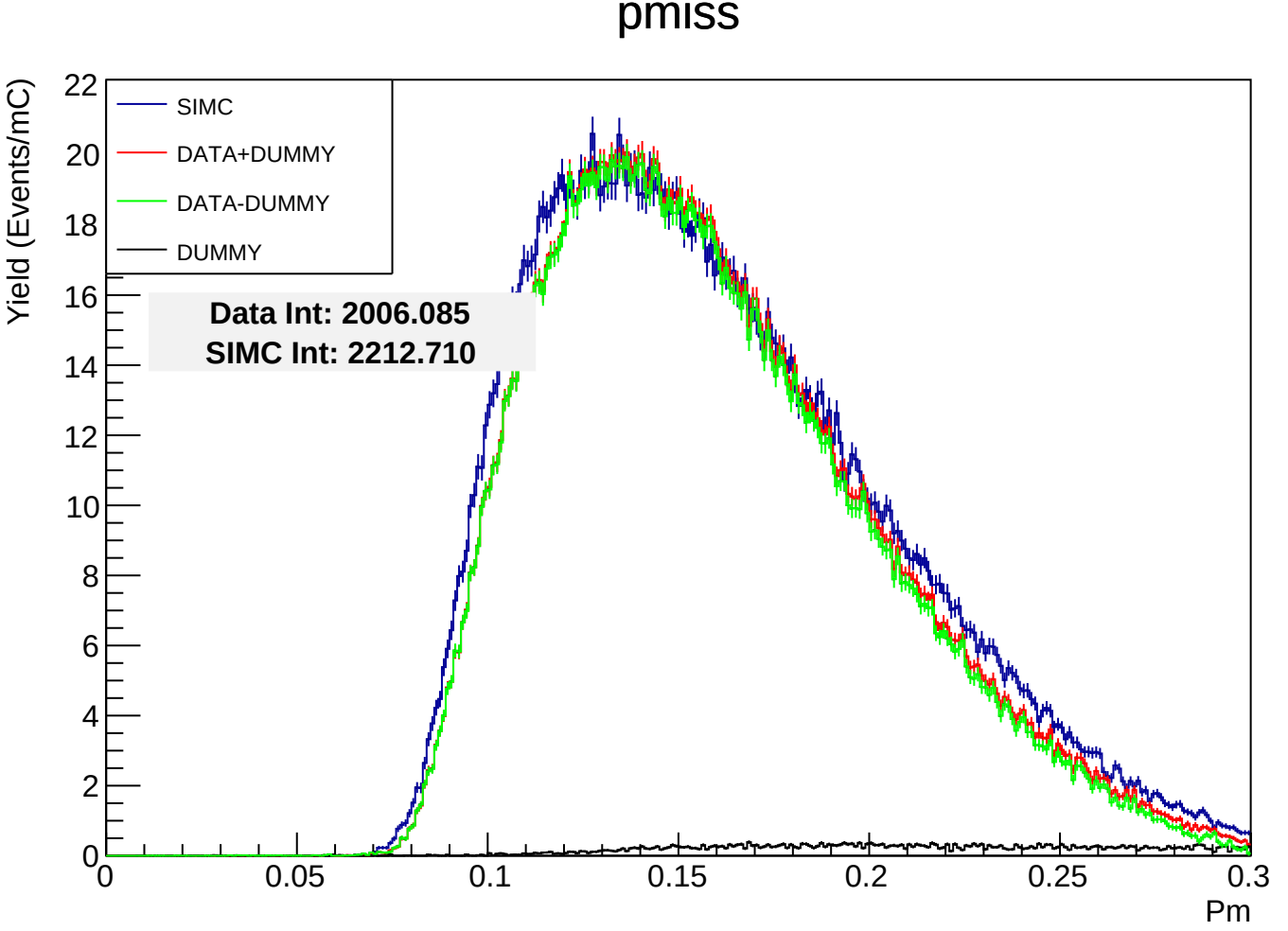

Q2
Yexp/YSIMC
18
16
14
12
10
8
6
4
2
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Q2

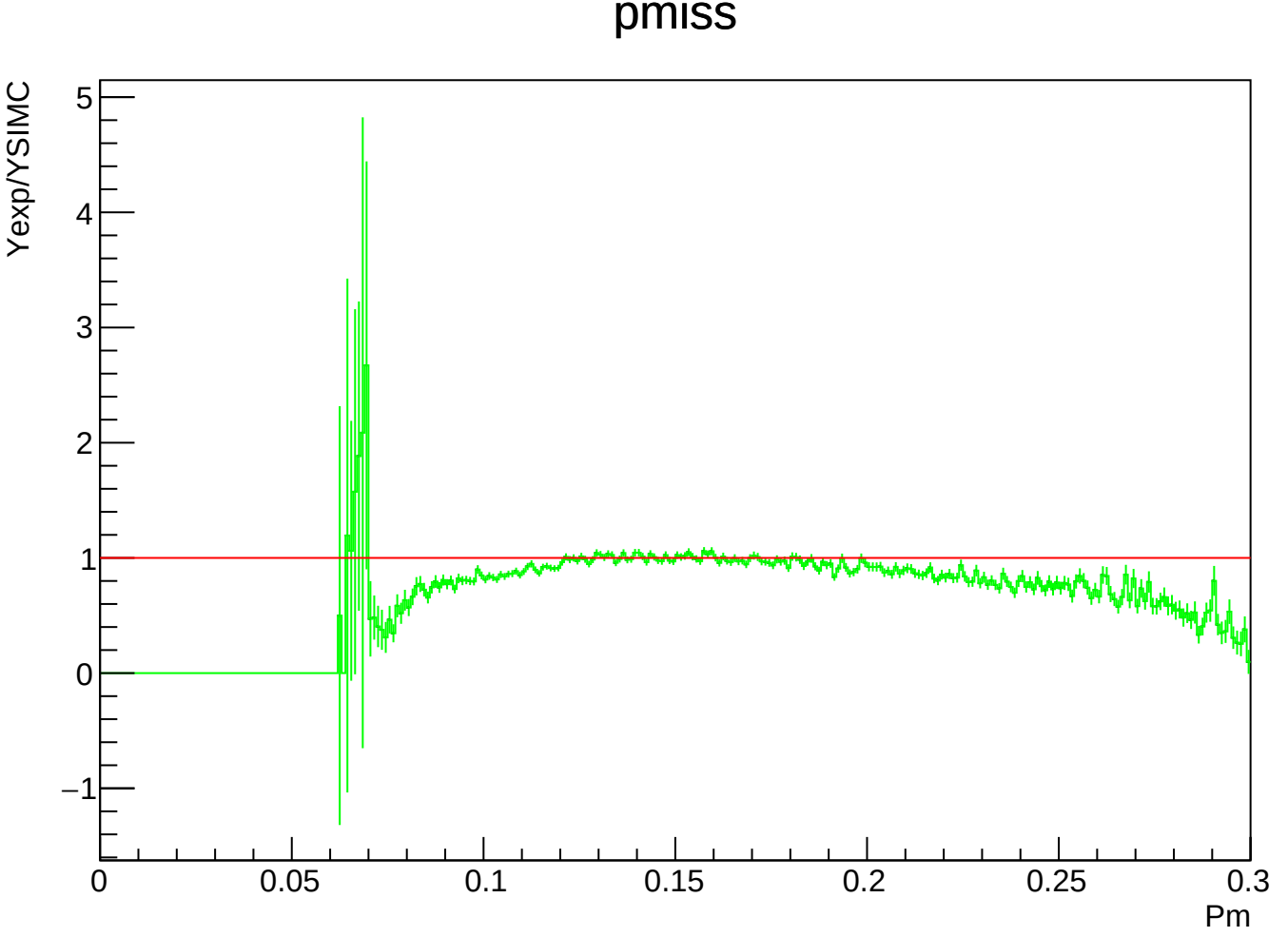

epsilon
SIMC
DATA+DUMMY
DATA-DUMMY
DUMMY
Data Int: 2006.085
SIMC Int: 2212.710
Yield (Events/mC)
epsilon
0
10
20
30
40
50
60
0.4
0.45
0.5
0.55
0.6
0.65
0.7
0.75
0.8
0.85
0.9

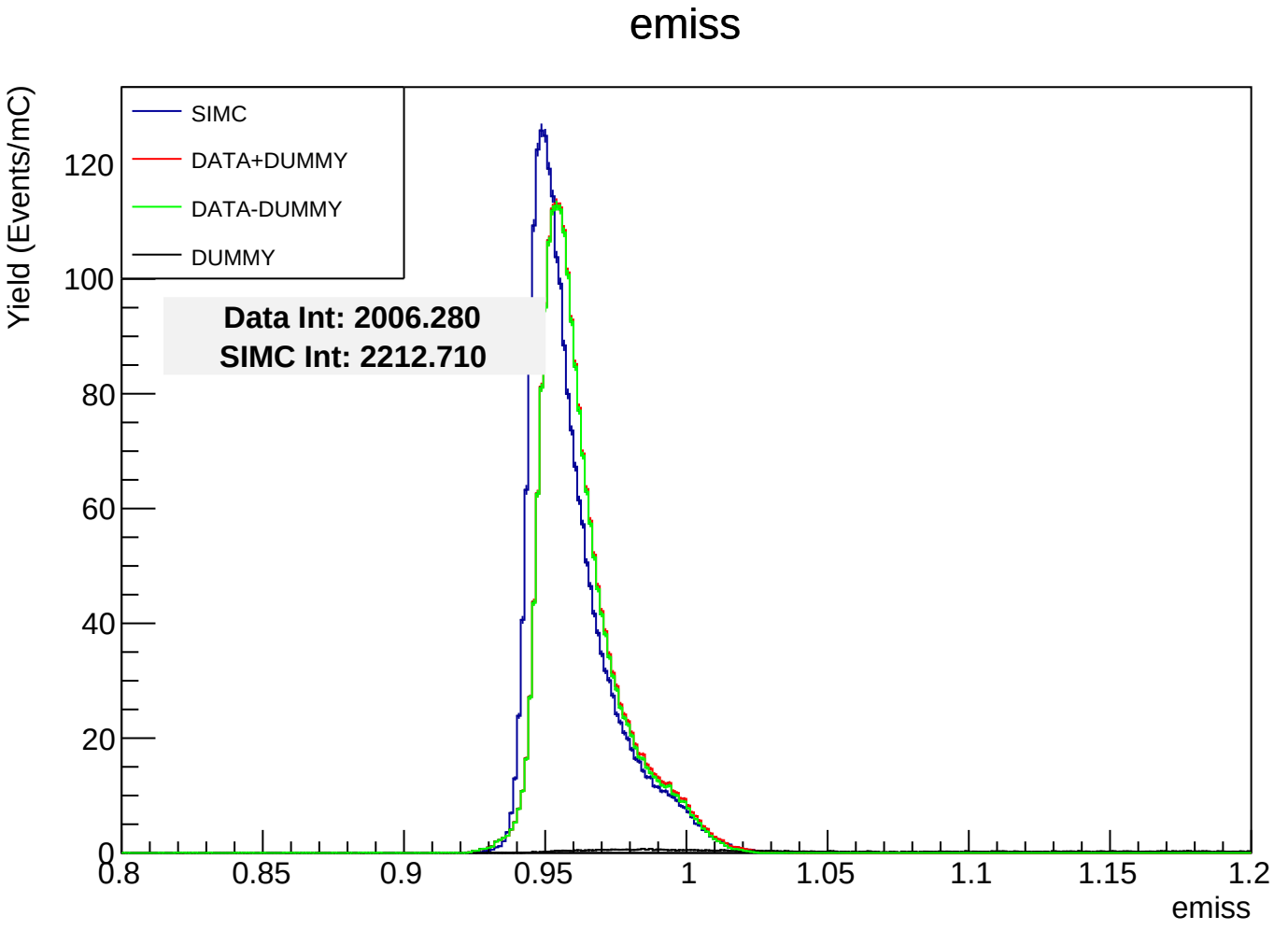

epsilon
Yexp/YSIMC
50
40
30
20
10
0
0.4
0.45
0.5
0.55
0.6
0.65
0.7
0.75
0.8
0.85
0.9
epsilon

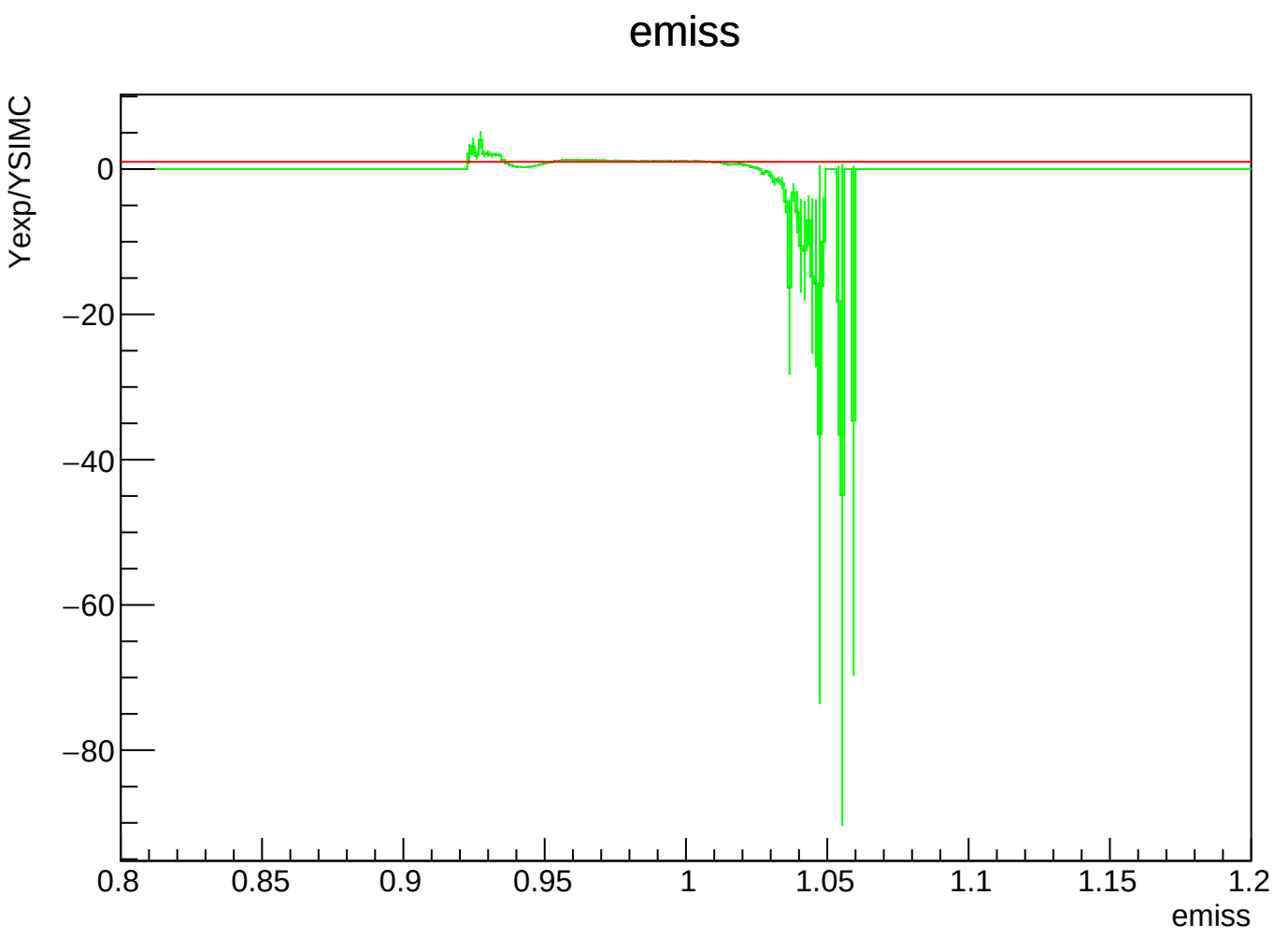

MMPi
SIMC
DATA+DUMMY
DATA-DUMMY
DUMMY
Data Int: 2005.944
SIMC Int: 2212.710
Yield (Events/mC)
0
10
20
30
40
50
60
0.9
0.91
0.92
0.93
0.94
0.95
0.96
0.97
0.98
0.99
1
MMPi

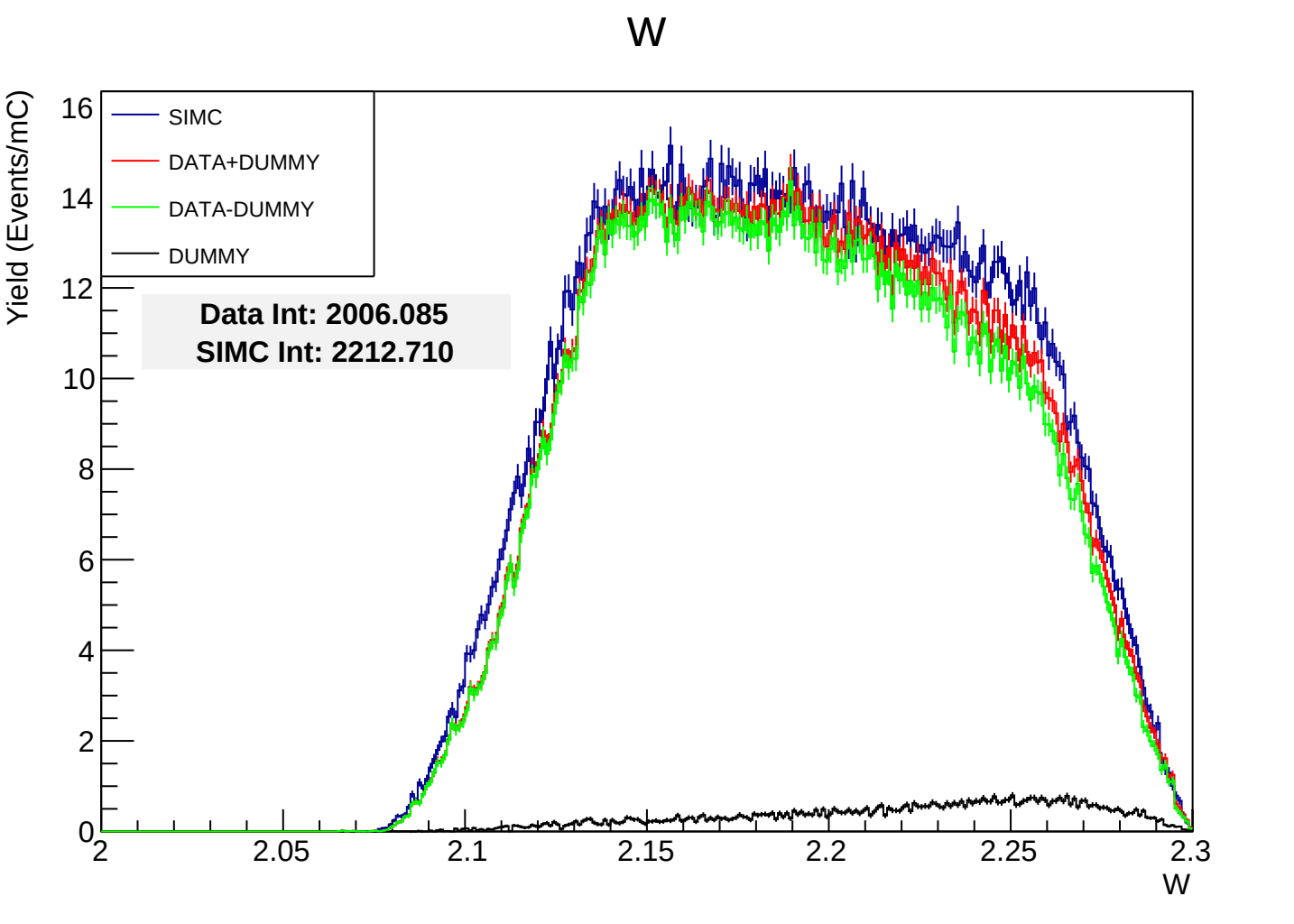

MMPi
Yexp/YSIMC
4
3.5
3
2.5
2
1.5
1
0.5
0
0.9
0.91
0.92
0.93
0.94
0.95
0.96
0.97
0.98
0.99
1
MMPi

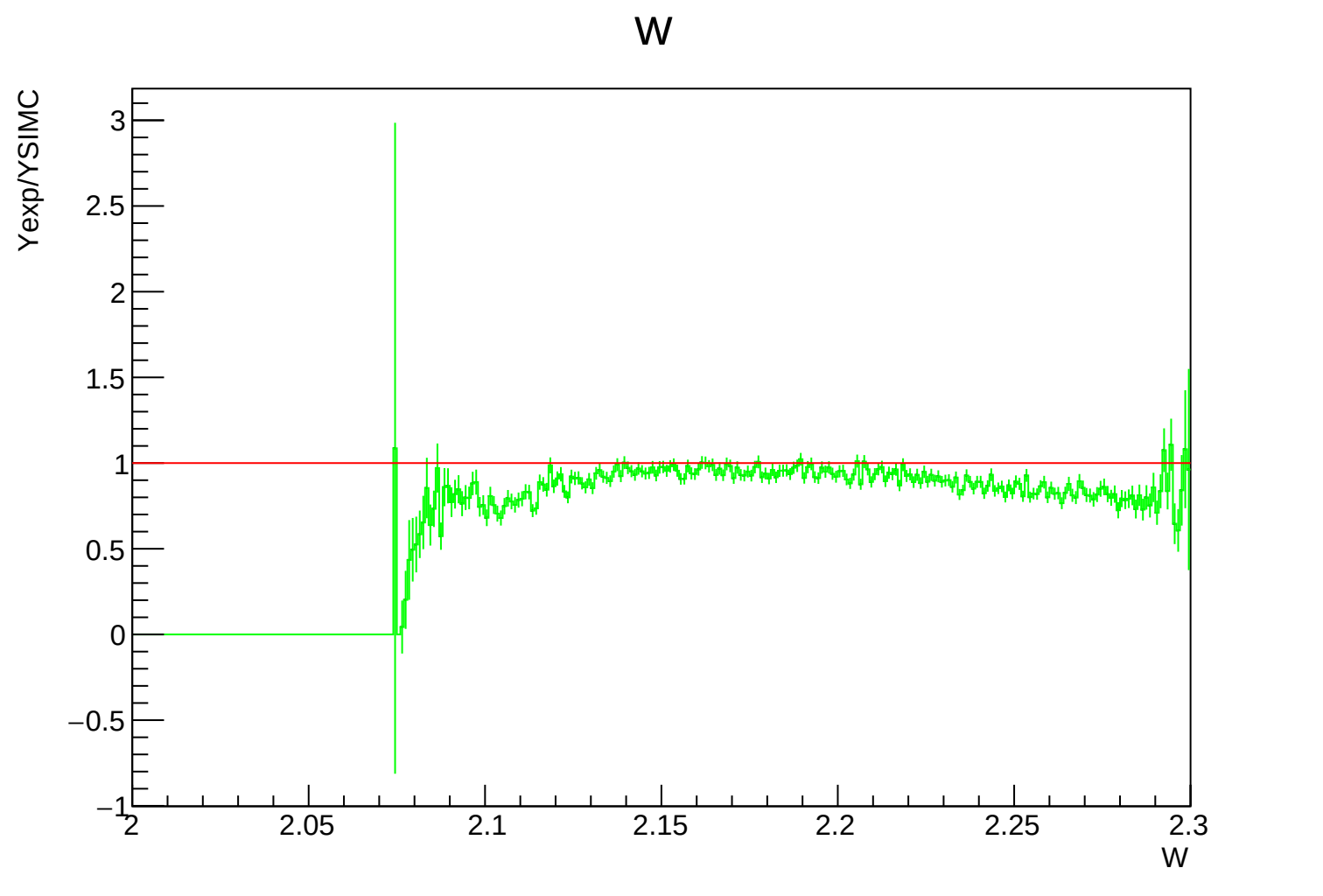

pmiss
SIMC
DATA+DUMMY
DATA-DUMMY
DUMMY
Data Int: 2006.085
SIMC Int: 2212.710
Yield (Events/mC)
Pm
0
2
4
6
8
10
12
14
16
18
20
22
0
0.05
0.1
0.15
0.2
0.25
0.3

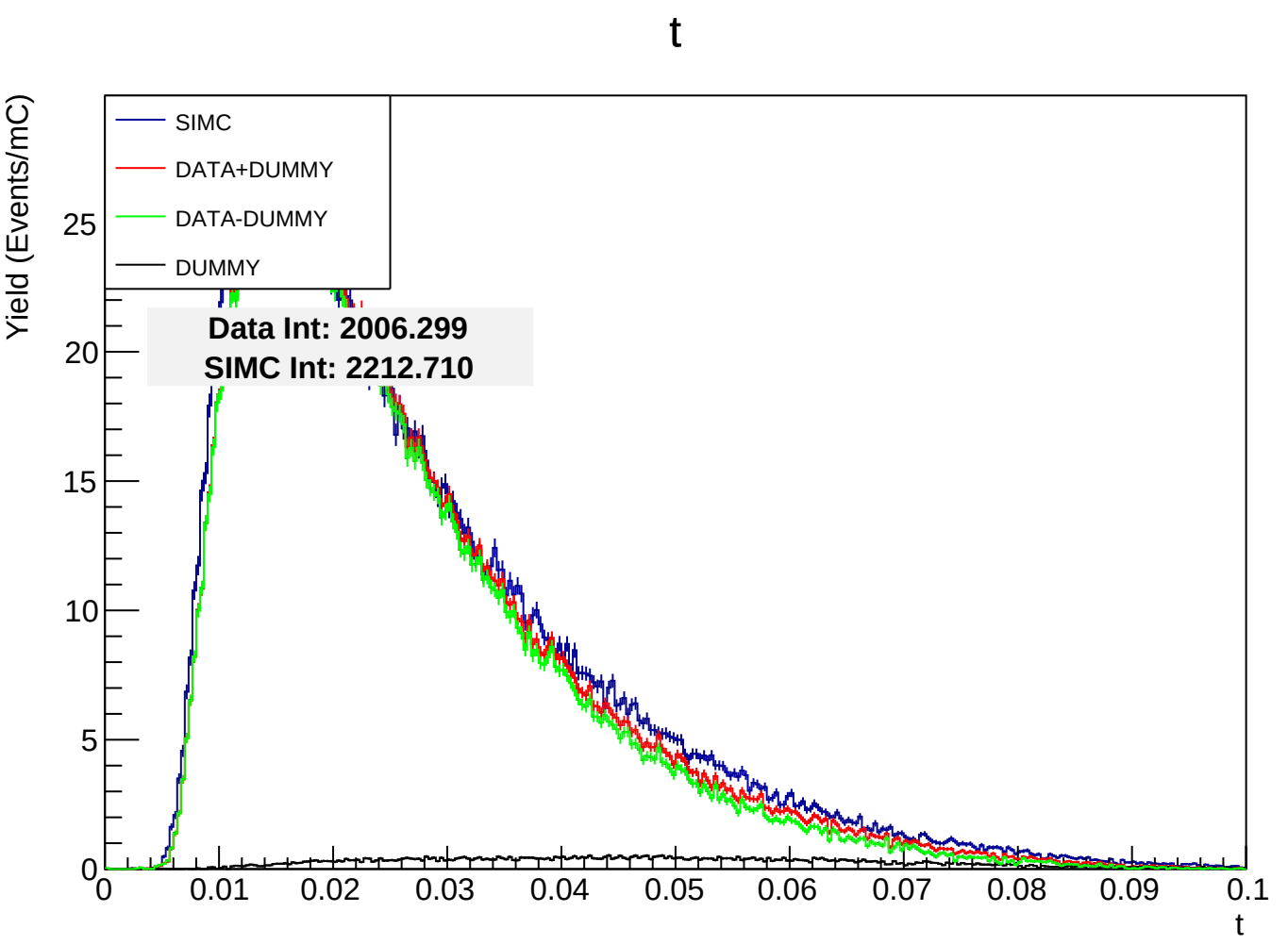

pmiss
Yexp/YSIMC
5
4
3
2
1
0
−1
0
0.05
0.1
0.15
0.2
0.25
0.3
Pm

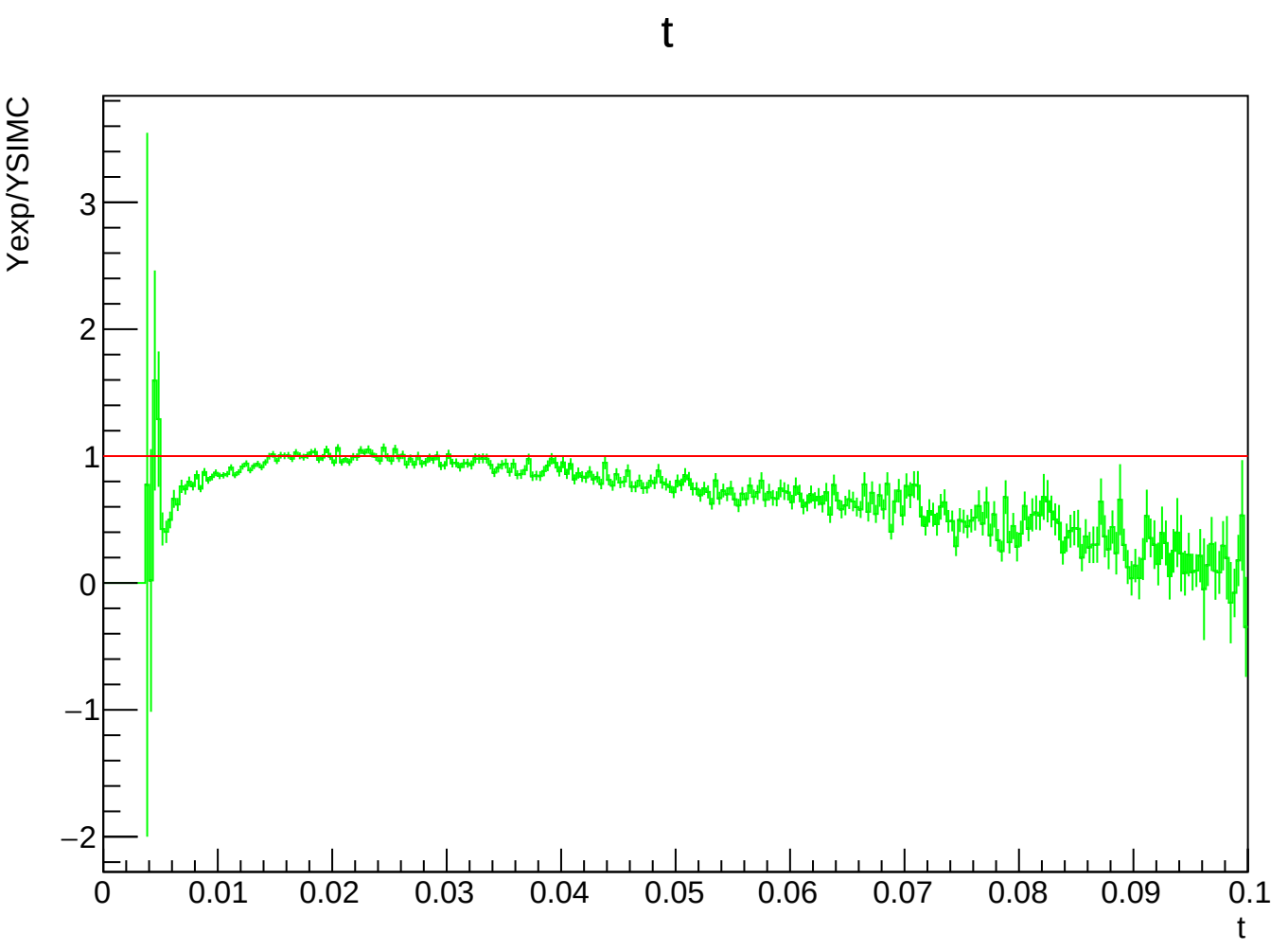

emiss
SIMC
DATA+DUMMY
DATA-DUMMY
DUMMY
Data Int: 2006.280
SIMC Int: 2212.710
Yield (Events/mC)
120
100
80
60
40
20
0
0.8
0.85
0.9
0.95
1
1.05
1.1
1.15
1.2
emiss


emiss
Yexp/YSIMC
0
−20
−40
−60
−80
0.8
0.85
0.9
0.95
1
1.05
1.1
1.15
1.2
emiss


W
SIMC
DATA+DUMMY
DATA-DUMMY
DUMMY
Data Int: 2006.085
SIMC Int: 2212.710
Yield (Events/mC)
0
2
4
6
8
10
12
14
16
2
2.05
2.1
2.15
2.2
2.25
2.3
W


W
Yexp/YSIMC
3
2.5
2
1.5
1
0.5
0
−0.5
−1
2
2.05
2.1
2.15
2.2
2.25
2.3
W


t
SIMC
DATA+DUMMY
DATA-DUMMY
DUMMY
Data Int: 2006.299
SIMC Int: 2212.710
Yield (Events/mC)
0
5
10
15
20
25
0
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.1
t


t
Yexp/YSIMC
3
2
1
0
−1
−2
0
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.1
t

Next Plan:

- Improve the Heep coin study of the KaonLT data first at **$Q^2 = 0.5$ GeV^2**, and then PionLT data at **$Q^2 = 0.38$** and **0.42 GeV^2**.
- Correct the experimental data to different **inefficiencies** and other **factors** that I did not do in the first round of the study.