VBF gamma + jets (Unblinded)

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The full list of uncertainty sources currently accessible for 2018 Autumn18_V19

Case I:

For precision measurements should use the full set of 27 sources (per year) listed here

The correlations are listed per-source

Uncertainty Source	JetMET grouping and correlation
	_year indicates a nuisance parameter uncorrelated across 3 years
Number of nuisances	4xAbsolute+4xBBEC1+4xEC2+4xHF+RelativeBal+3xRelativeSample+FlavorQCD = 21
AbsoluteMPFBias	Absolute
AbsoluteScale	Absolute
AbsoluteStat	Absolute_year
FlavorQCD	FlavorQCD
Fragmentation	Absolute
PileUpDataMC	Absolute
PileUpPtBB	BBEC1
PileUpPtEC1	BBEC1
PileUpPtEC2	EC2
PileUpPtHF	HF
PileUpPtRef	Absolute
RelativeFSR	Absolute
RelativeJEREC1	BBEC1_year
RelativeJEREC2	EC2_year
RelativeJERHF	HF
RelativePtBB	BBEC1
RelativePtEC1	BBEC1_year
RelativePtEC2	EC2_year
RelativePtHF	HF
RelativeBal	RelativeBal
RelativeSample	RelativeSample_year
RelativeStatEC	BBEC1_year
RelativeStatFSR	Absolute_year
RelativeStatHF	HF_year
SinglePionECAL	Absolute
SinglePionHCAL	Absolute
TimePtEta	Absolute_year


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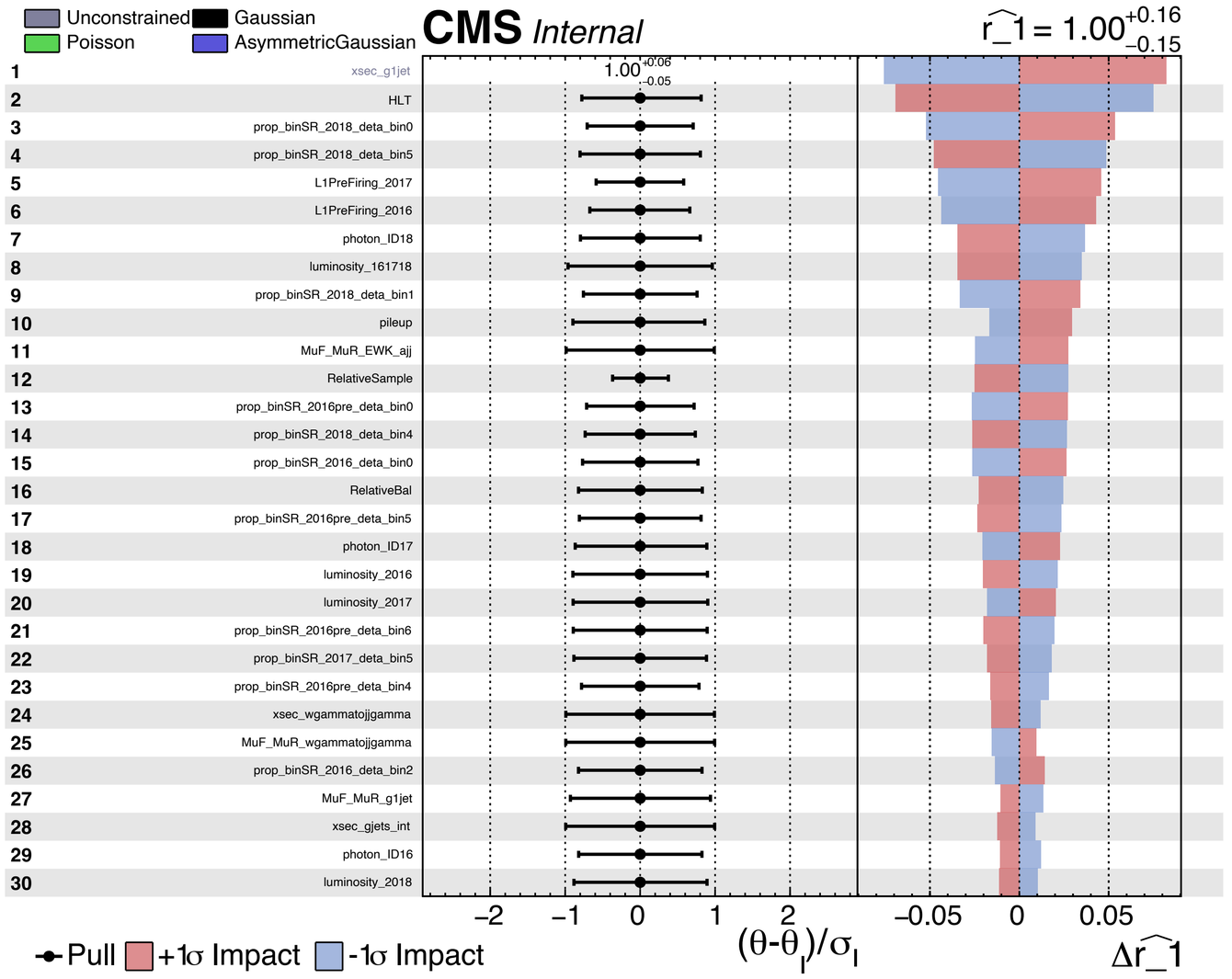
New impact plot with JES splitter by source (Blinded)



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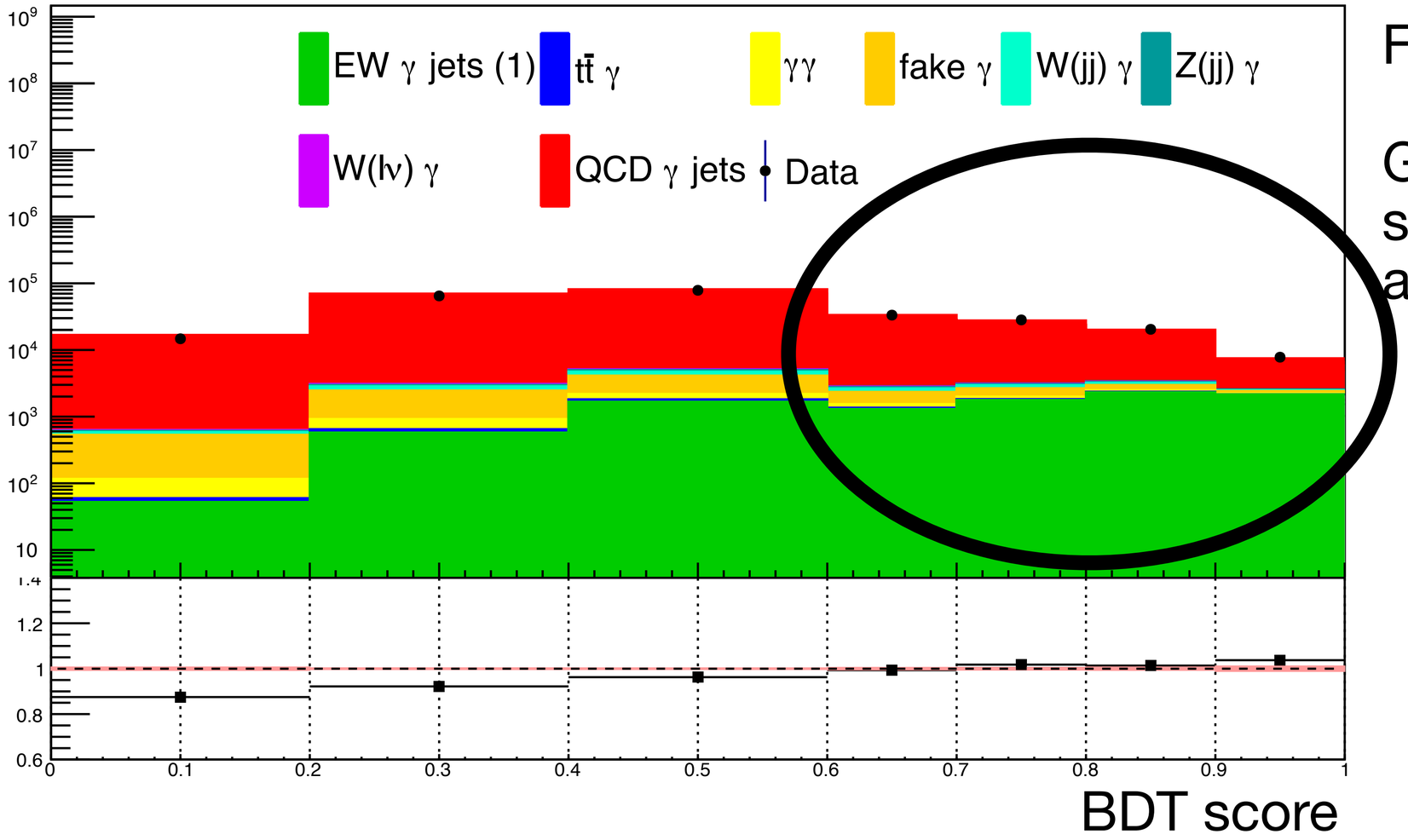
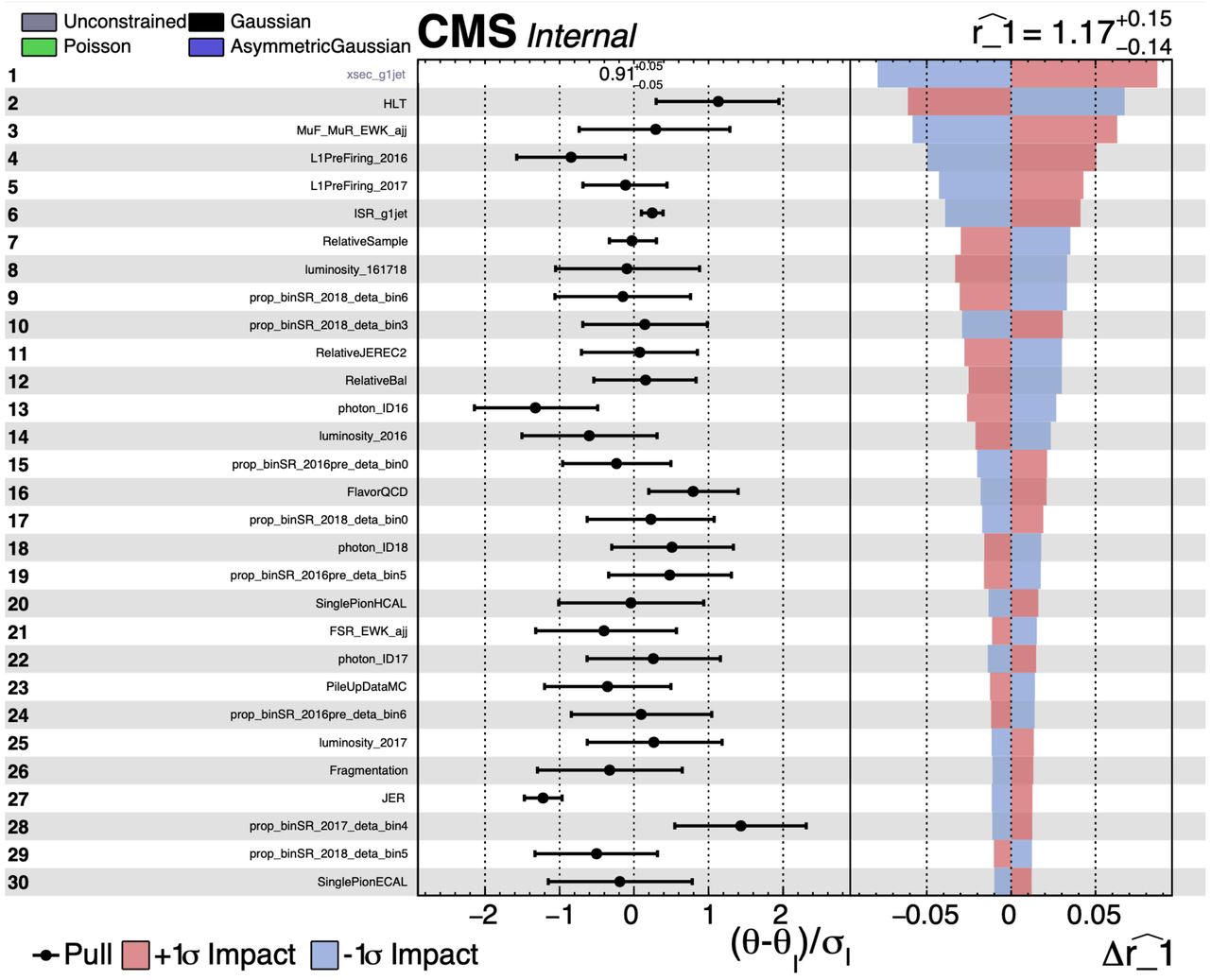
Inclusive measurement - Unblinded data (prefit)

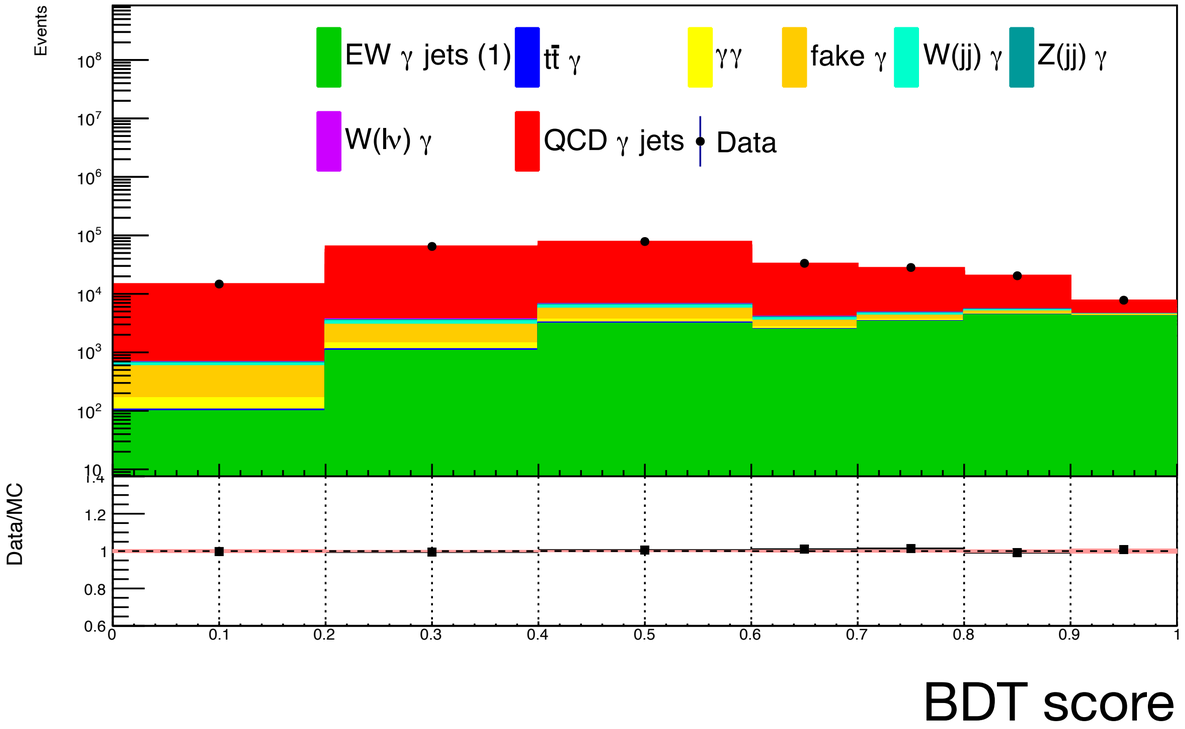


Full Run II data:

Good agreement when BDT score > 0.6 where the signal accumulates.

Inclusive measurement - Unblinded data (postfit)





BDT score

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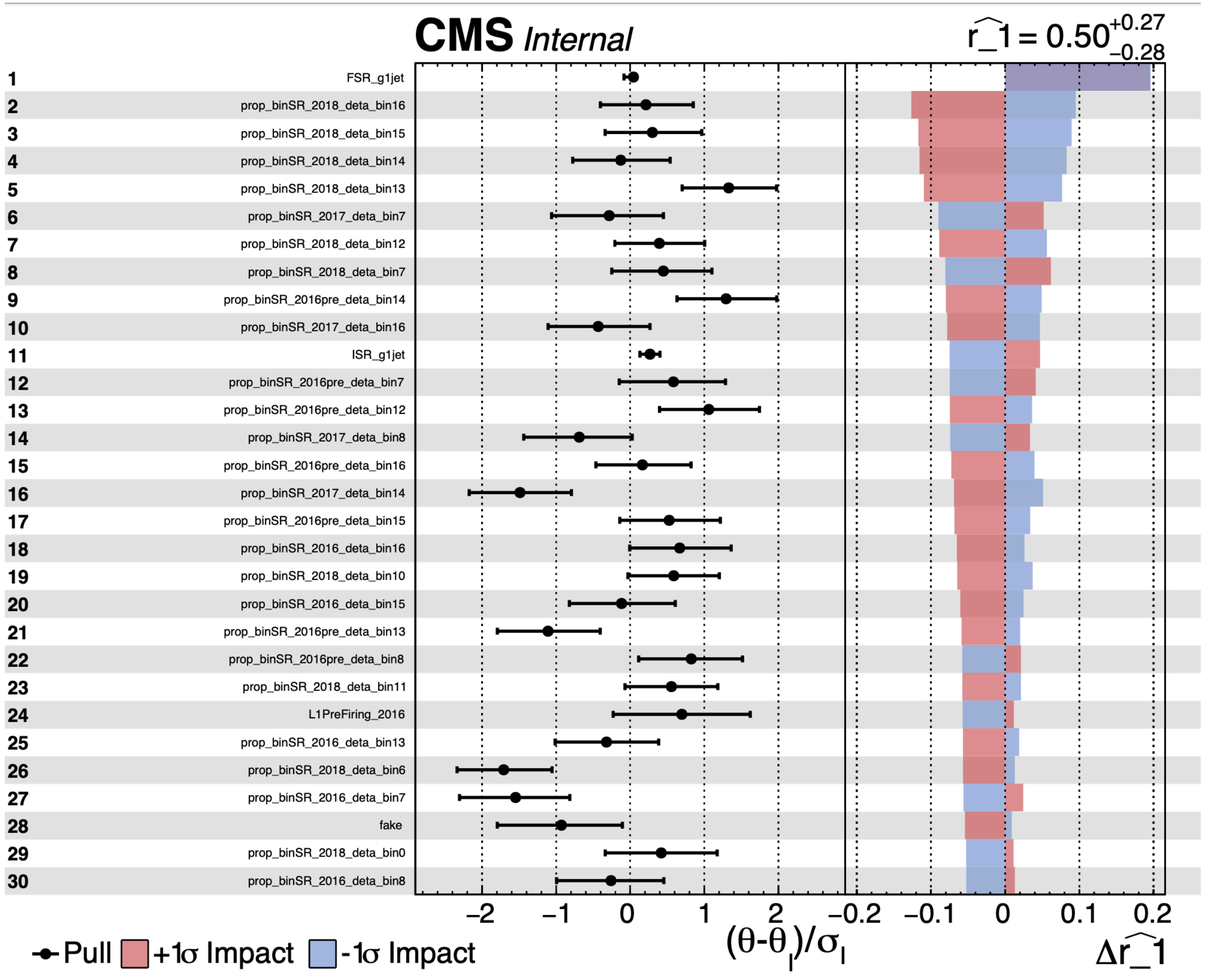
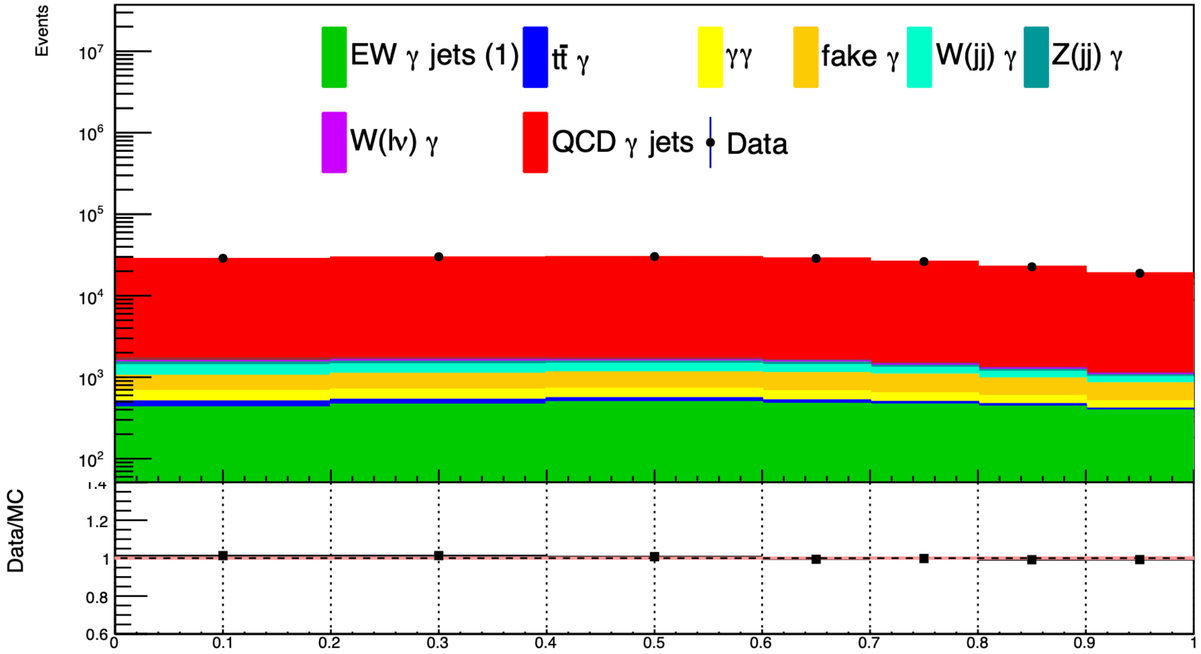
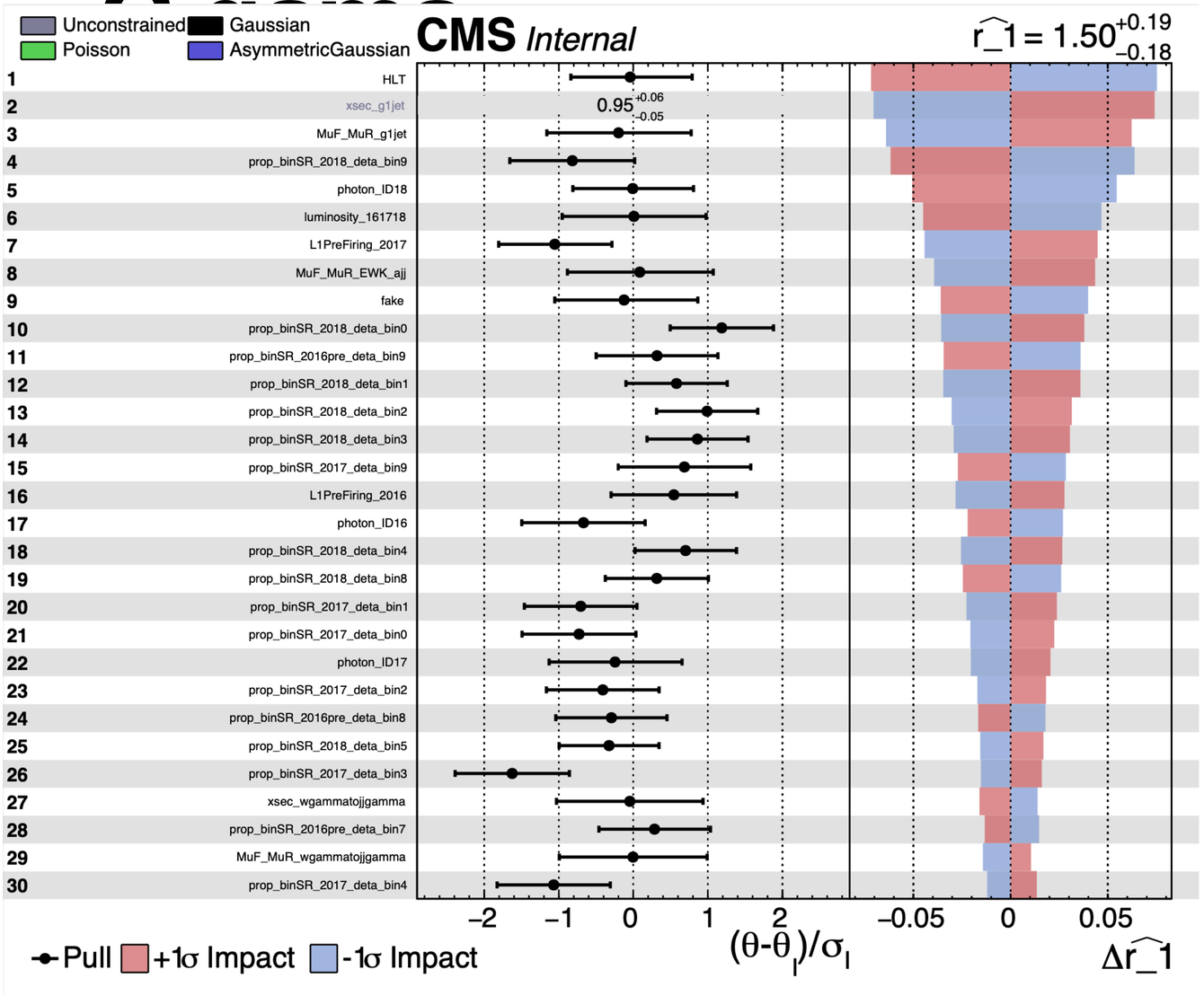
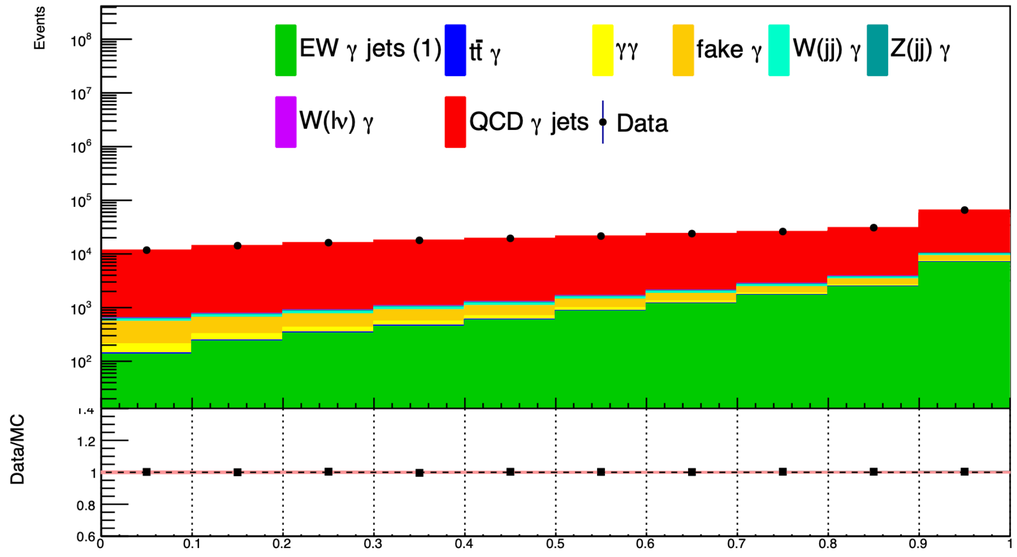
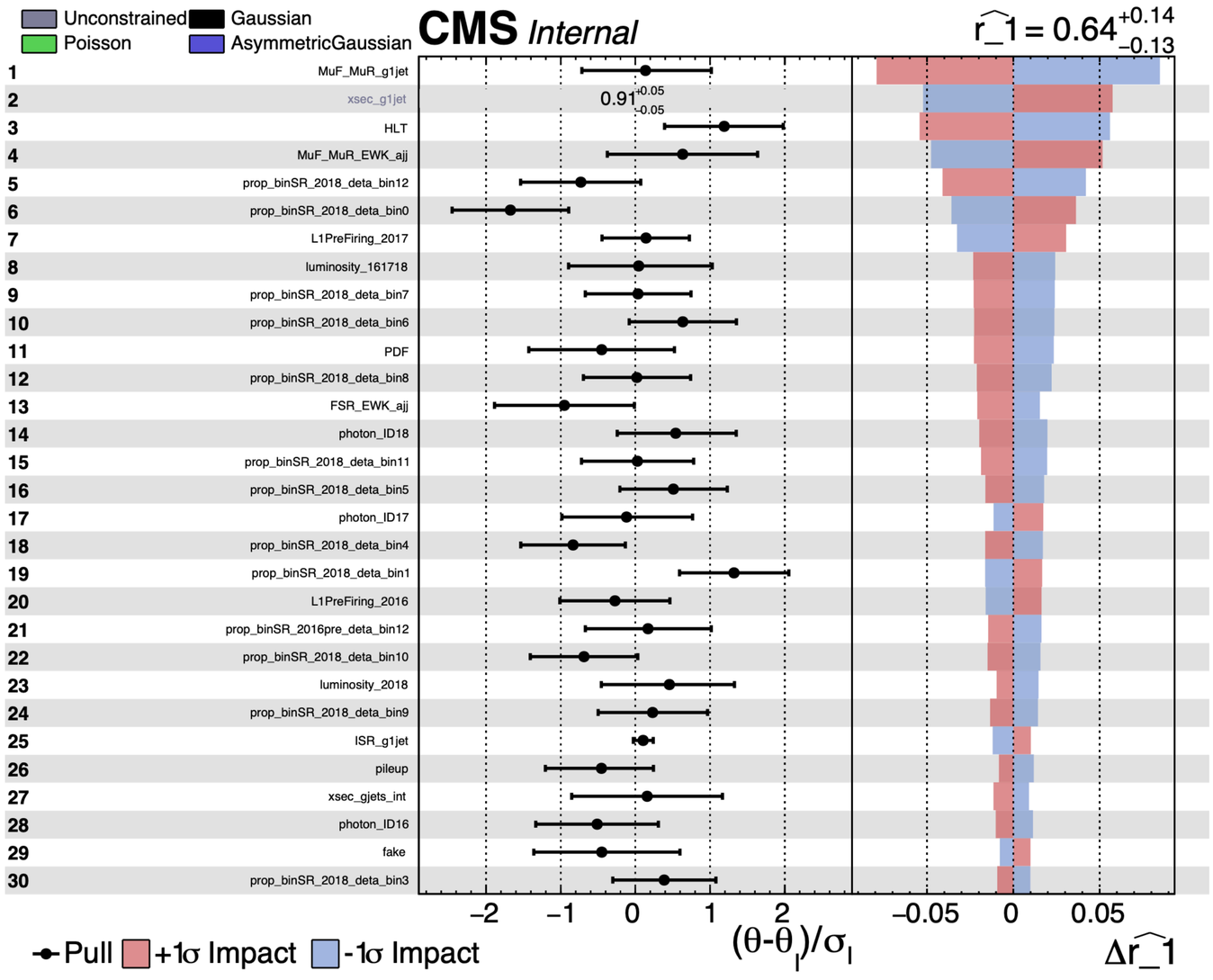
Fit with all the input variables

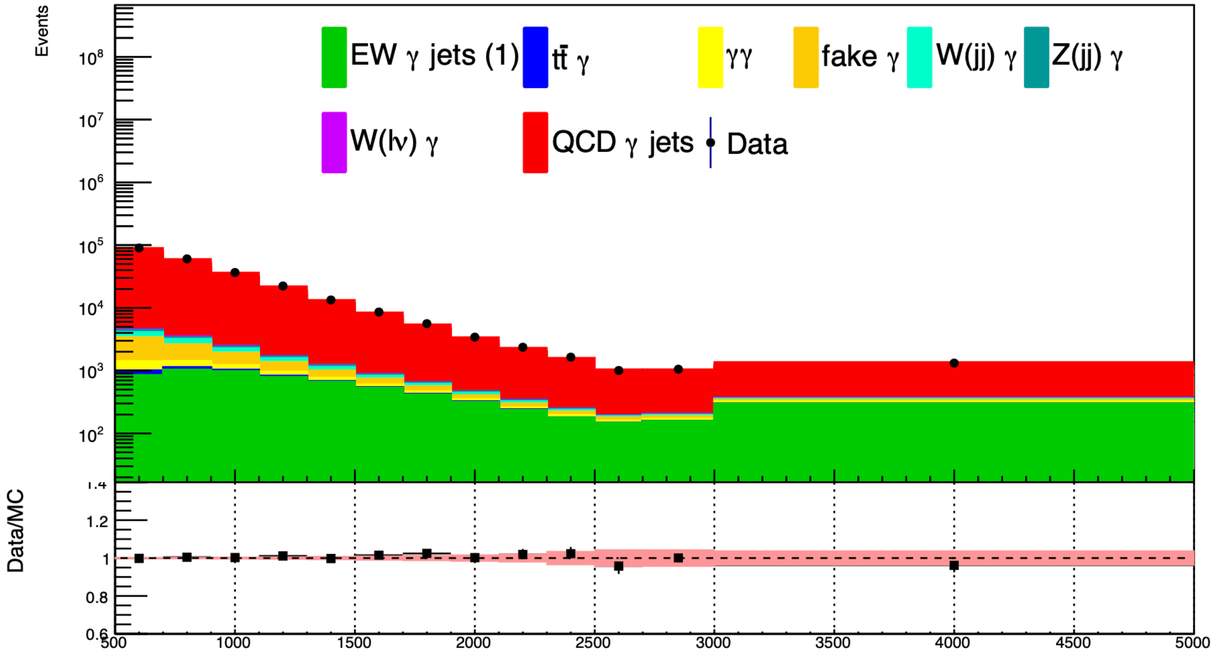

CMS Internal
$\hat{r}_1 = 0.50^{+0.27}_{-0.28}$
1 FSR_g1jet
2 prop_binSR_2018_deta_bin16
3 prop_binSR_2018_deta_bin15
4 prop_binSR_2018_deta_bin14
5 prop_binSR_2018_deta_bin13
6 prop_binSR_2017_deta_bin7
7 prop_binSR_2018_deta_bin12
8 prop_binSR_2018_deta_bin7
9 prop_binSR_2016pre_deta_bin14
10 prop_binSR_2017_deta_bin16
11 ISR_g1jet
12 prop_binSR_2016pre_deta_bin7
13 prop_binSR_2016pre_deta_bin12
14 prop_binSR_2017_deta_bin8
15 prop_binSR_2016pre_deta_bin16
16 prop_binSR_2017_deta_bin14
17 prop_binSR_2016pre_deta_bin15
18 prop_binSR_2016_deta_bin16
19 prop_binSR_2018_deta_bin10
20 prop_binSR_2016_deta_bin15
21 prop_binSR_2016pre_deta_bin13
22 prop_binSR_2016pre_deta_bin8
23 prop_binSR_2018_deta_bin11
24 L1PreFiring_2016
25 prop_binSR_2016_deta_bin13
26 prop_binSR_2018_deta_bin6
27 prop_binSR_2016_deta_bin7
28 fake
29 prop_binSR_2018_deta_bin0
30 prop_binSR_2016_deta_bin8
−2 −1 0 1 2
$(\theta-\theta_I)/\sigma_I$
−0.2 −0.1 0 0.1 0.2
$\Delta\hat{r}_1$
Pull
+1σ Impact
-1σ Impact

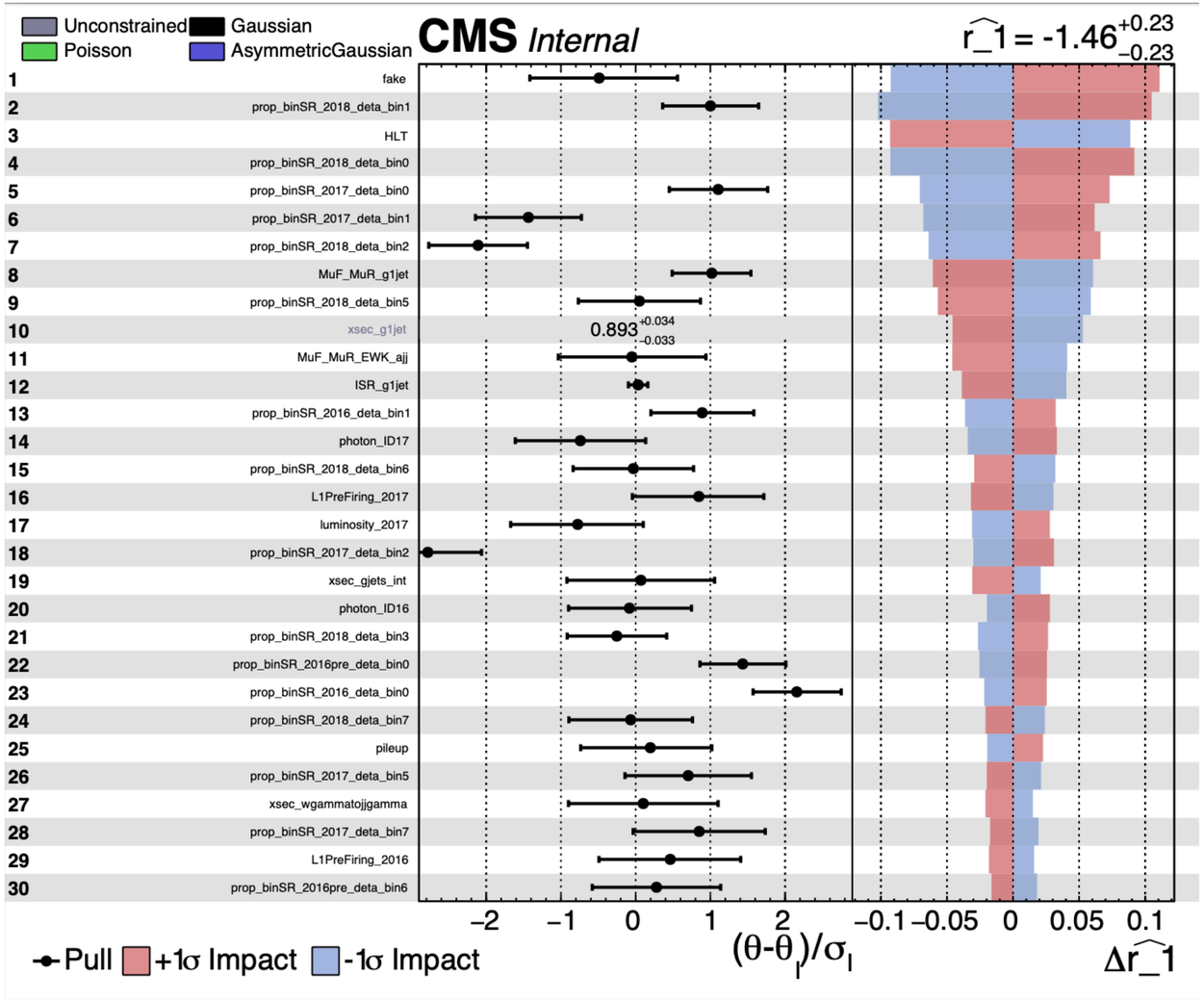

Events
EW γ jets (1)
tt̄ γ
γγ
fake γ
W(jj) γ
Z(jj) γ
W(lν) γ
QCD γ jets
Data
Data/MC
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1

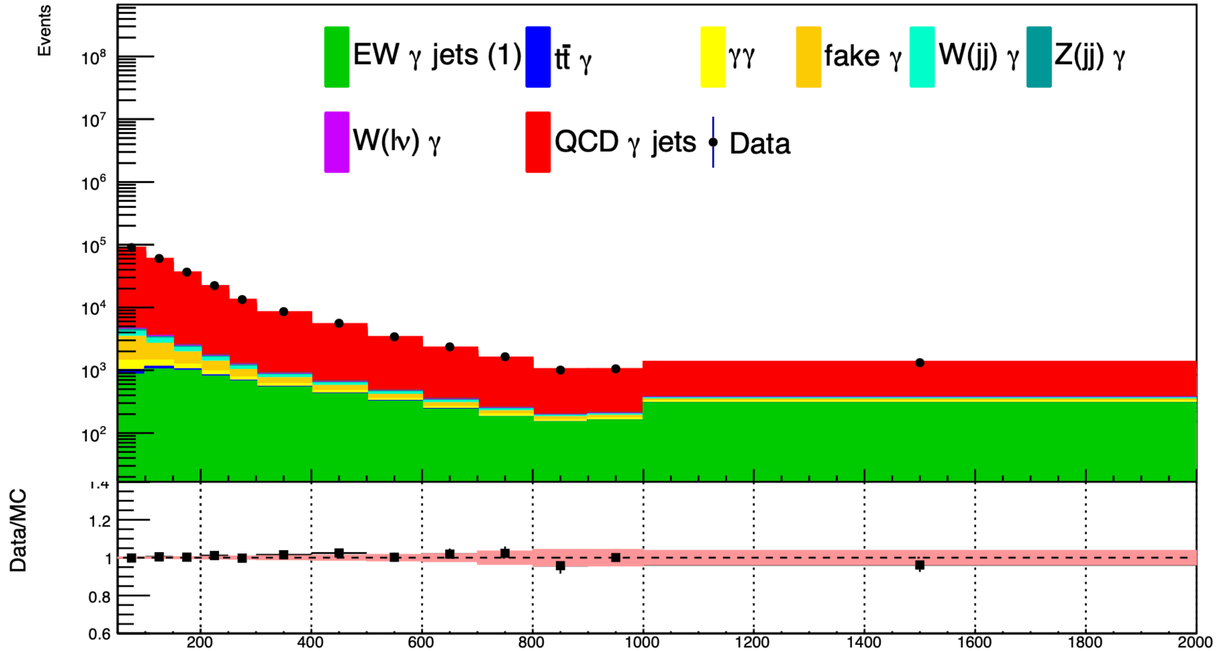

Unconstrained
Gaussian
Poisson
AsymmetricGaussian
CMS Internal
r̂_1 = 1.50 +0.19 −0.18
1 HLT
2 xsec_g1jet
0.95 +0.06 −0.05
3 MuF_MuR_g1jet
4 prop_binSR_2018_deta_bin9
5 photon_ID18
6 luminosity_161718
7 L1PreFiring_2017
8 MuF_MuR_EWK_ajj
9 fake
10 prop_binSR_2018_deta_bin0
11 prop_binSR_2016pre_deta_bin9
12 prop_binSR_2018_deta_bin1
13 prop_binSR_2018_deta_bin2
14 prop_binSR_2018_deta_bin3
15 prop_binSR_2017_deta_bin9
16 L1PreFiring_2016
17 photon_ID16
18 prop_binSR_2018_deta_bin4
19 prop_binSR_2018_deta_bin8
20 prop_binSR_2017_deta_bin1
21 prop_binSR_2017_deta_bin0
22 photon_ID17
23 prop_binSR_2017_deta_bin2
24 prop_binSR_2016pre_deta_bin8
25 prop_binSR_2018_deta_bin5
26 prop_binSR_2017_deta_bin3
27 xsec_wgammatojjgamma
28 prop_binSR_2016pre_deta_bin7
29 MuF_MuR_wgammatojjgamma
30 prop_binSR_2017_deta_bin4
−2 −1 0 1 2
(θ-θ_I)/σ_I
−0.05 0 0.05
Δr̂_1
Pull
+1σ Impact
-1σ Impact

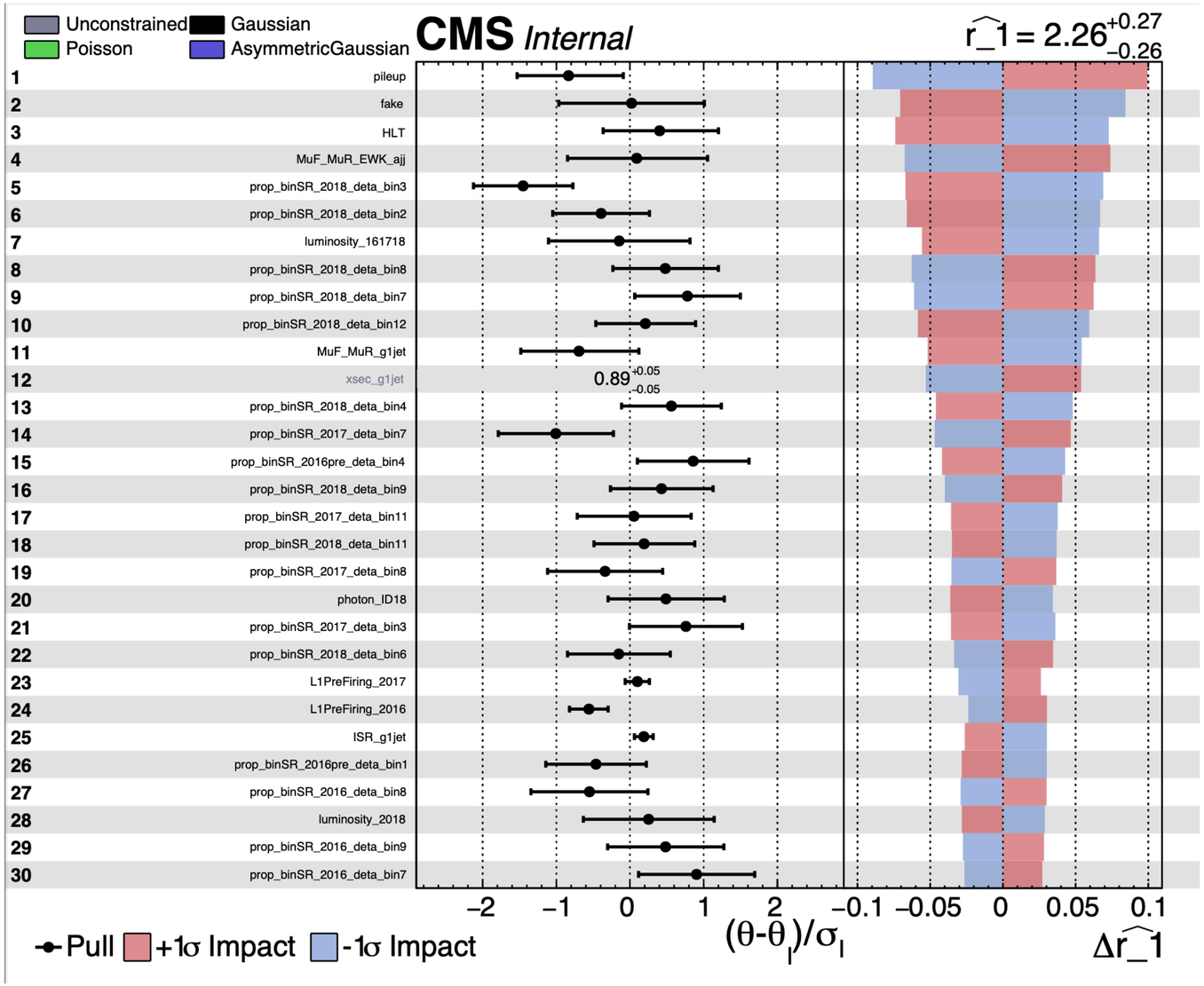

Events
EW γ jets (1)
tt̄ γ
γγ
fake γ
W(jj) γ
Z(jj) γ
W(lν) γ
QCD γ jets
Data
Data/MC

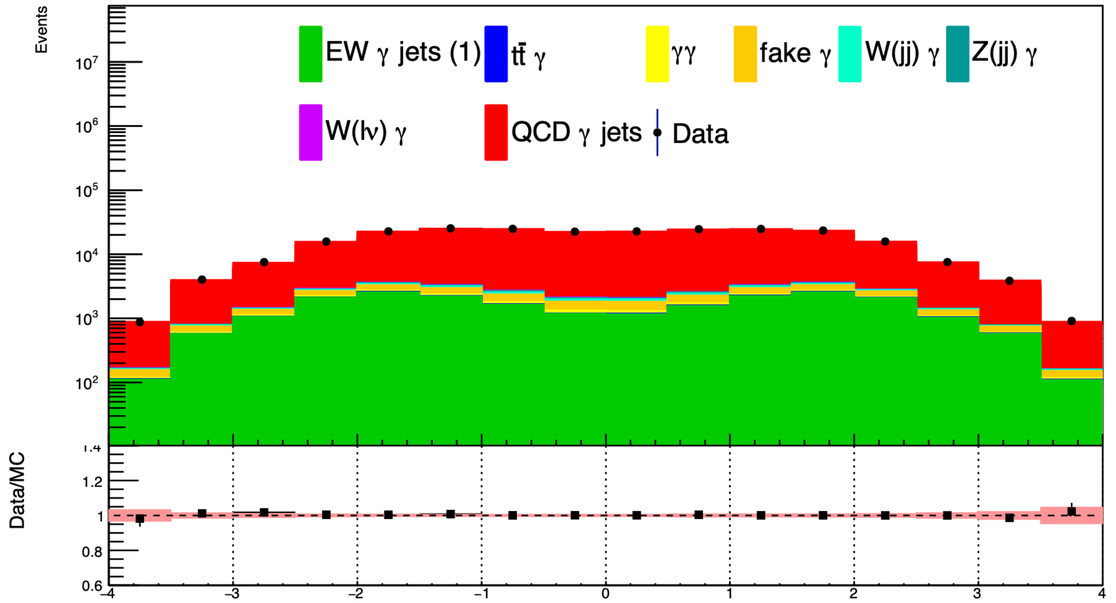

Unconstrained
Gaussian
Poisson
AsymmetricGaussian
CMS Internal
$\hat{r}_1 = 0.64^{+0.14}_{-0.13}$
1 MuF_MuR_g1jet
2 xsec_g1jet
3 HLT
4 MuF_MuR_EWK_ajj
5 prop_binSR_2018_deta_bin12
6 prop_binSR_2018_deta_bin0
7 L1PreFiring_2017
8 luminosity_161718
9 prop_binSR_2018_deta_bin7
10 prop_binSR_2018_deta_bin6
11 PDF
12 prop_binSR_2018_deta_bin8
13 FSR_EWK_ajj
14 photon_ID18
15 prop_binSR_2018_deta_bin11
16 prop_binSR_2018_deta_bin5
17 photon_ID17
18 prop_binSR_2018_deta_bin4
19 prop_binSR_2018_deta_bin1
20 L1PreFiring_2016
21 prop_binSR_2016pre_deta_bin12
22 prop_binSR_2018_deta_bin10
23 luminosity_2018
24 prop_binSR_2018_deta_bin9
25 ISR_g1jet
26 pileup
27 xsec_gjets_int
28 photon_ID16
29 fake
30 prop_binSR_2018_deta_bin3
$0.91^{+0.05}_{-0.05}$
−2 −1 0 1 2
$(\theta-\hat{\theta})/\sigma$
−0.05 0 0.05
$\Delta\hat{r}_1$
Pull
+1σ Impact
-1σ Impact

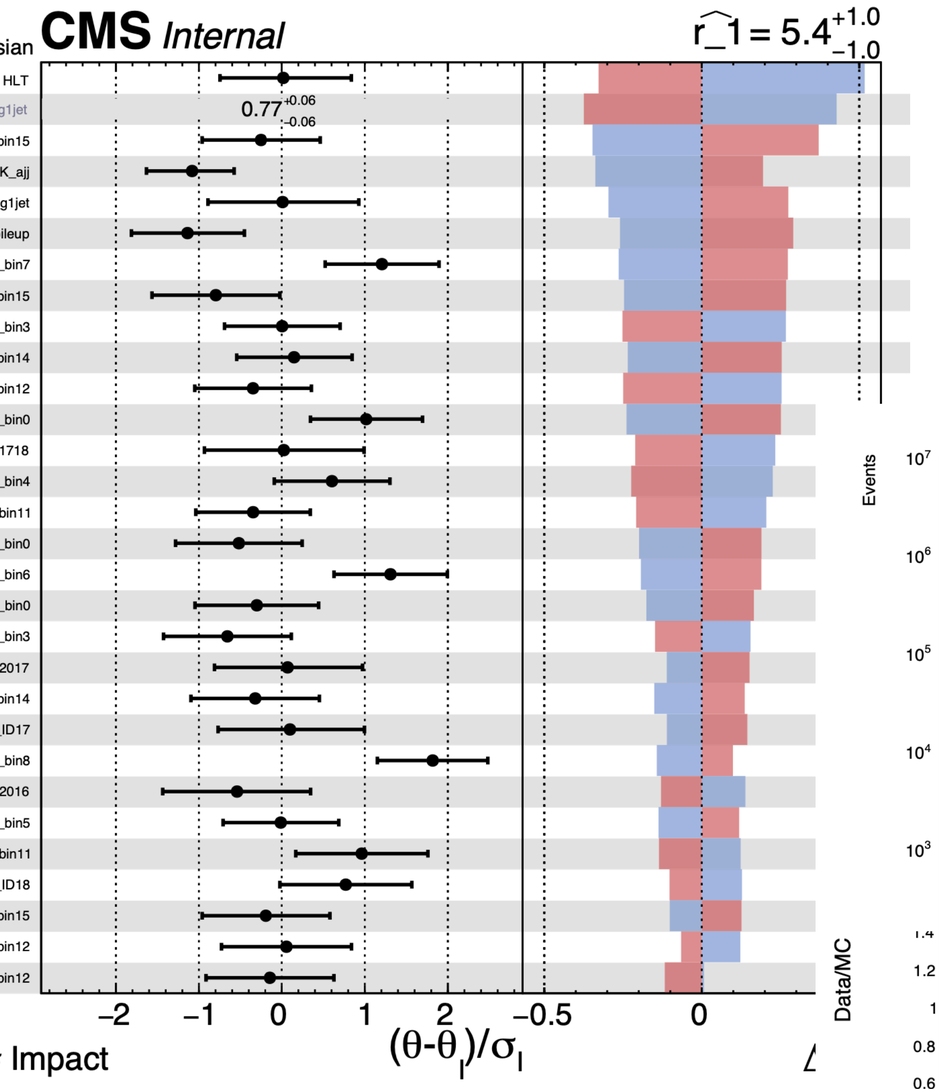

Events
EW γ jets (1)
tt̄ γ
γγ
fake γ
W(jj) γ
Z(jj) γ
W(lν) γ
QCD γ jets
Data
Data/MC
500 1000 1500 2000 2500 3000 3500 4000 4500 5000

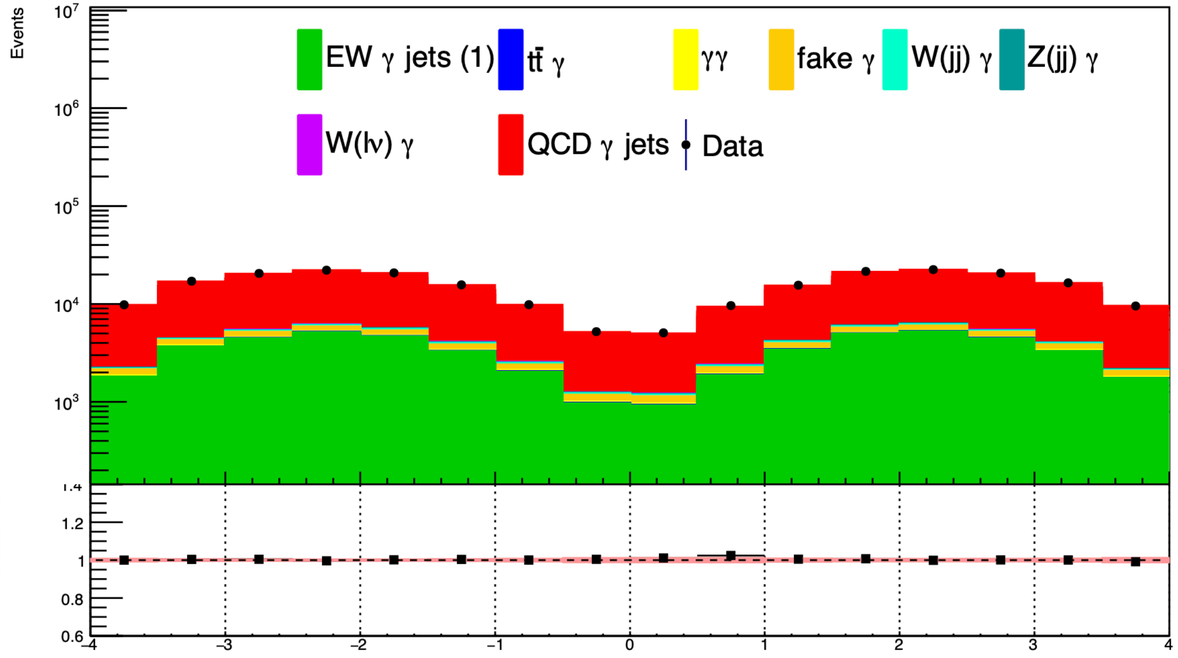

Unconstrained
Gaussian
Poisson
AsymmetricGaussian
CMS Internal
$\hat{r}_1 = -1.46^{+0.23}_{-0.23}$
1 fake
2 prop_binSR_2018_deta_bin1
3 HLT
4 prop_binSR_2018_deta_bin0
5 prop_binSR_2017_deta_bin0
6 prop_binSR_2017_deta_bin1
7 prop_binSR_2018_deta_bin2
8 MuF_MuR_g1jet
9 prop_binSR_2018_deta_bin5
10 xsec_g1jet
$0.893^{+0.034}_{-0.033}$
11 MuF_MuR_EWK_ajj
12 ISR_g1jet
13 prop_binSR_2016_deta_bin1
14 photon_ID17
15 prop_binSR_2018_deta_bin6
16 L1PreFiring_2017
17 luminosity_2017
18 prop_binSR_2017_deta_bin2
19 xsec_gjets_int
20 photon_ID16
21 prop_binSR_2018_deta_bin3
22 prop_binSR_2016pre_deta_bin0
23 prop_binSR_2016_deta_bin0
24 prop_binSR_2018_deta_bin7
25 pileup
26 prop_binSR_2017_deta_bin5
27 xsec_wgammatojjgamma
28 prop_binSR_2017_deta_bin7
29 L1PreFiring_2016
30 prop_binSR_2016pre_deta_bin6
−2 −1 0 1 2
−0.1 −0.05 0 0.05 0.1
Pull
+1σ Impact
-1σ Impact
$(\theta-\theta_I)/\sigma_I$
$\Delta\hat{r}_1$

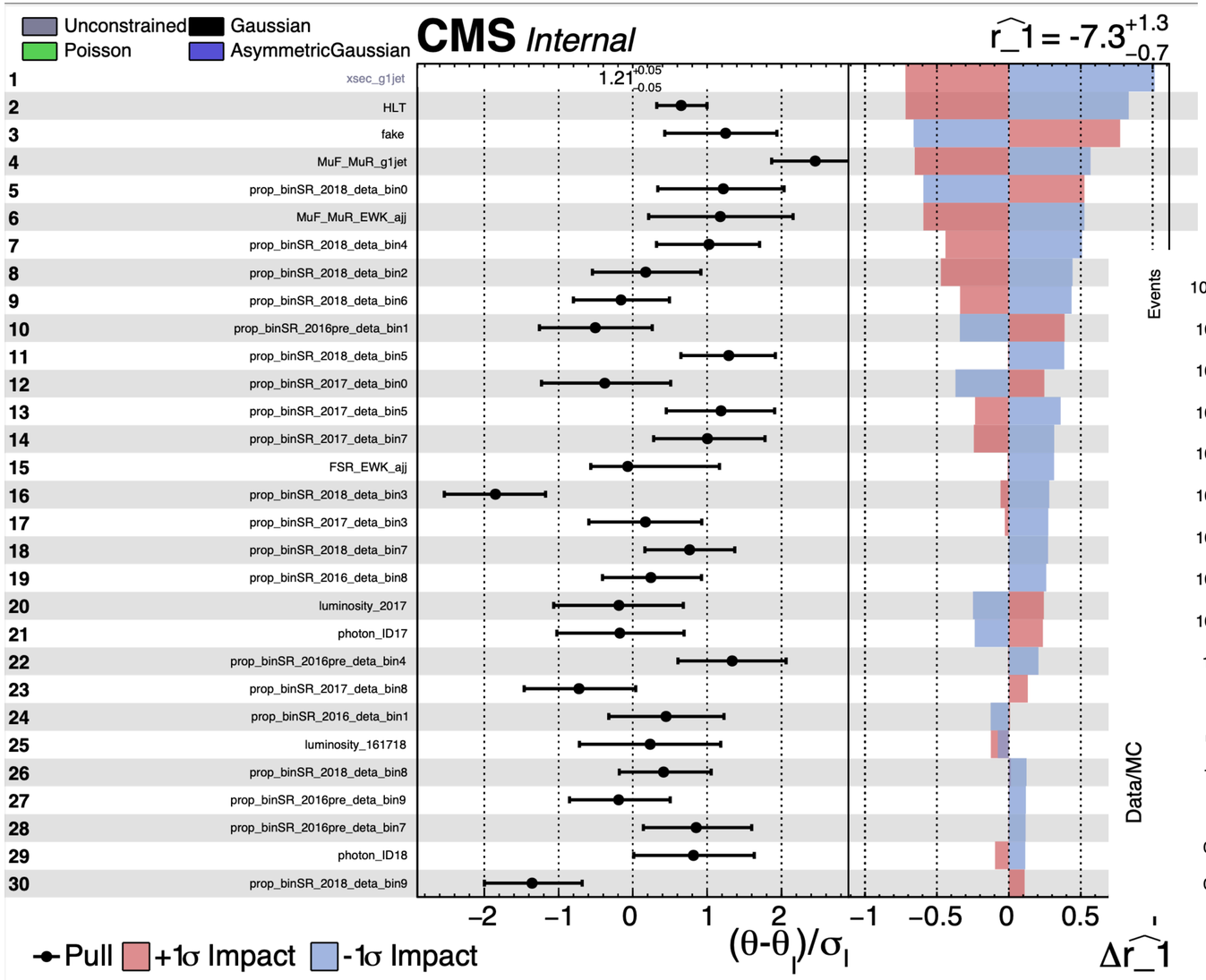

Events
EW γ jets (1)
tt̄ γ
γγ
fake γ
W(jj) γ
Z(jj) γ
W(lν) γ
QCD γ jets
Data
Data/MC
200 400 600 800 1000 1200 1400 1600 1800 2000

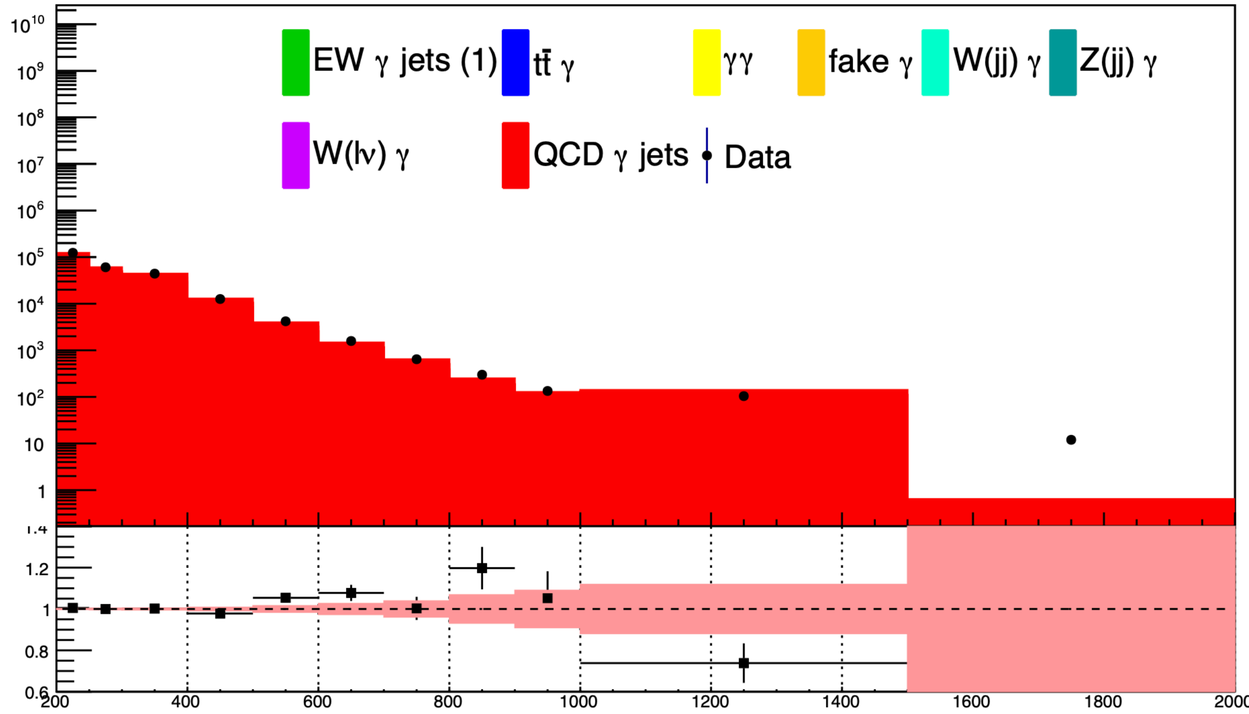

Unconstrained
Gaussian
Poisson
AsymmetricGaussian
CMS Internal
$\hat{r}_1 = 2.26^{+0.27}_{-0.26}$
1 pileup
2 fake
3 HLT
4 MuF_MuR_EWK_ajj
5 prop_binSR_2018_deta_bin3
6 prop_binSR_2018_deta_bin2
7 luminosity_161718
8 prop_binSR_2018_deta_bin8
9 prop_binSR_2018_deta_bin7
10 prop_binSR_2018_deta_bin12
11 MuF_MuR_g1jet
12 xsec_g1jet
$0.89^{+0.05}_{-0.05}$
13 prop_binSR_2018_deta_bin4
14 prop_binSR_2017_deta_bin7
15 prop_binSR_2016pre_deta_bin4
16 prop_binSR_2018_deta_bin9
17 prop_binSR_2017_deta_bin11
18 prop_binSR_2018_deta_bin11
19 prop_binSR_2017_deta_bin8
20 photon_ID18
21 prop_binSR_2017_deta_bin3
22 prop_binSR_2018_deta_bin6
23 L1PreFiring_2017
24 L1PreFiring_2016
25 ISR_g1jet
26 prop_binSR_2016pre_deta_bin1
27 prop_binSR_2016_deta_bin8
28 luminosity_2018
29 prop_binSR_2016_deta_bin9
30 prop_binSR_2016_deta_bin7
−2 −1 0 1 2
−0.1 −0.05 0 0.05 0.1
Pull
+1σ Impact
-1σ Impact
$(\theta-\theta_I)/\sigma_I$
$\Delta\hat{r}_1$

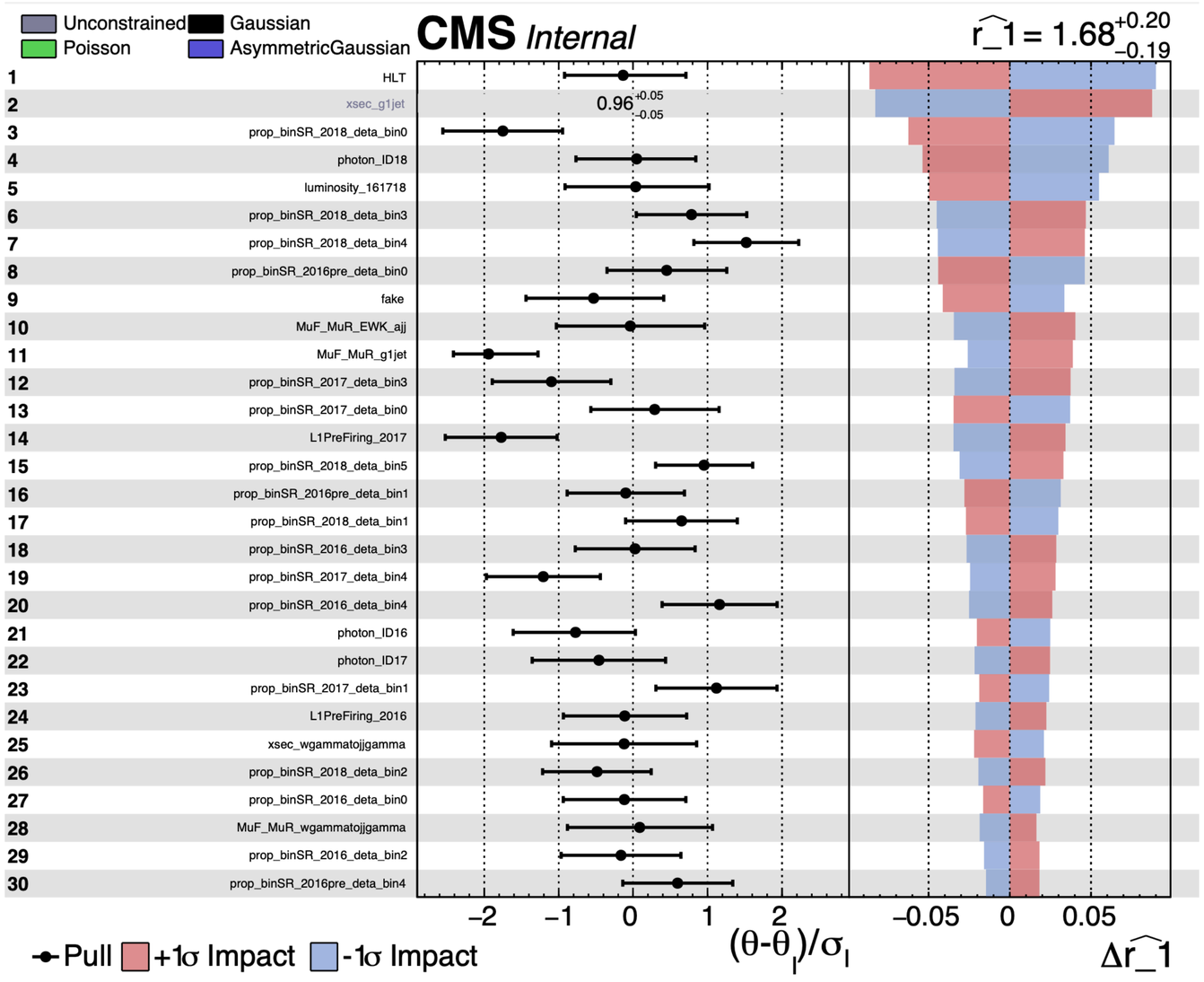

Events
EW γ jets (1)
tt̄ γ
γγ
fake γ
W(jj) γ
Z(jj) γ
W(lν) γ
QCD γ jets
Data
Data/MC
10^7
10^6
10^5
10^4
10^3
10^2
1.2
1
0.8
0.6
−4 −3 −2 −1 0 1 2 3 4

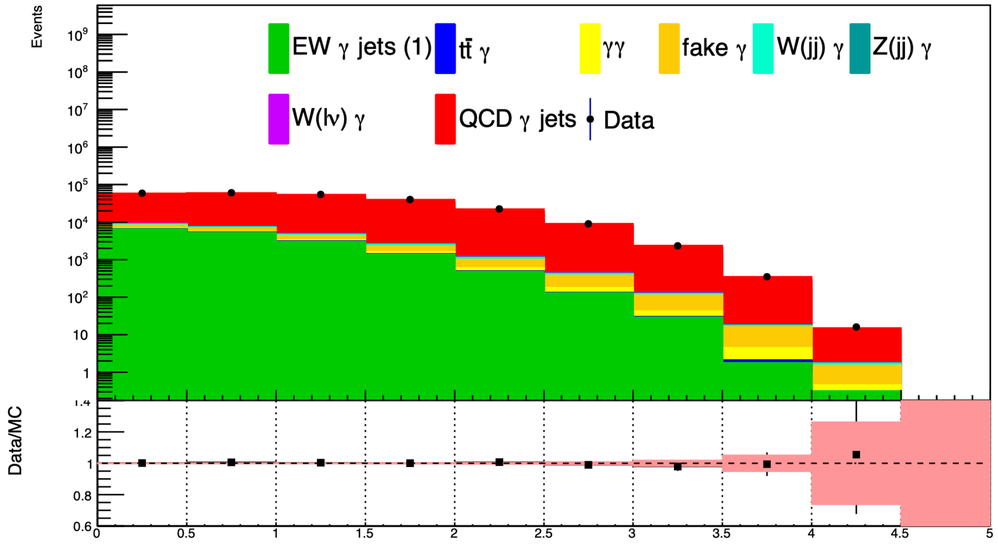

CMS Internal
$\hat{r}_1 = 5.4^{+1.0}_{-1.0}$
sian
HLT
g1jet
$0.77^{+0.06}_{-0.06}$
bin15
K_ajj
g1jet
ileup
_bin7
bin15
_bin3
bin14
bin12
_bin0
1718
_bin4
bin11
_bin0
_bin6
_bin0
_bin3
2017
bin14
ID17
_bin8
2016
_bin5
bin11
ID18
bin15
bin12
bin12
−2
−1
0
1
2
−0.5
0
Impact
$(\theta-\hat{\theta}_I)/\sigma_I$

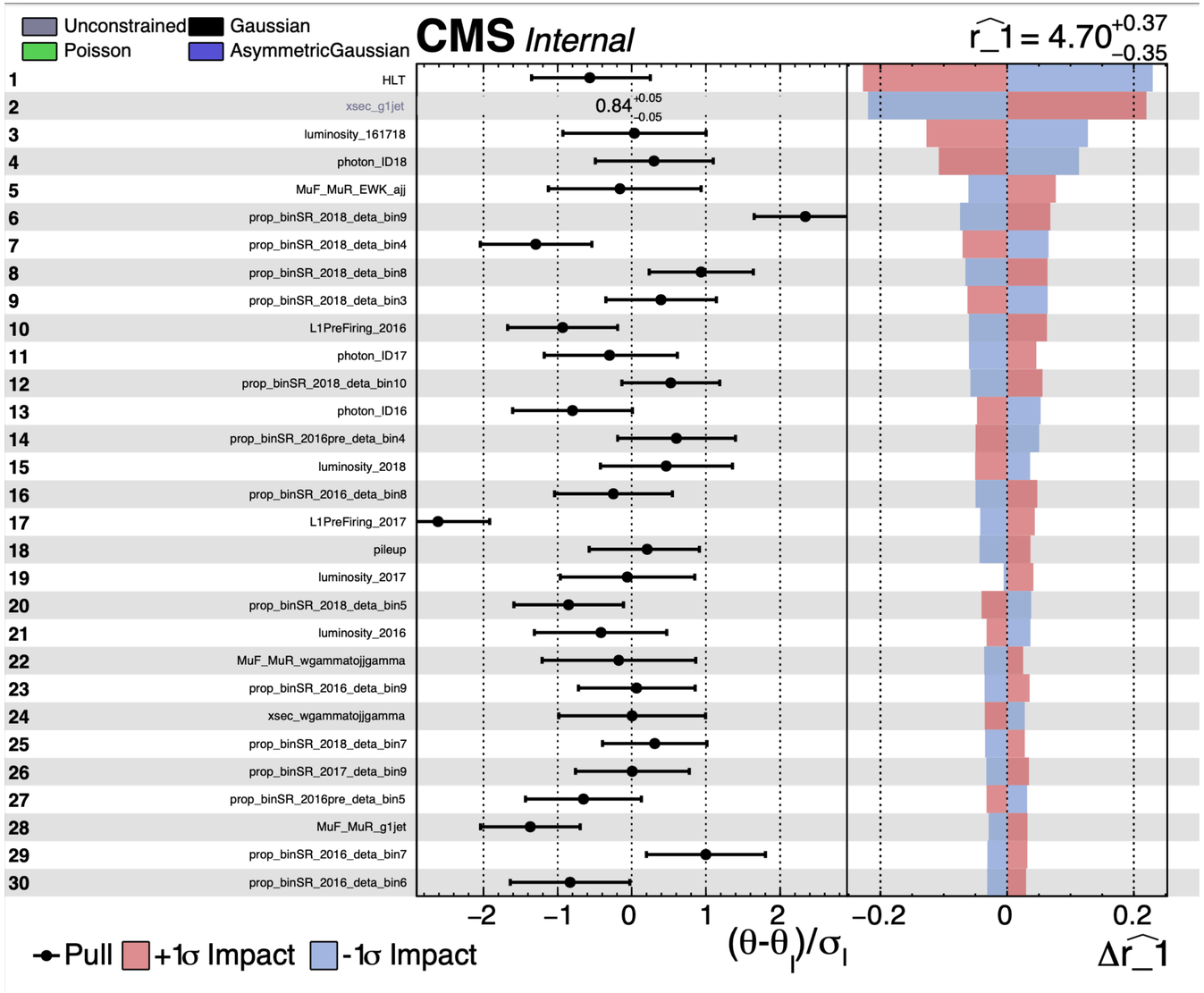

Events
EW γ jets (1)
tt̄ γ
γγ
fake γ
W(jj) γ
Z(jj) γ
W(lν) γ
QCD γ jets
Data
Data/MC

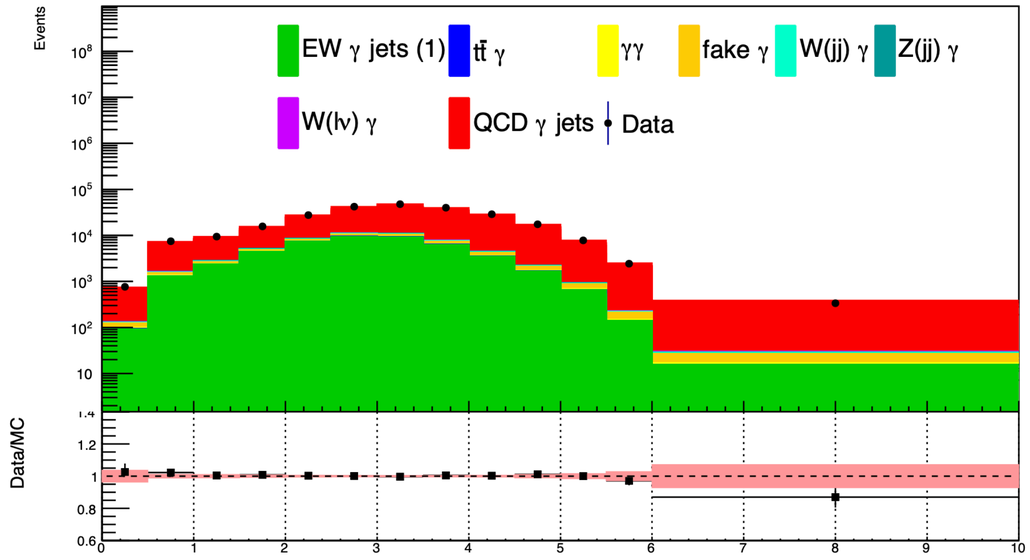

Unconstrained
Gaussian
Poisson
AsymmetricGaussian
CMS Internal
r̂_1 = -7.3 +1.3 −0.7
1 xsec_g1jet
2 HLT
3 fake
4 MuF_MuR_g1jet
5 prop_binSR_2018_deta_bin0
6 MuF_MuR_EWK_ajj
7 prop_binSR_2018_deta_bin4
8 prop_binSR_2018_deta_bin2
9 prop_binSR_2018_deta_bin6
10 prop_binSR_2016pre_deta_bin1
11 prop_binSR_2018_deta_bin5
12 prop_binSR_2017_deta_bin0
13 prop_binSR_2017_deta_bin5
14 prop_binSR_2017_deta_bin7
15 FSR_EWK_ajj
16 prop_binSR_2018_deta_bin3
17 prop_binSR_2017_deta_bin3
18 prop_binSR_2018_deta_bin7
19 prop_binSR_2016_deta_bin8
20 luminosity_2017
21 photon_ID17
22 prop_binSR_2016pre_deta_bin4
23 prop_binSR_2017_deta_bin8
24 prop_binSR_2016_deta_bin1
25 luminosity_161718
26 prop_binSR_2018_deta_bin8
27 prop_binSR_2016pre_deta_bin9
28 prop_binSR_2016pre_deta_bin7
29 photon_ID18
30 prop_binSR_2018_deta_bin9
1.21 +0.05 −0.05
−2 −1 0 1 2
−1 −0.5 0 0.5
Pull
+1σ Impact
-1σ Impact
(θ-θ_I)/σ_I
Δr̂_1


EW γ jets (1)
tt̄ γ
γγ
fake γ
W(jj) γ
Z(jj) γ
W(lν) γ
QCD γ jets
Data
Events
Data/MC
200 400 600 800 1000 1200 1400 1600 1800 2000


Unconstrained
Gaussian
Poisson
AsymmetricGaussian
CMS Internal
$\hat{r}_1 = 1.68^{+0.20}_{-0.19}$
1 HLT
2 xsec_g1jet
3 prop_binSR_2018_deta_bin0
4 photon_ID18
5 luminosity_161718
6 prop_binSR_2018_deta_bin3
7 prop_binSR_2018_deta_bin4
8 prop_binSR_2016pre_deta_bin0
9 fake
10 MuF_MuR_EWK_ajj
11 MuF_MuR_g1jet
12 prop_binSR_2017_deta_bin3
13 prop_binSR_2017_deta_bin0
14 L1PreFiring_2017
15 prop_binSR_2018_deta_bin5
16 prop_binSR_2016pre_deta_bin1
17 prop_binSR_2018_deta_bin1
18 prop_binSR_2016_deta_bin3
19 prop_binSR_2017_deta_bin4
20 prop_binSR_2016_deta_bin4
21 photon_ID16
22 photon_ID17
23 prop_binSR_2017_deta_bin1
24 L1PreFiring_2016
25 xsec_wgammatojjgamma
26 prop_binSR_2018_deta_bin2
27 prop_binSR_2016_deta_bin0
28 MuF_MuR_wgammatojjgamma
29 prop_binSR_2016_deta_bin2
30 prop_binSR_2016pre_deta_bin4
$0.96^{+0.05}_{-0.05}$
−2 −1 0 1 2
$(\theta-\hat{\theta})/\sigma_I$
−0.05 0 0.05
$\Delta\hat{r}_1$
Pull
+1σ Impact
-1σ Impact


Events
EW γ jets (1)
tt̄ γ
γγ
fake γ
W(jj) γ
Z(jj) γ
W(lν) γ
QCD γ jets
Data
Data/MC


Unconstrained
Gaussian
Poisson
AsymmetricGaussian
CMS Internal
$\hat{r}_1 = 4.70^{+0.37}_{-0.35}$
1 HLT
2 xsec_g1jet
3 luminosity_161718
4 photon_ID18
5 MuF_MuR_EWK_ajj
6 prop_binSR_2018_deta_bin9
7 prop_binSR_2018_deta_bin4
8 prop_binSR_2018_deta_bin8
9 prop_binSR_2018_deta_bin3
10 L1PreFiring_2016
11 photon_ID17
12 prop_binSR_2018_deta_bin10
13 photon_ID16
14 prop_binSR_2016pre_deta_bin4
15 luminosity_2018
16 prop_binSR_2016_deta_bin8
17 L1PreFiring_2017
18 pileup
19 luminosity_2017
20 prop_binSR_2018_deta_bin5
21 luminosity_2016
22 MuF_MuR_wgammatojjgamma
23 prop_binSR_2016_deta_bin9
24 xsec_wgammatojjgamma
25 prop_binSR_2018_deta_bin7
26 prop_binSR_2017_deta_bin9
27 prop_binSR_2016pre_deta_bin5
28 MuF_MuR_g1jet
29 prop_binSR_2016_deta_bin7
30 prop_binSR_2016_deta_bin6
$0.84^{+0.05}_{-0.05}$
−2 −1 0 1 2
$(\theta-\theta_I)/\sigma_I$
−0.2 0 0.2
$\Delta\hat{r}_1$
Pull
+1σ Impact
-1σ Impact


Events
EW γ jets (1)
tt̄ γ
γγ
fake γ
W(jj) γ
Z(jj) γ
W(lν) γ
QCD γ jets
Data
Data/MC