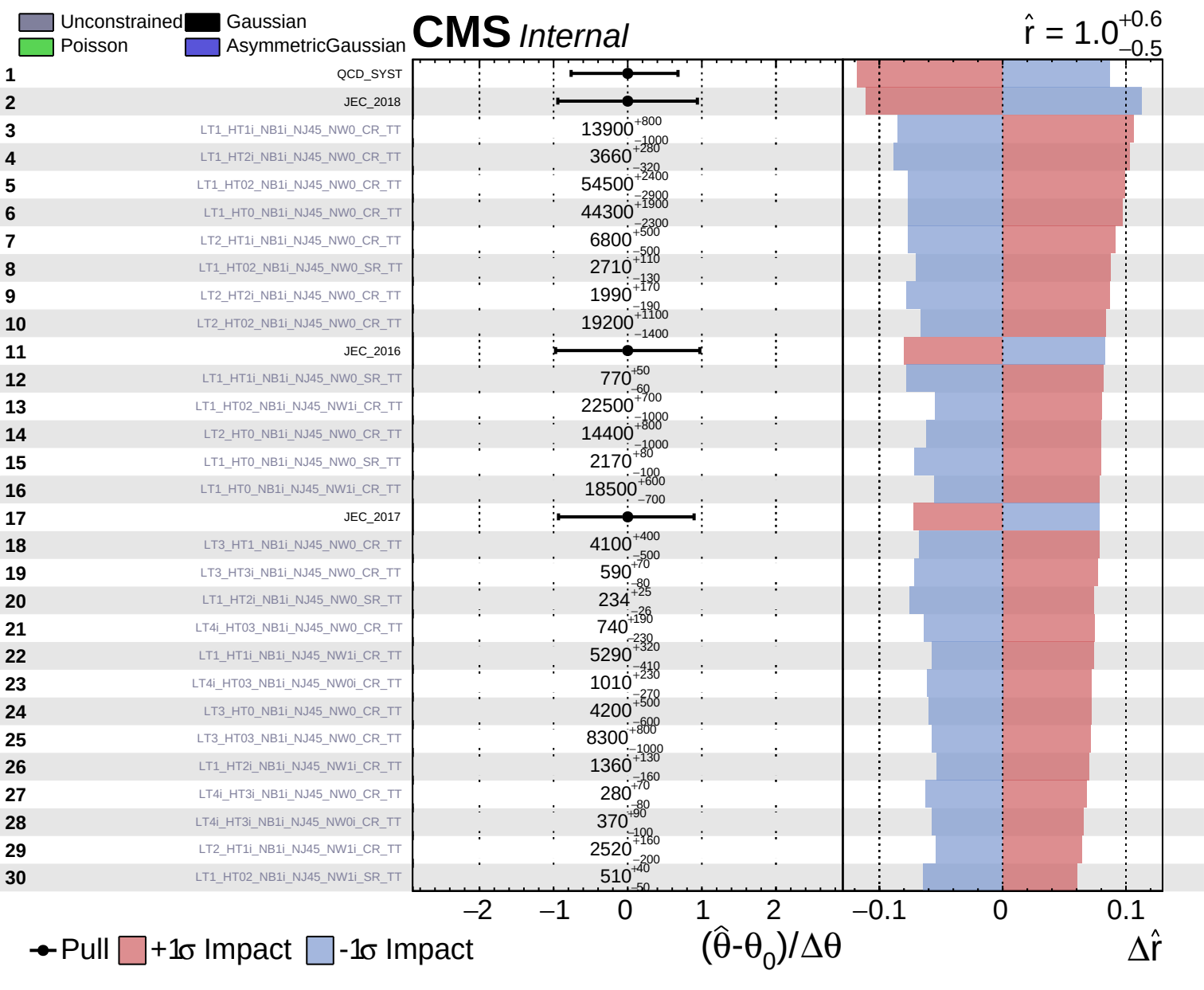
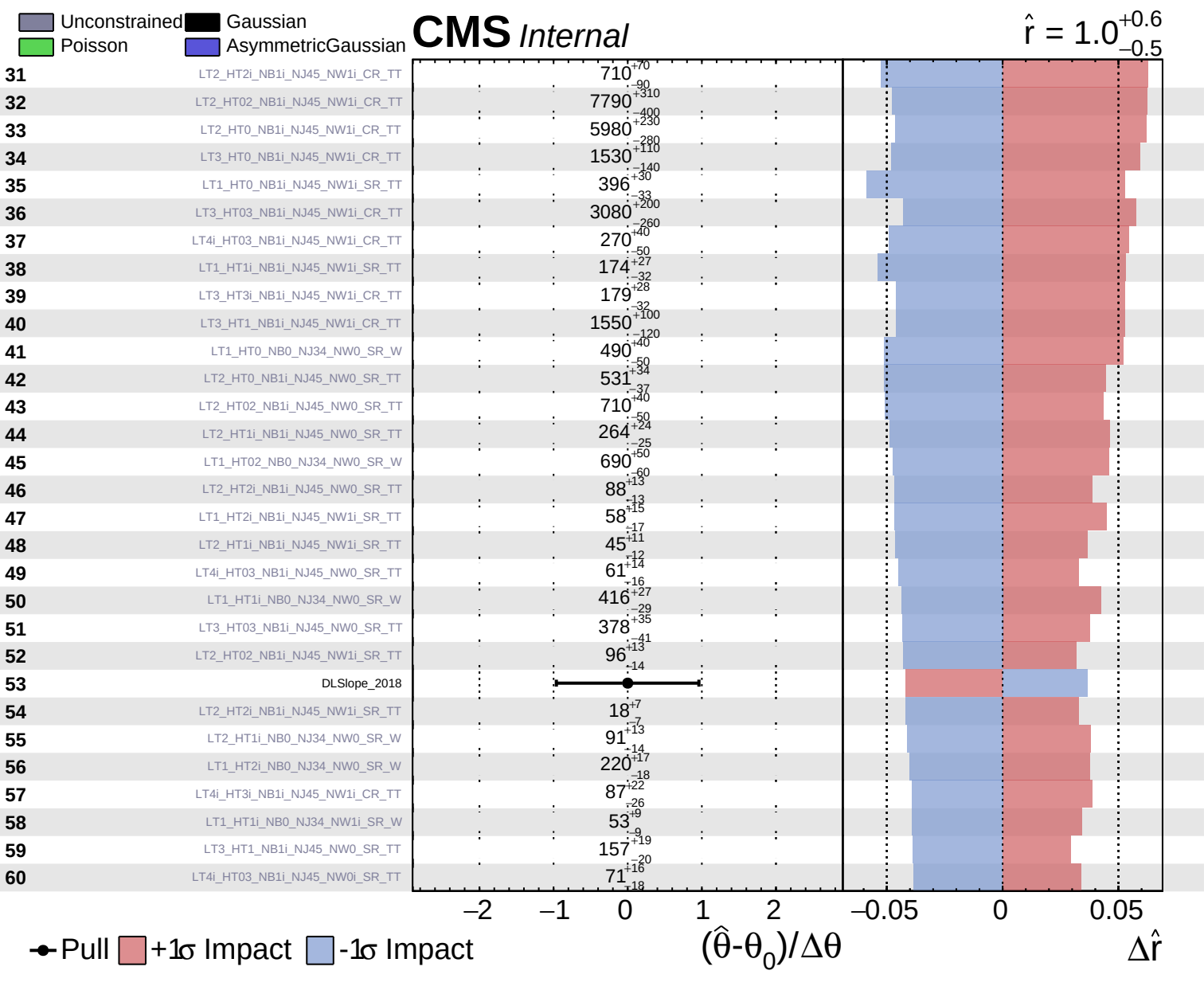
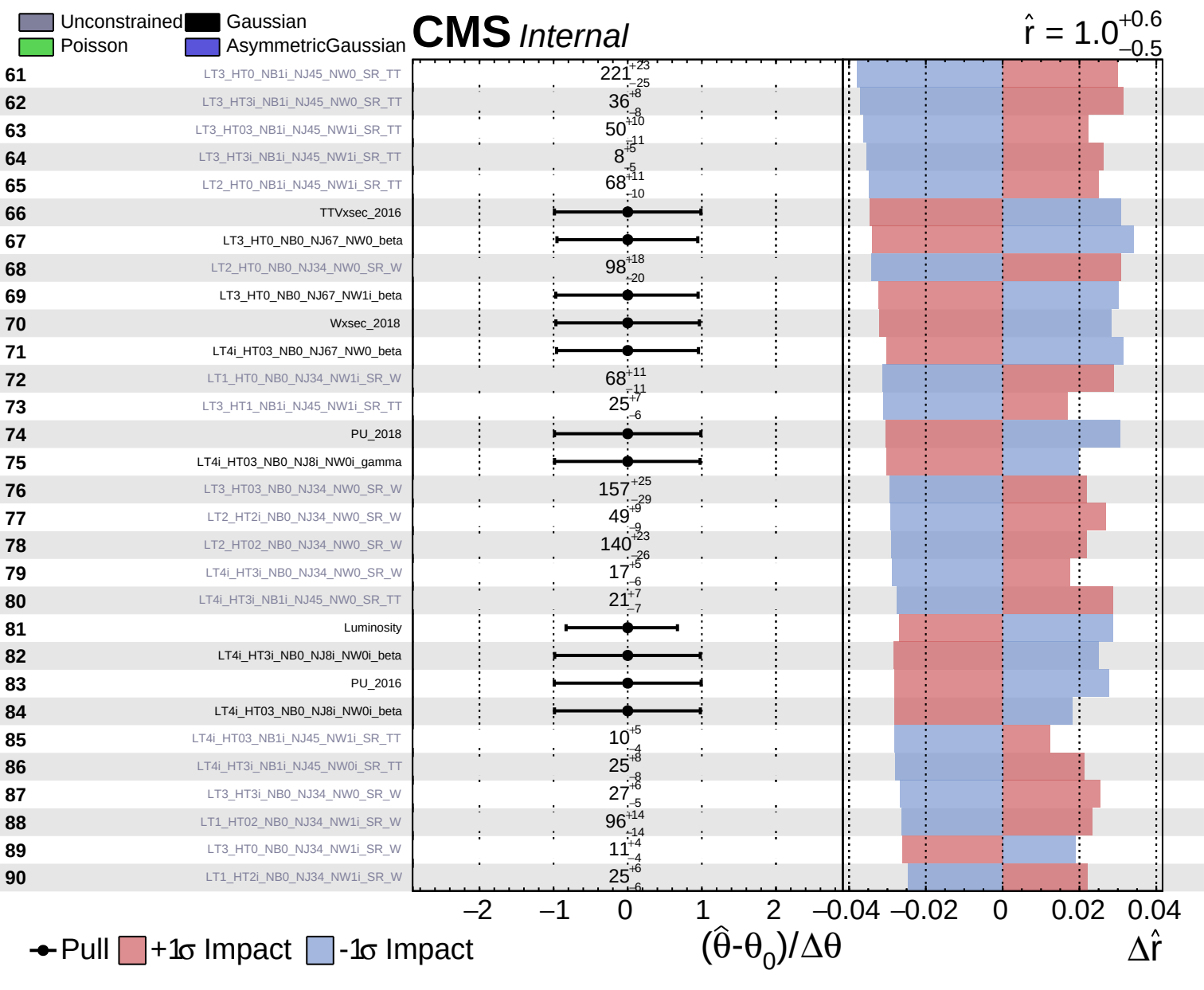
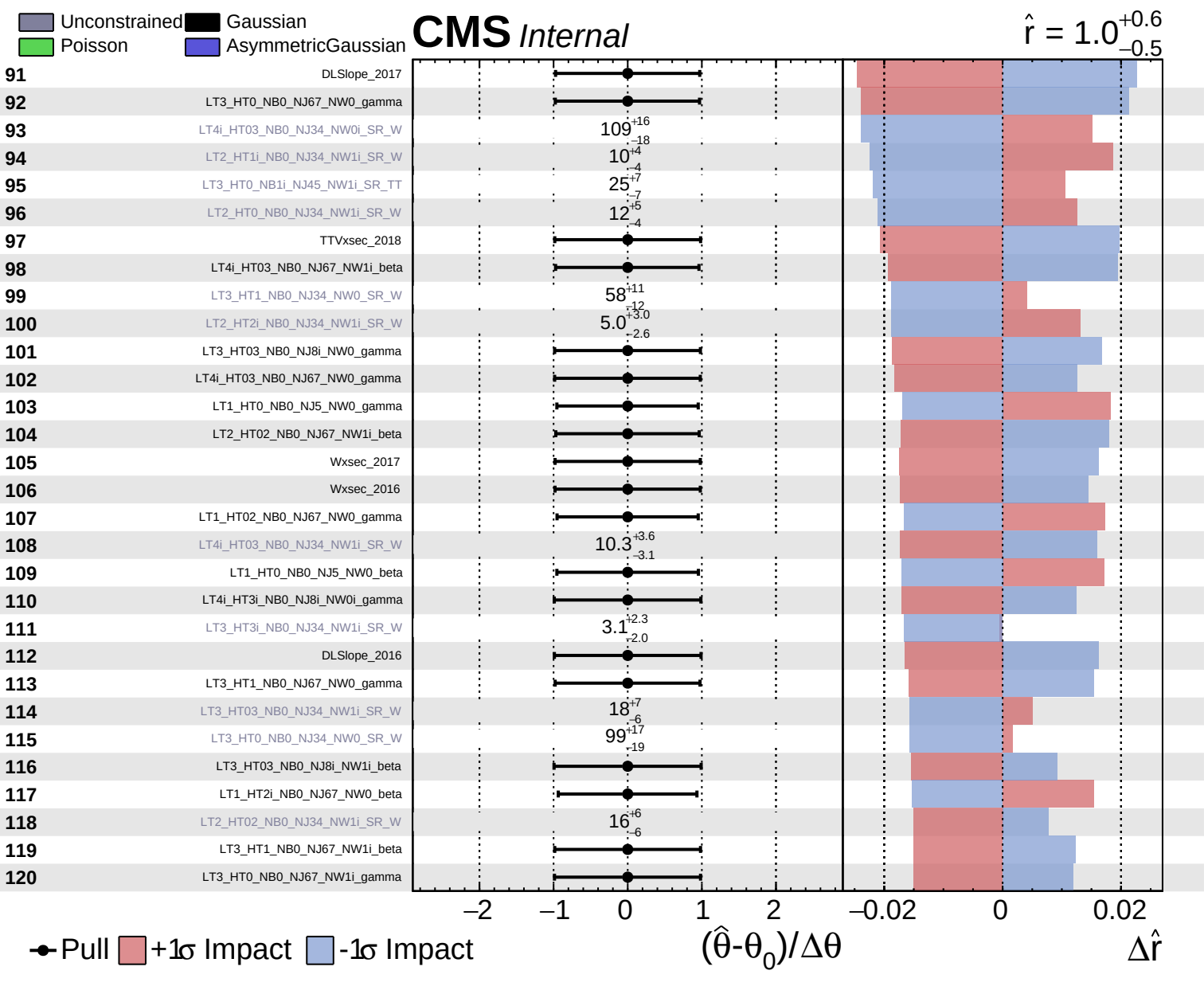
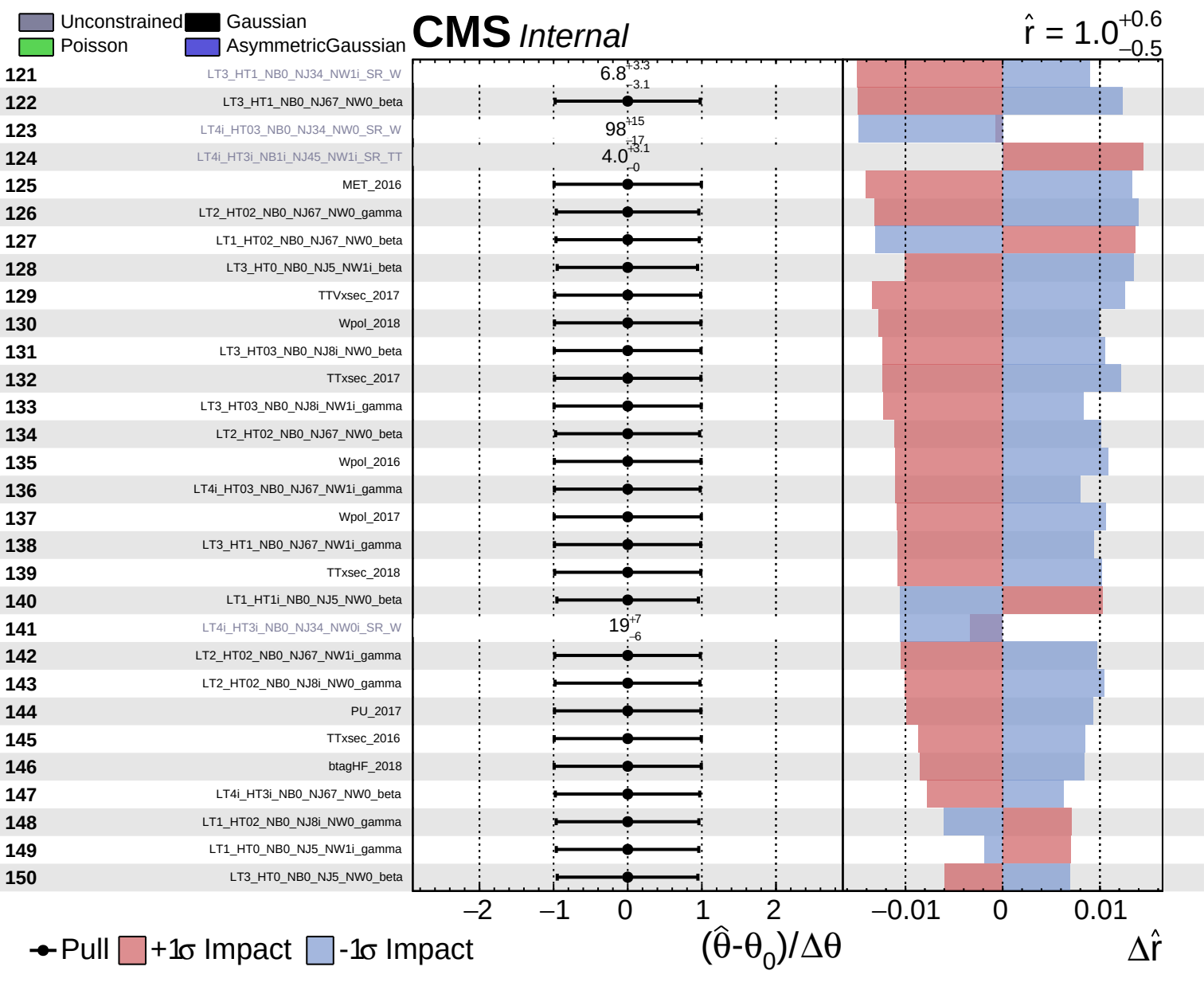
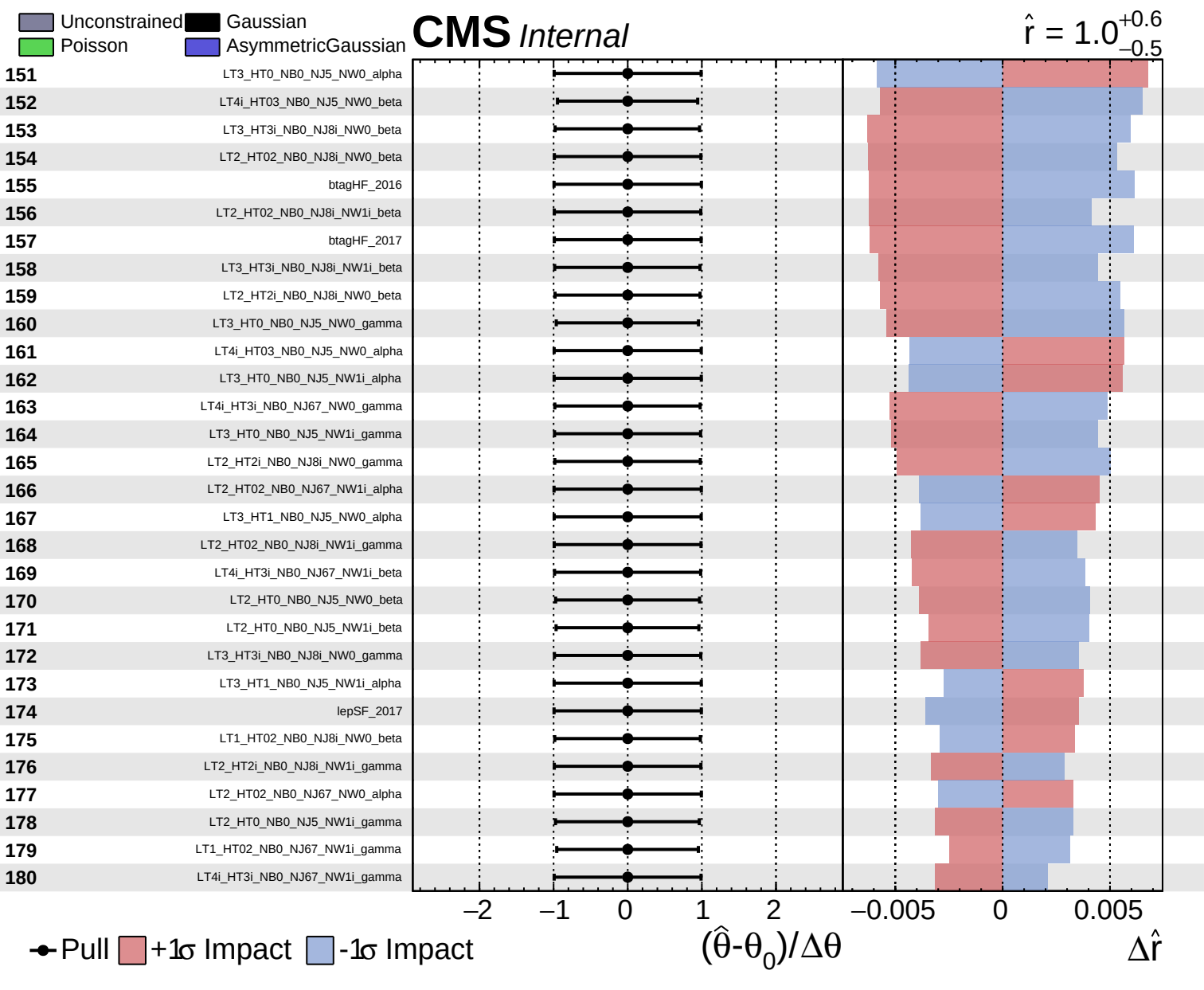

Unconstrained
Gaussian
Poisson
AsymmetricGaussian
CMS Internal
r̂ = 1.0 +0.6 −0.5
1 QCD_SYST
2 JEC_2018
3 LT1_HT1i_NB1i_NJ45_NW0_CR_TT 13900 +800 −1000
4 LT1_HT2i_NB1i_NJ45_NW0_CR_TT 3660 +280 −320
5 LT1_HT02_NB1i_NJ45_NW0_CR_TT 54500 +2400 −2900
6 LT1_HT0_NB1i_NJ45_NW0_CR_TT 44300 +1900 −2300
7 LT2_HT1i_NB1i_NJ45_NW0_CR_TT 6800 +500 −500
8 LT1_HT02_NB1i_NJ45_NW0_SR_TT 2710 +110 −130
9 LT2_HT2i_NB1i_NJ45_NW0_CR_TT 1990 +170 −190
10 LT2_HT02_NB1i_NJ45_NW0_CR_TT 19200 +1100 −1400
11 JEC_2016
12 LT1_HT1i_NB1i_NJ45_NW0_SR_TT 770 +50 −60
13 LT1_HT02_NB1i_NJ45_NW1i_CR_TT 22500 +700 −1000
14 LT2_HT0_NB1i_NJ45_NW0_CR_TT 14400 +800 −1000
15 LT1_HT0_NB1i_NJ45_NW0_SR_TT 2170 +80 −100
16 LT1_HT0_NB1i_NJ45_NW1i_CR_TT 18500 +600 −700
17 JEC_2017
18 LT3_HT1_NB1i_NJ45_NW0_CR_TT 4100 +400 −500
19 LT3_HT3i_NB1i_NJ45_NW0_CR_TT 590 +70 −80
20 LT1_HT2i_NB1i_NJ45_NW0_SR_TT 234 +25 −26
21 LT4i_HT03_NB1i_NJ45_NW0_CR_TT 740 +190 −230
22 LT1_HT1i_NB1i_NJ45_NW1i_CR_TT 5290 +320 −410
23 LT4i_HT03_NB1i_NJ45_NW0i_CR_TT 1010 +230 −270
24 LT3_HT0_NB1i_NJ45_NW0_CR_TT 4200 +500 −600
25 LT3_HT03_NB1i_NJ45_NW0_CR_TT 8300 +800 −1000
26 LT1_HT2i_NB1i_NJ45_NW1i_CR_TT 1360 +130 −160
27 LT4i_HT3i_NB1i_NJ45_NW0_CR_TT 280 +70 −80
28 LT4i_HT3i_NB1i_NJ45_NW0i_CR_TT 370 +90 −100
29 LT2_HT1i_NB1i_NJ45_NW1i_CR_TT 2520 +160 −200
30 LT1_HT02_NB1i_NJ45_NW1i_SR_TT 510 +40 −50
−2 −1 0 1 2
−0.1 0 0.1
Pull +1σ Impact -1σ Impact
(θ̂-θ0)/Δθ
Δr̂

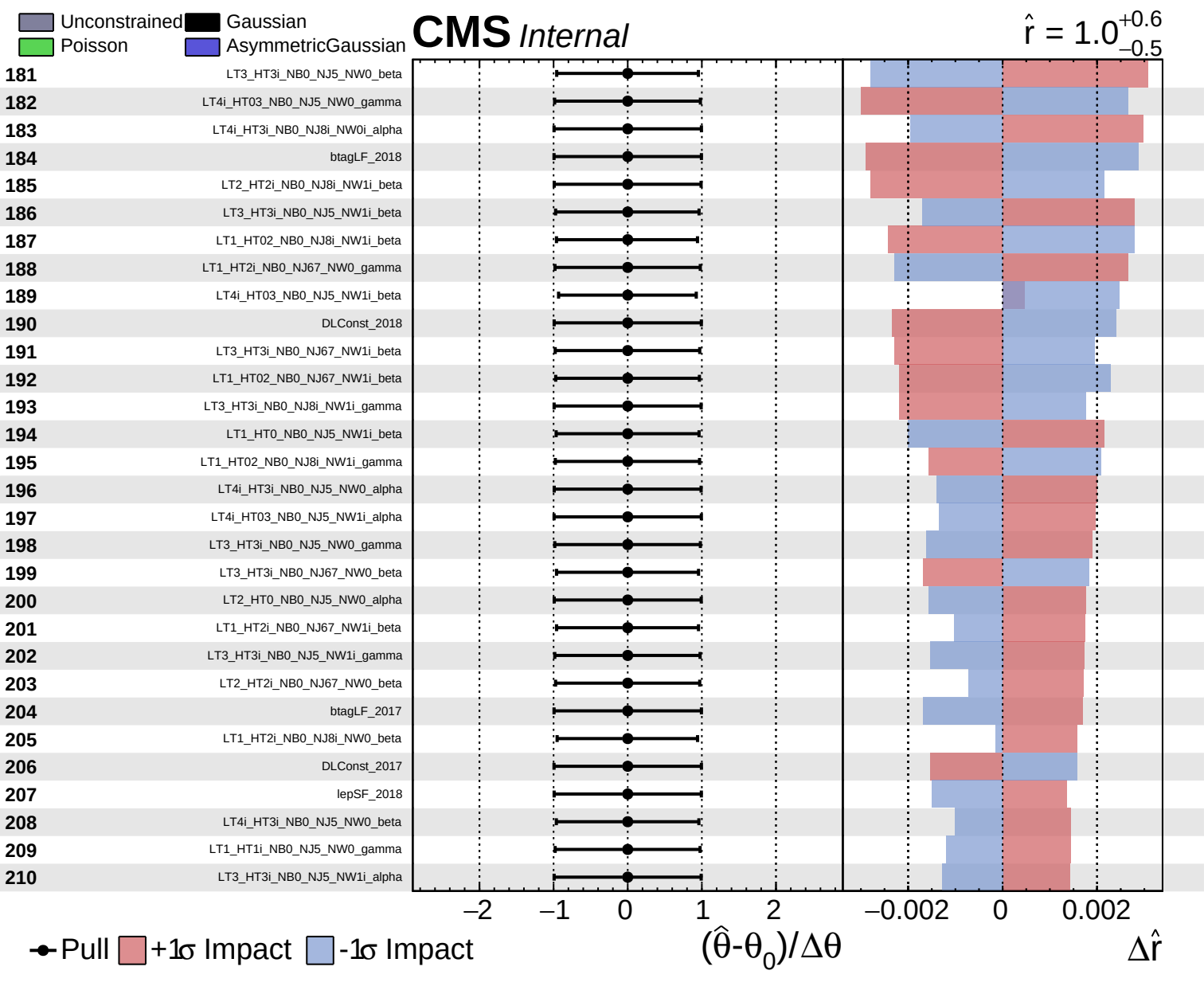

Unconstrained
Gaussian
Poisson
AsymmetricGaussian
CMS Internal
r̂ = 1.0 +0.6 −0.5
31 LT2_HT2i_NB1i_NJ45_NW1i_CR_TT 710 +70 −90
32 LT2_HT02_NB1i_NJ45_NW1i_CR_TT 7790 +310 −400
33 LT2_HT0_NB1i_NJ45_NW1i_CR_TT 5980 +230 −280
34 LT3_HT0_NB1i_NJ45_NW1i_CR_TT 1530 +110 −140
35 LT1_HT0_NB1i_NJ45_NW1i_SR_TT 396 +30 −33
36 LT3_HT03_NB1i_NJ45_NW1i_CR_TT 3080 +200 −260
37 LT4i_HT03_NB1i_NJ45_NW1i_CR_TT 270 +40 −50
38 LT1_HT1i_NB1i_NJ45_NW1i_SR_TT 174 +27 −32
39 LT3_HT3i_NB1i_NJ45_NW1i_CR_TT 179 +28 −32
40 LT3_HT1_NB1i_NJ45_NW1i_CR_TT 1550 +100 −120
41 LT1_HT0_NB0_NJ34_NW0_SR_W 490 +40 −50
42 LT2_HT0_NB1i_NJ45_NW0_SR_TT 531 +34 −37
43 LT2_HT02_NB1i_NJ45_NW0_SR_TT 710 +40 −50
44 LT2_HT1i_NB1i_NJ45_NW0_SR_TT 264 +24 −25
45 LT1_HT02_NB0_NJ34_NW0_SR_W 690 +50 −60
46 LT2_HT2i_NB1i_NJ45_NW0_SR_TT 88 +13 −13
47 LT1_HT2i_NB1i_NJ45_NW1i_SR_TT 58 +15 −17
48 LT2_HT1i_NB1i_NJ45_NW1i_SR_TT 45 +11 −12
49 LT4i_HT03_NB1i_NJ45_NW0_SR_TT 61 +14 −16
50 LT1_HT1i_NB0_NJ34_NW0_SR_W 416 +27 −29
51 LT3_HT03_NB1i_NJ45_NW0_SR_TT 378 +35 −41
52 LT2_HT02_NB1i_NJ45_NW1i_SR_TT 96 +13 −14
53 DLSlope_2018
54 LT2_HT2i_NB1i_NJ45_NW1i_SR_TT 18 +7 −7
55 LT2_HT1i_NB0_NJ34_NW0_SR_W 91 +13 −14
56 LT1_HT2i_NB0_NJ34_NW0_SR_W 220 +17 −18
57 LT4i_HT3i_NB1i_NJ45_NW1i_CR_TT 87 +22 −26
58 LT1_HT1i_NB0_NJ34_NW1i_SR_W 53 +9 −9
59 LT3_HT1_NB1i_NJ45_NW0_SR_TT 157 +19 −20
60 LT4i_HT03_NB1i_NJ45_NW0i_SR_TT 71 +16 −18
−2 −1 0 1 2
−0.05 0 0.05
Pull +1σ Impact -1σ Impact
(θ̂-θ0)/Δθ
Δr̂

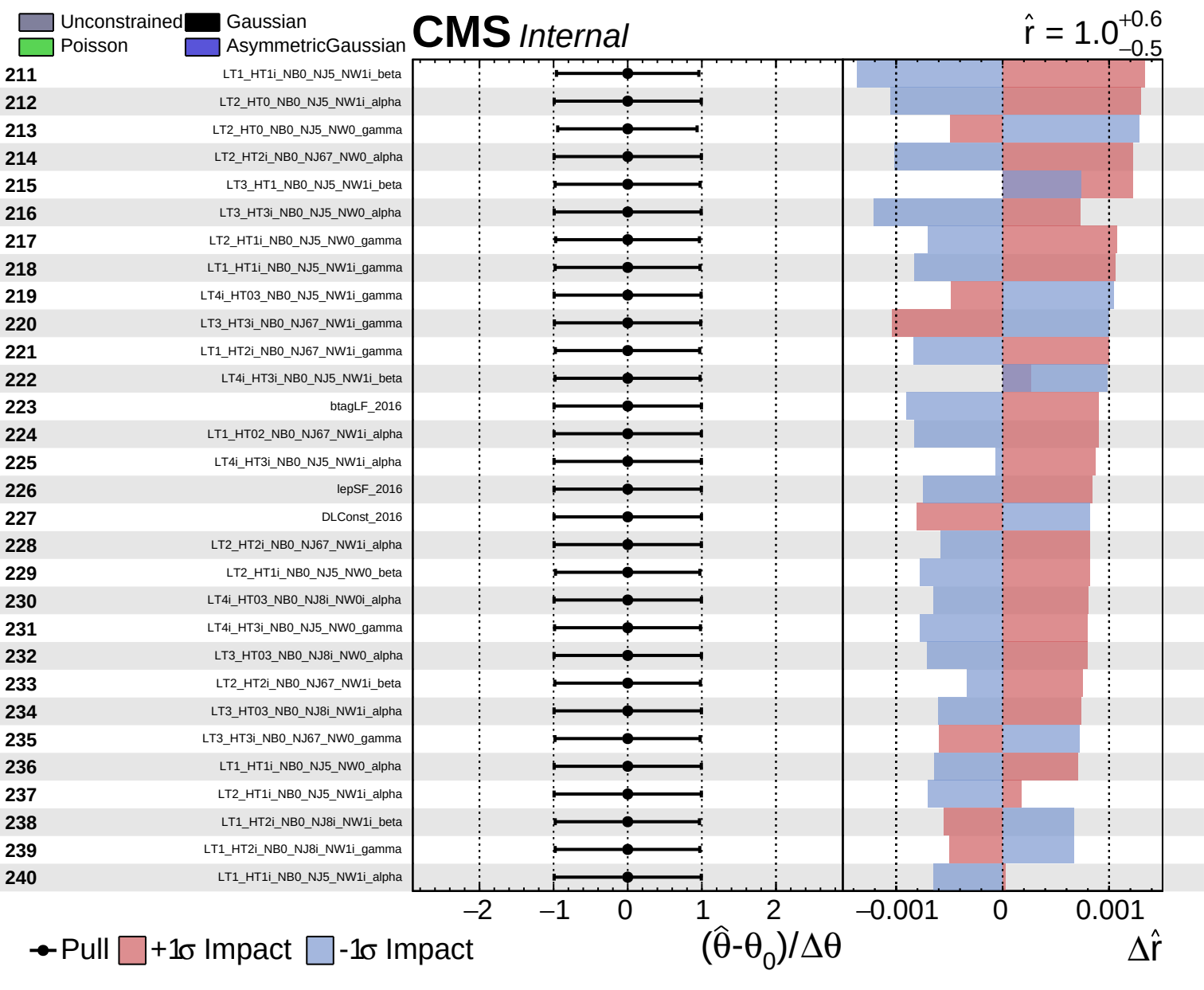

Unconstrained
Gaussian
Poisson
AsymmetricGaussian
CMS Internal
r̂ = 1.0 +0.6 −0.5
61 LT3_HT0_NB1i_NJ45_NW0_SR_TT 221 +23 −25
62 LT3_HT3i_NB1i_NJ45_NW0_SR_TT 36 +8 −8
63 LT3_HT03_NB1i_NJ45_NW1i_SR_TT 50 +10 −11
64 LT3_HT3i_NB1i_NJ45_NW1i_SR_TT 8 +5 −5
65 LT2_HT0_NB1i_NJ45_NW1i_SR_TT 68 +11 −10
66 TTVxsec_2016
67 LT3_HT0_NB0_NJ67_NW0_beta
68 LT2_HT0_NB0_NJ34_NW0_SR_W 98 +18 −20
69 LT3_HT0_NB0_NJ67_NW1i_beta
70 Wxsec_2018
71 LT4i_HT03_NB0_NJ67_NW0_beta
72 LT1_HT0_NB0_NJ34_NW1i_SR_W 68 +11 −11
73 LT3_HT1_NB1i_NJ45_NW1i_SR_TT 25 +7 −6
74 PU_2018
75 LT4i_HT03_NB0_NJ8i_NW0i_gamma
76 LT3_HT03_NB0_NJ34_NW0_SR_W 157 +25 −29
77 LT2_HT2i_NB0_NJ34_NW0_SR_W 49 +9 −9
78 LT2_HT02_NB0_NJ34_NW0_SR_W 140 +23 −26
79 LT4i_HT3i_NB0_NJ34_NW0_SR_W 17 +5 −6
80 LT4i_HT3i_NB1i_NJ45_NW0_SR_TT 21 +7 −7
81 Luminosity
82 LT4i_HT3i_NB0_NJ8i_NW0i_beta
83 PU_2016
84 LT4i_HT03_NB0_NJ8i_NW0i_beta
85 LT4i_HT03_NB1i_NJ45_NW1i_SR_TT 10 +5 −4
86 LT4i_HT3i_NB1i_NJ45_NW0i_SR_TT 25 +8 −8
87 LT3_HT3i_NB0_NJ34_NW0_SR_W 27 +6 −5
88 LT1_HT02_NB0_NJ34_NW1i_SR_W 96 +14 −14
89 LT3_HT0_NB0_NJ34_NW1i_SR_W 11 +4 −4
90 LT1_HT2i_NB0_NJ34_NW1i_SR_W 25 +6 −6
−2 −1 0 1 2
−0.04 −0.02 0 0.02 0.04
Pull +1σ Impact -1σ Impact
(θ̂-θ0)/Δθ
Δr̂

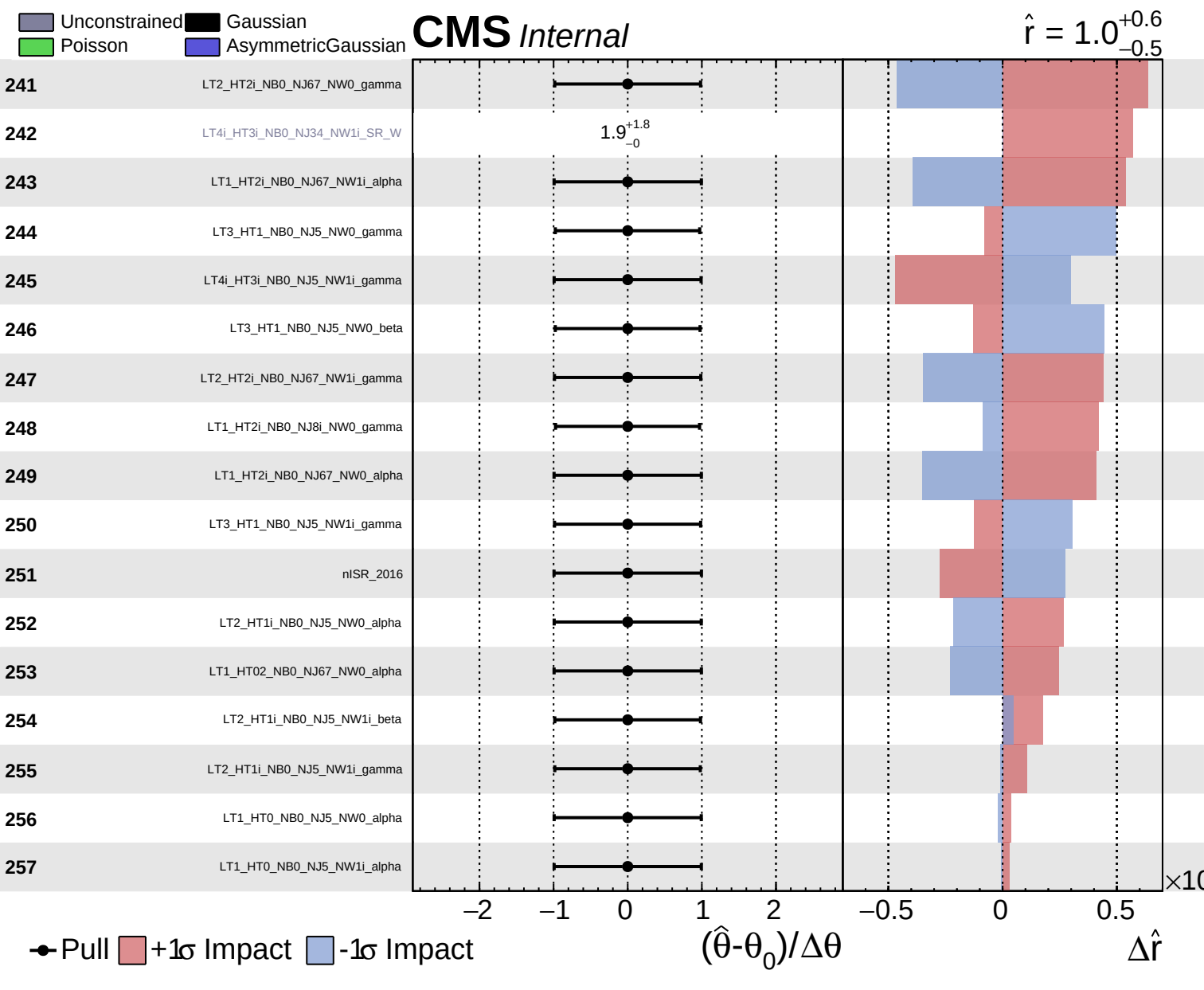

Unconstrained
Gaussian
Poisson
AsymmetricGaussian
CMS Internal
r̂ = 1.0 +0.6 −0.5
91 DLSlope_2017
92 LT3_HT0_NB0_NJ67_NW0_gamma
93 LT4i_HT03_NB0_NJ34_NW0i_SR_W
109 +16 −18
94 LT2_HT1i_NB0_NJ34_NW1i_SR_W
10 +4 −4
95 LT3_HT0_NB1i_NJ45_NW1i_SR_TT
25 +7 −7
96 LT2_HT0_NB0_NJ34_NW1i_SR_W
12 +5 −4
97 TTVxsec_2018
98 LT4i_HT03_NB0_NJ67_NW1i_beta
99 LT3_HT1_NB0_NJ34_NW0_SR_W
58 +11 −12
100 LT2_HT2i_NB0_NJ34_NW1i_SR_W
5.0 +3.0 −2.6
101 LT3_HT03_NB0_NJ8i_NW0_gamma
102 LT4i_HT03_NB0_NJ67_NW0_gamma
103 LT1_HT0_NB0_NJ5_NW0_gamma
104 LT2_HT02_NB0_NJ67_NW1i_beta
105 Wxsec_2017
106 Wxsec_2016
107 LT1_HT02_NB0_NJ67_NW0_gamma
108 LT4i_HT03_NB0_NJ34_NW1i_SR_W
10.3 +3.6 −3.1
109 LT1_HT0_NB0_NJ5_NW0_beta
110 LT4i_HT3i_NB0_NJ8i_NW0i_gamma
111 LT3_HT3i_NB0_NJ34_NW1i_SR_W
3.1 +2.3 −2.0
112 DLSlope_2016
113 LT3_HT1_NB0_NJ67_NW0_gamma
114 LT3_HT03_NB0_NJ34_NW1i_SR_W
18 +7 −6
115 LT3_HT0_NB0_NJ34_NW0_SR_W
99 +17 −19
116 LT3_HT03_NB0_NJ8i_NW1i_beta
117 LT1_HT2i_NB0_NJ67_NW0_beta
118 LT2_HT02_NB0_NJ34_NW1i_SR_W
16 +6 −6
119 LT3_HT1_NB0_NJ67_NW1i_beta
120 LT3_HT0_NB0_NJ67_NW1i_gamma
−2 −1 0 1 2
−0.02 0 0.02
Pull
+1σ Impact
-1σ Impact
(θ̂-θ0)/Δθ
Δr̂


Unconstrained
Gaussian
Poisson
AsymmetricGaussian
CMS Internal
r̂ = 1.0 +0.6 −0.5
121 LT3_HT1_NB0_NJ34_NW1i_SR_W
122 LT3_HT1_NB0_NJ67_NW0_beta
123 LT4i_HT03_NB0_NJ34_NW0_SR_W
124 LT4i_HT3i_NB1i_NJ45_NW1i_SR_TT
125 MET_2016
126 LT2_HT02_NB0_NJ67_NW0_gamma
127 LT1_HT02_NB0_NJ67_NW0_beta
128 LT3_HT0_NB0_NJ5_NW1i_beta
129 TTVxsec_2017
130 Wpol_2018
131 LT3_HT03_NB0_NJ8i_NW0_beta
132 TTxsec_2017
133 LT3_HT03_NB0_NJ8i_NW1i_gamma
134 LT2_HT02_NB0_NJ67_NW0_beta
135 Wpol_2016
136 LT4i_HT03_NB0_NJ67_NW1i_gamma
137 Wpol_2017
138 LT3_HT1_NB0_NJ67_NW1i_gamma
139 TTxsec_2018
140 LT1_HT1i_NB0_NJ5_NW0_beta
141 LT4i_HT3i_NB0_NJ34_NW0i_SR_W
142 LT2_HT02_NB0_NJ67_NW1i_gamma
143 LT2_HT02_NB0_NJ8i_NW0_gamma
144 PU_2017
145 TTxsec_2016
146 btagHF_2018
147 LT4i_HT3i_NB0_NJ67_NW0_beta
148 LT1_HT02_NB0_NJ8i_NW0_gamma
149 LT1_HT0_NB0_NJ5_NW1i_gamma
150 LT3_HT0_NB0_NJ5_NW0_beta
6.8 +3.3 −3.1
98 +15 −17
4.0 +3.1 −0
19 +7 −6
−2 −1 0 1 2
−0.01 0 0.01
Pull +1σ Impact -1σ Impact
(θ̂-θ0)/Δθ
Δr̂


Unconstrained
Gaussian
Poisson
AsymmetricGaussian
CMS Internal
r̂ = 1.0 +0.6 −0.5
151 LT3_HT0_NB0_NJ5_NW0_alpha
152 LT4i_HT03_NB0_NJ5_NW0_beta
153 LT3_HT3i_NB0_NJ8i_NW0_beta
154 LT2_HT02_NB0_NJ8i_NW0_beta
155 btagHF_2016
156 LT2_HT02_NB0_NJ8i_NW1i_beta
157 btagHF_2017
158 LT3_HT3i_NB0_NJ8i_NW1i_beta
159 LT2_HT2i_NB0_NJ8i_NW0_beta
160 LT3_HT0_NB0_NJ5_NW0_gamma
161 LT4i_HT03_NB0_NJ5_NW0_alpha
162 LT3_HT0_NB0_NJ5_NW1i_alpha
163 LT4i_HT3i_NB0_NJ67_NW0_gamma
164 LT3_HT0_NB0_NJ5_NW1i_gamma
165 LT2_HT2i_NB0_NJ8i_NW0_gamma
166 LT2_HT02_NB0_NJ67_NW1i_alpha
167 LT3_HT1_NB0_NJ5_NW0_alpha
168 LT2_HT02_NB0_NJ8i_NW1i_gamma
169 LT4i_HT3i_NB0_NJ67_NW1i_beta
170 LT2_HT0_NB0_NJ5_NW0_beta
171 LT2_HT0_NB0_NJ5_NW1i_beta
172 LT3_HT3i_NB0_NJ8i_NW0_gamma
173 LT3_HT1_NB0_NJ5_NW1i_alpha
174 lepSF_2017
175 LT1_HT02_NB0_NJ8i_NW0_beta
176 LT2_HT2i_NB0_NJ8i_NW1i_gamma
177 LT2_HT02_NB0_NJ67_NW0_alpha
178 LT2_HT0_NB0_NJ5_NW1i_gamma
179 LT1_HT02_NB0_NJ67_NW1i_gamma
180 LT4i_HT3i_NB0_NJ67_NW1i_gamma
−2 −1 0 1 2
−0.005 0 0.005
Pull
+1σ Impact
-1σ Impact
(θ̂-θ0)/Δθ
Δr̂


Unconstrained
Gaussian
Poisson
AsymmetricGaussian
CMS Internal
r̂ = 1.0 +0.6 −0.5
181 LT3_HT3i_NB0_NJ5_NW0_beta
182 LT4i_HT03_NB0_NJ5_NW0_gamma
183 LT4i_HT3i_NB0_NJ8i_NW0i_alpha
184 btagLF_2018
185 LT2_HT2i_NB0_NJ8i_NW1i_beta
186 LT3_HT3i_NB0_NJ5_NW1i_beta
187 LT1_HT02_NB0_NJ8i_NW1i_beta
188 LT1_HT2i_NB0_NJ67_NW0_gamma
189 LT4i_HT03_NB0_NJ5_NW1i_beta
190 DLConst_2018
191 LT3_HT3i_NB0_NJ67_NW1i_beta
192 LT1_HT02_NB0_NJ67_NW1i_beta
193 LT3_HT3i_NB0_NJ8i_NW1i_gamma
194 LT1_HT0_NB0_NJ5_NW1i_beta
195 LT1_HT02_NB0_NJ8i_NW1i_gamma
196 LT4i_HT3i_NB0_NJ5_NW0_alpha
197 LT4i_HT03_NB0_NJ5_NW1i_alpha
198 LT3_HT3i_NB0_NJ5_NW0_gamma
199 LT3_HT3i_NB0_NJ67_NW0_beta
200 LT2_HT0_NB0_NJ5_NW0_alpha
201 LT1_HT2i_NB0_NJ67_NW1i_beta
202 LT3_HT3i_NB0_NJ5_NW1i_gamma
203 LT2_HT2i_NB0_NJ67_NW0_beta
204 btagLF_2017
205 LT1_HT2i_NB0_NJ8i_NW0_beta
206 DLConst_2017
207 lepSF_2018
208 LT4i_HT3i_NB0_NJ5_NW0_beta
209 LT1_HT1i_NB0_NJ5_NW0_gamma
210 LT3_HT3i_NB0_NJ5_NW1i_alpha
−2
−1
0
1
2
−0.002
0
0.002
Pull
+1σ Impact
-1σ Impact
(θ̂-θ0)/Δθ
Δr̂


Unconstrained
Gaussian
Poisson
AsymmetricGaussian
CMS Internal
r̂ = 1.0 +0.6 −0.5
211 LT1_HT1i_NB0_NJ5_NW1i_beta
212 LT2_HT0_NB0_NJ5_NW1i_alpha
213 LT2_HT0_NB0_NJ5_NW0_gamma
214 LT2_HT2i_NB0_NJ67_NW0_alpha
215 LT3_HT1_NB0_NJ5_NW1i_beta
216 LT3_HT3i_NB0_NJ5_NW0_alpha
217 LT2_HT1i_NB0_NJ5_NW0_gamma
218 LT1_HT1i_NB0_NJ5_NW1i_gamma
219 LT4i_HT03_NB0_NJ5_NW1i_gamma
220 LT3_HT3i_NB0_NJ67_NW1i_gamma
221 LT1_HT2i_NB0_NJ67_NW1i_gamma
222 LT4i_HT3i_NB0_NJ5_NW1i_beta
223 btagLF_2016
224 LT1_HT02_NB0_NJ67_NW1i_alpha
225 LT4i_HT3i_NB0_NJ5_NW1i_alpha
226 lepSF_2016
227 DLConst_2016
228 LT2_HT2i_NB0_NJ67_NW1i_alpha
229 LT2_HT1i_NB0_NJ5_NW0_beta
230 LT4i_HT03_NB0_NJ8i_NW0i_alpha
231 LT4i_HT3i_NB0_NJ5_NW0_gamma
232 LT3_HT03_NB0_NJ8i_NW0_alpha
233 LT2_HT2i_NB0_NJ67_NW1i_beta
234 LT3_HT03_NB0_NJ8i_NW1i_alpha
235 LT3_HT3i_NB0_NJ67_NW0_gamma
236 LT1_HT1i_NB0_NJ5_NW0_alpha
237 LT2_HT1i_NB0_NJ5_NW1i_alpha
238 LT1_HT2i_NB0_NJ8i_NW1i_beta
239 LT1_HT2i_NB0_NJ8i_NW1i_gamma
240 LT1_HT1i_NB0_NJ5_NW1i_alpha
−2
−1
0
1
2
−0.001
0
0.001
Pull
+1σ Impact
-1σ Impact
(θ̂-θ0)/Δθ
Δr̂


Unconstrained
Gaussian
Poisson
AsymmetricGaussian
CMS Internal
r̂ = 1.0 +0.6 −0.5
241 LT2_HT2i_NB0_NJ67_NW0_gamma
242 LT4i_HT3i_NB0_NJ34_NW1i_SR_W
1.9 +1.8 −0
243 LT1_HT2i_NB0_NJ67_NW1i_alpha
244 LT3_HT1_NB0_NJ5_NW0_gamma
245 LT4i_HT3i_NB0_NJ5_NW1i_gamma
246 LT3_HT1_NB0_NJ5_NW0_beta
247 LT2_HT2i_NB0_NJ67_NW1i_gamma
248 LT1_HT2i_NB0_NJ8i_NW0_gamma
249 LT1_HT2i_NB0_NJ67_NW0_alpha
250 LT3_HT1_NB0_NJ5_NW1i_gamma
251 nISR_2016
252 LT2_HT1i_NB0_NJ5_NW0_alpha
253 LT1_HT02_NB0_NJ67_NW0_alpha
254 LT2_HT1i_NB0_NJ5_NW1i_beta
255 LT2_HT1i_NB0_NJ5_NW1i_gamma
256 LT1_HT0_NB0_NJ5_NW0_alpha
257 LT1_HT0_NB0_NJ5_NW1i_alpha
−2 −1 0 1 2
−0.5 0 0.5
×10
Pull +1σ Impact -1σ Impact
(θ̂-θ0)/Δθ
Δr̂