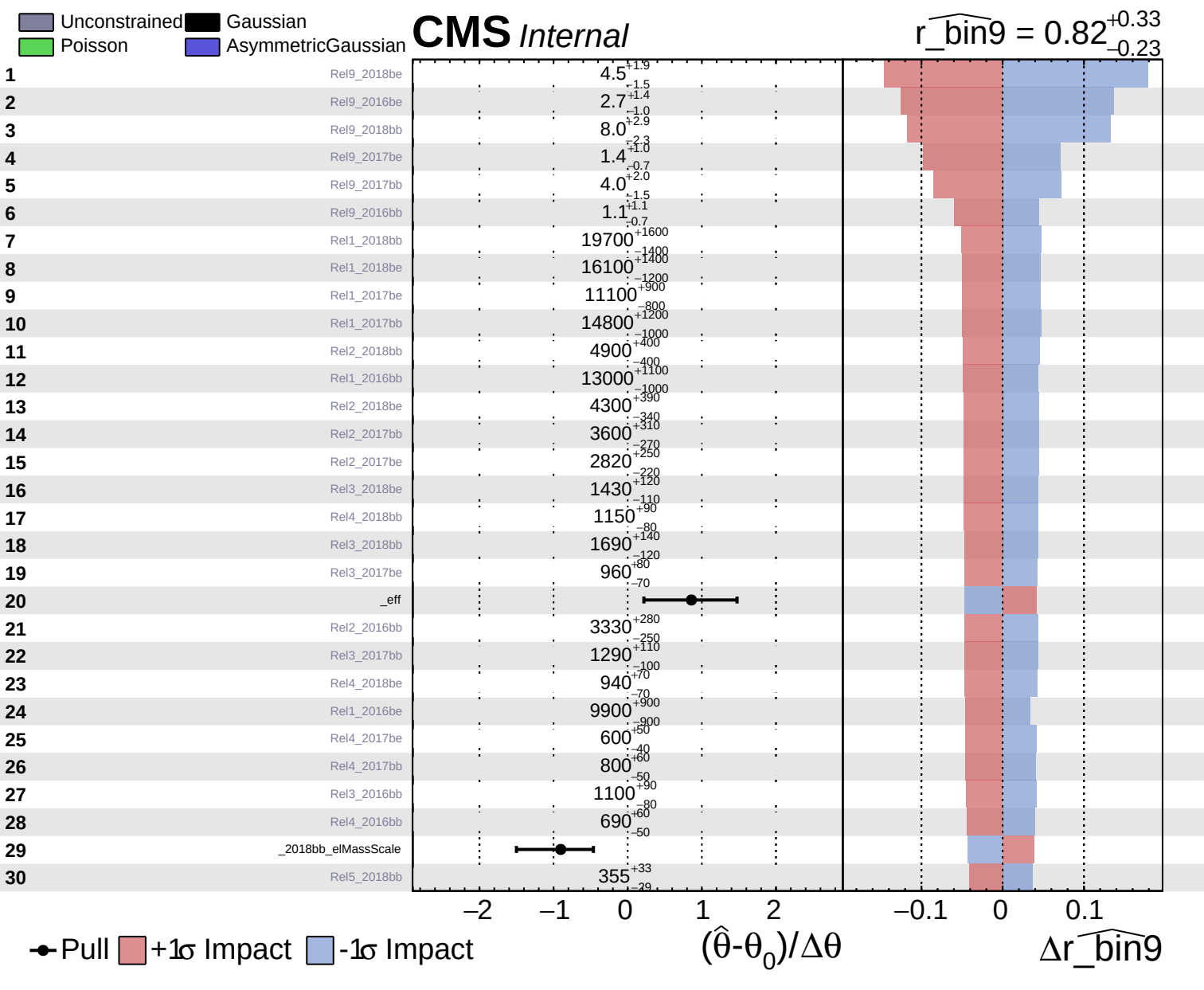
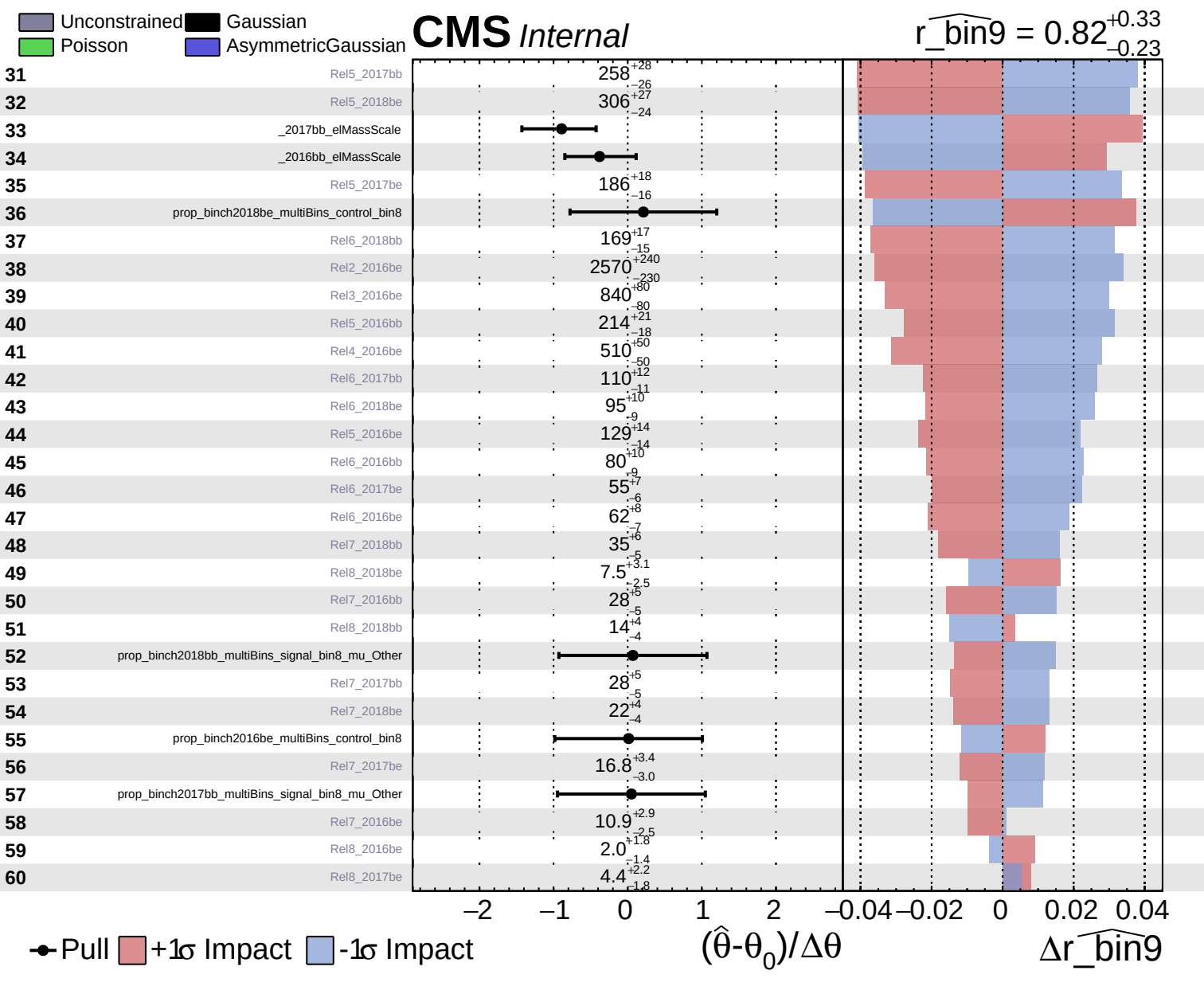
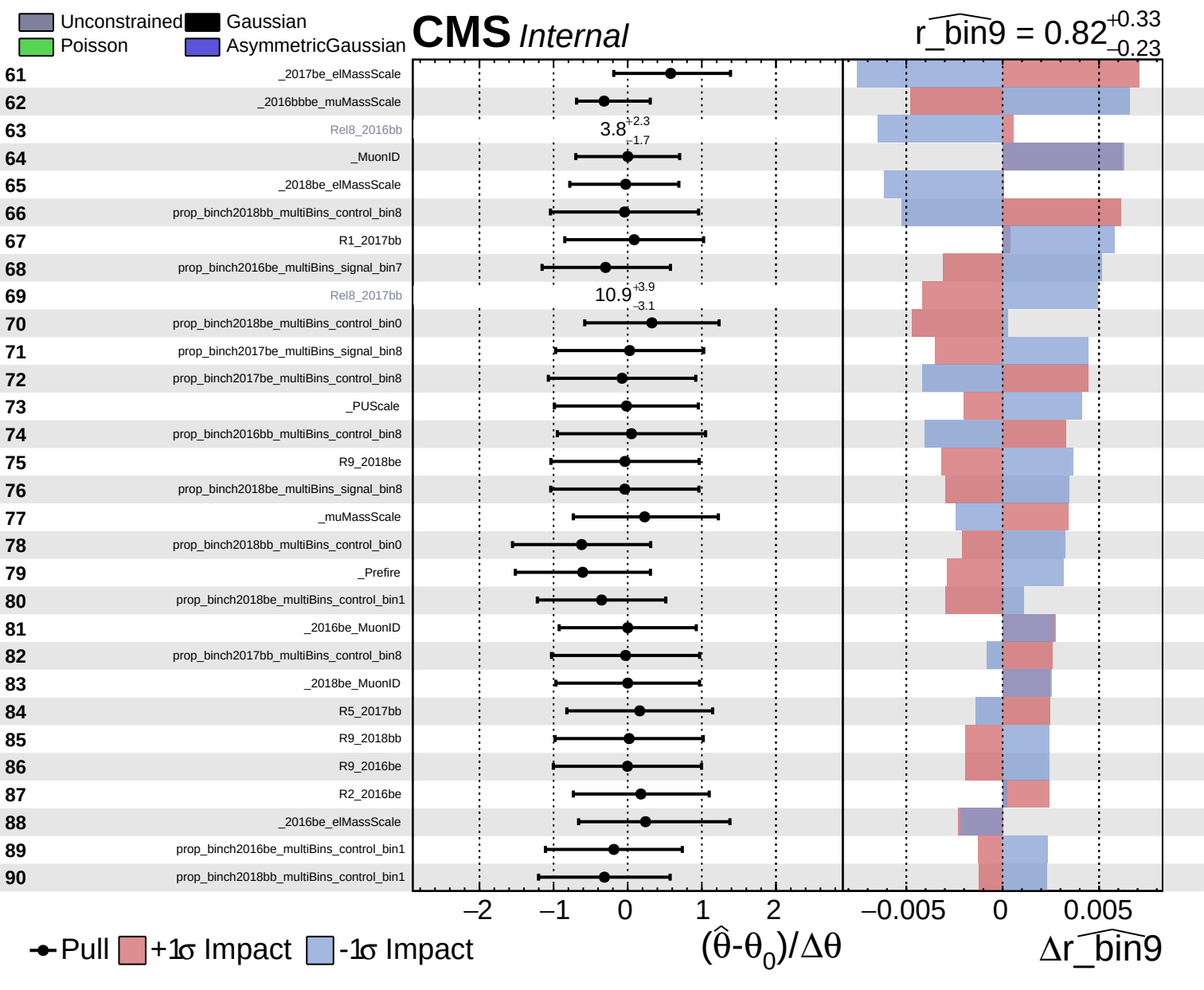
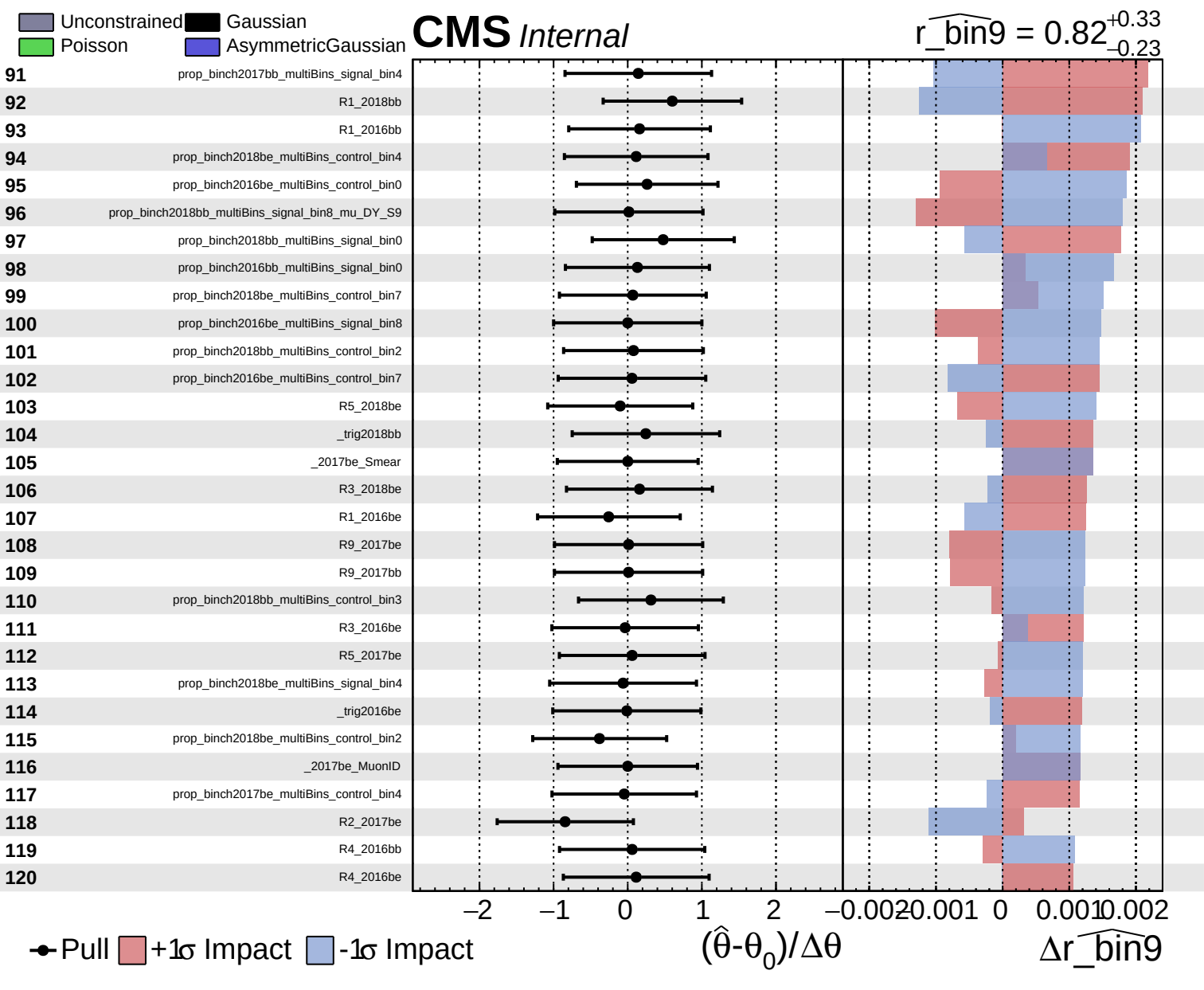
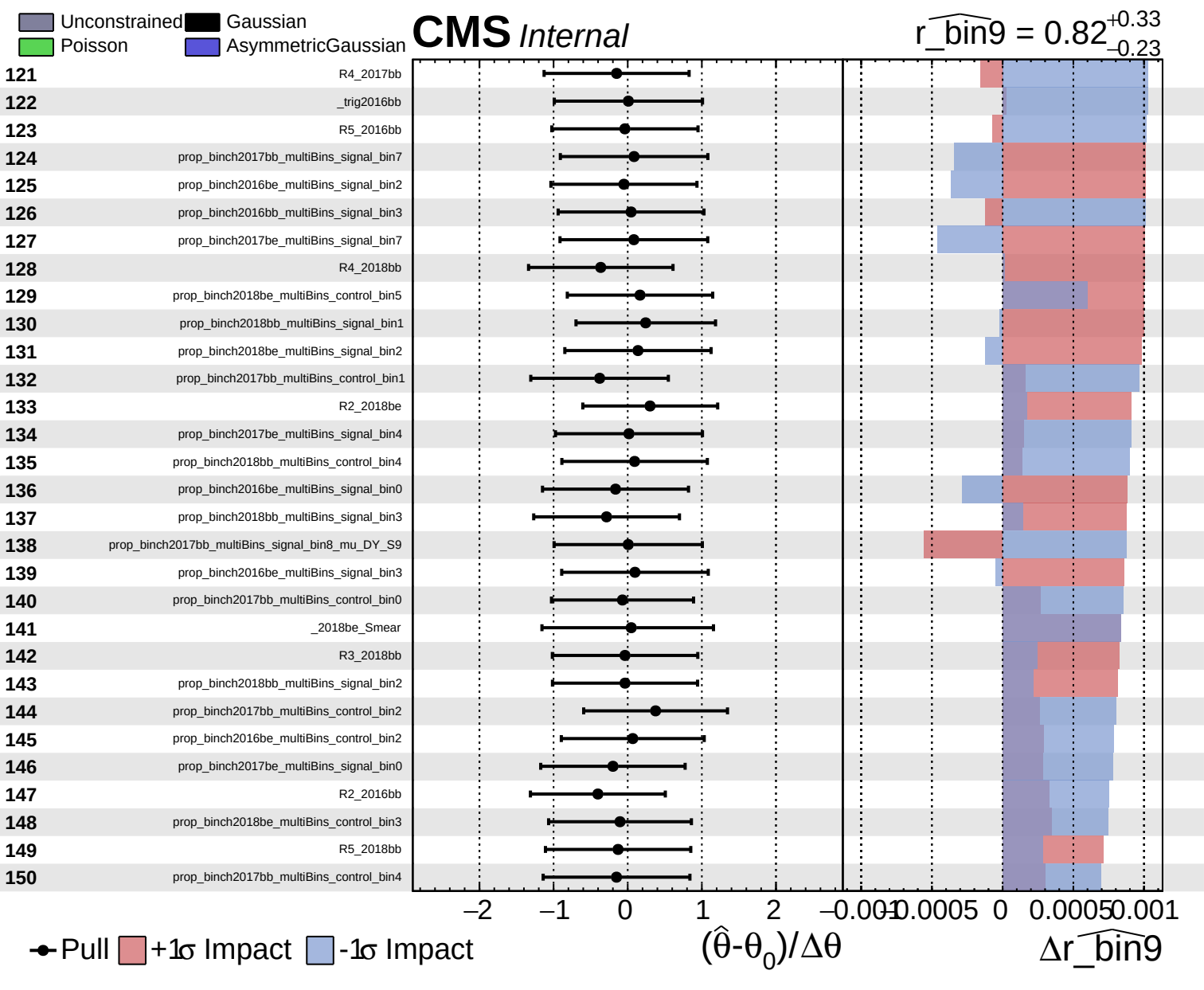
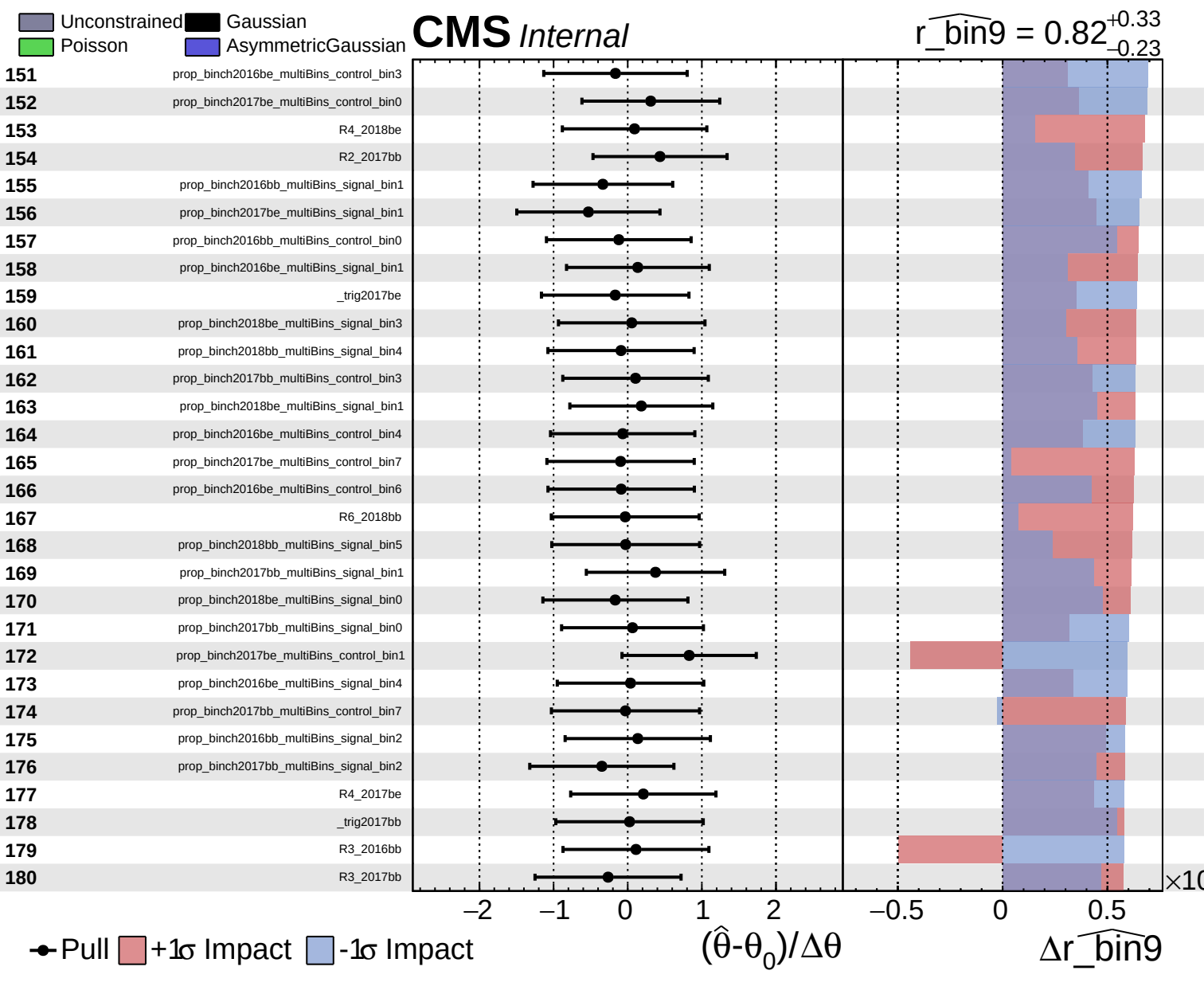

Unconstrained
Gaussian
Poisson
AsymmetricGaussian
CMS Internal
r_bin9 = 0.82 +0.33 −0.23
1 Rel9_2018be 4.5 +1.9 −1.5
2 Rel9_2016be 2.7 +1.4 −1.0
3 Rel9_2018bb 8.0 +2.9 −2.3
4 Rel9_2017be 1.4 +1.0 −0.7
5 Rel9_2017bb 4.0 +2.0 −1.5
6 Rel9_2016bb 1.1 +1.1 −0.7
7 Rel1_2018bb 19700 +1600 −1400
8 Rel1_2018be 16100 +1400 −1200
9 Rel1_2017be 11100 +900 −800
10 Rel1_2017bb 14800 +1200 −1000
11 Rel2_2018bb 4900 +400 −400
12 Rel1_2016bb 13000 +1100 −1000
13 Rel2_2018be 4300 +390 −340
14 Rel2_2017bb 3600 +310 −270
15 Rel2_2017be 2820 +250 −220
16 Rel3_2018be 1430 +120 −110
17 Rel4_2018bb 1150 +90 −80
18 Rel3_2018bb 1690 +140 −120
19 Rel3_2017be 960 +80 −70
20 _eff
21 Rel2_2016bb 3330 +280 −250
22 Rel3_2017bb 1290 +110 −100
23 Rel4_2018be 940 +70 −70
24 Rel1_2016be 9900 +900 −900
25 Rel4_2017be 600 +50 −40
26 Rel4_2017bb 800 +60 −50
27 Rel3_2016bb 1100 +90 −80
28 Rel4_2016bb 690 +60 −50
29 _2018bb_elMassScale
30 Rel5_2018bb 355 +33 −29
−2 −1 0 1 2
−0.1 0 0.1
Pull +1σ Impact -1σ Impact
(θ̂-θ0)/Δθ
Δr_bin9

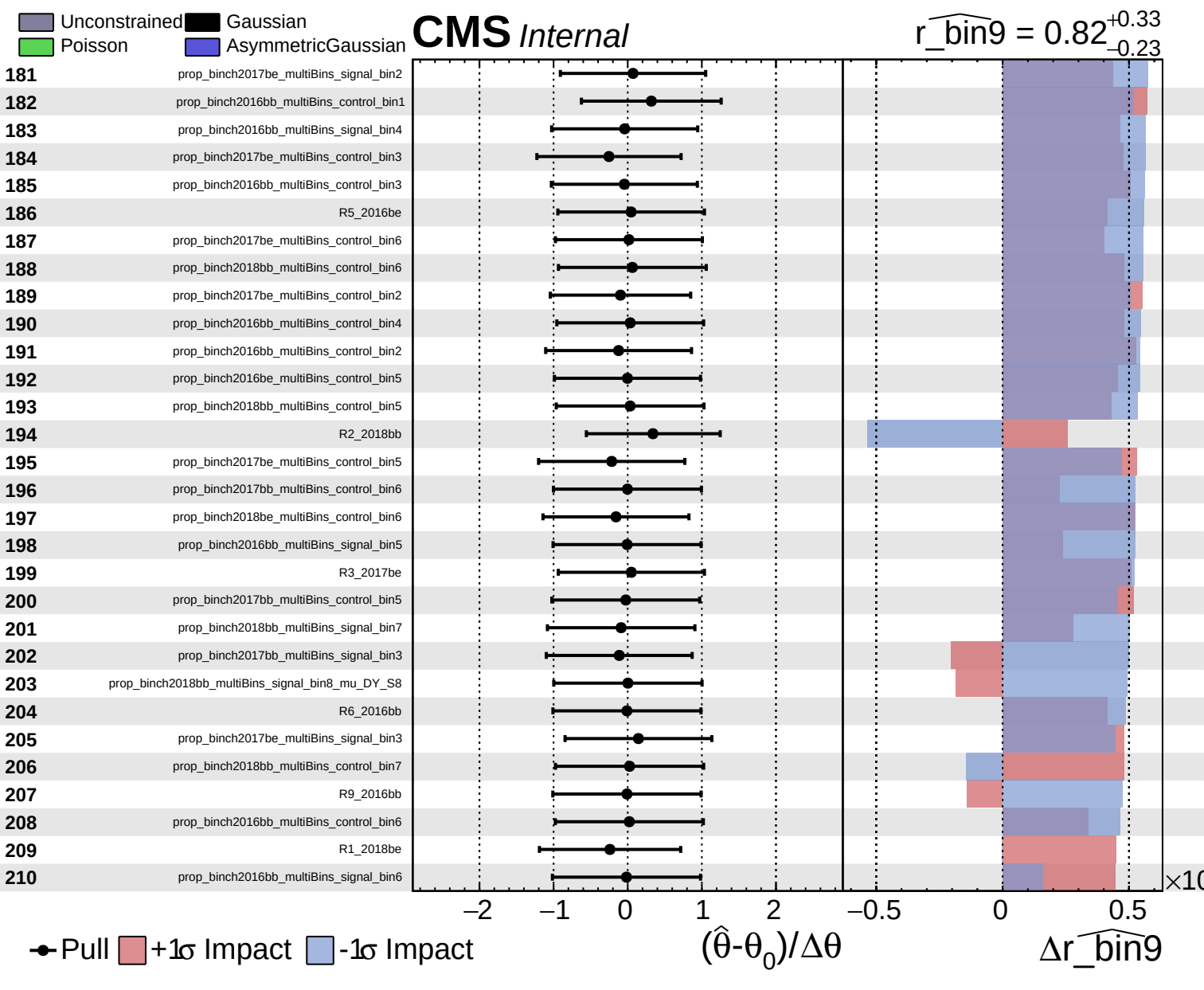

Unconstrained
Gaussian
Poisson
AsymmetricGaussian
CMS Internal
r_bin9 = 0.82 +0.33 −0.23
31 Rel5_2017bb 258 +28 −26
32 Rel5_2018be 306 +27 −24
33 _2017bb_elMassScale
34 _2016bb_elMassScale
35 Rel5_2017be 186 +18 −16
36 prop_binch2018be_multiBins_control_bin8
37 Rel6_2018bb 169 +17 −15
38 Rel2_2016be 2570 +240 −230
39 Rel3_2016be 840 +80 −80
40 Rel5_2016bb 214 +21 −18
41 Rel4_2016be 510 +50 −50
42 Rel6_2017bb 110 +12 −11
43 Rel6_2018be 95 +10 −9
44 Rel5_2016be 129 +14 −14
45 Rel6_2016bb 80 +10 −9
46 Rel6_2017be 55 +7 −6
47 Rel6_2016be 62 +8 −7
48 Rel7_2018bb 35 +6 −5
49 Rel8_2018be 7.5 +3.1 −2.5
50 Rel7_2016bb 28 +5 −5
51 Rel8_2018bb 14 +4 −4
52 prop_binch2018bb_multiBins_signal_bin8_mu_Other
53 Rel7_2017bb 28 +5 −5
54 Rel7_2018be 22 +4 −4
55 prop_binch2016be_multiBins_control_bin8
56 Rel7_2017be 16.8 +3.4 −3.0
57 prop_binch2017bb_multiBins_signal_bin8_mu_Other
58 Rel7_2016be 10.9 +2.9 −2.5
59 Rel8_2016be 2.0 +1.8 −1.4
60 Rel8_2017be 4.4 +2.2 −1.8
−2 −1 0 1 2
−0.04 −0.02 0 0.02 0.04
Pull
+1σ Impact
-1σ Impact
(θ̂-θ0)/Δθ
Δr_bin9

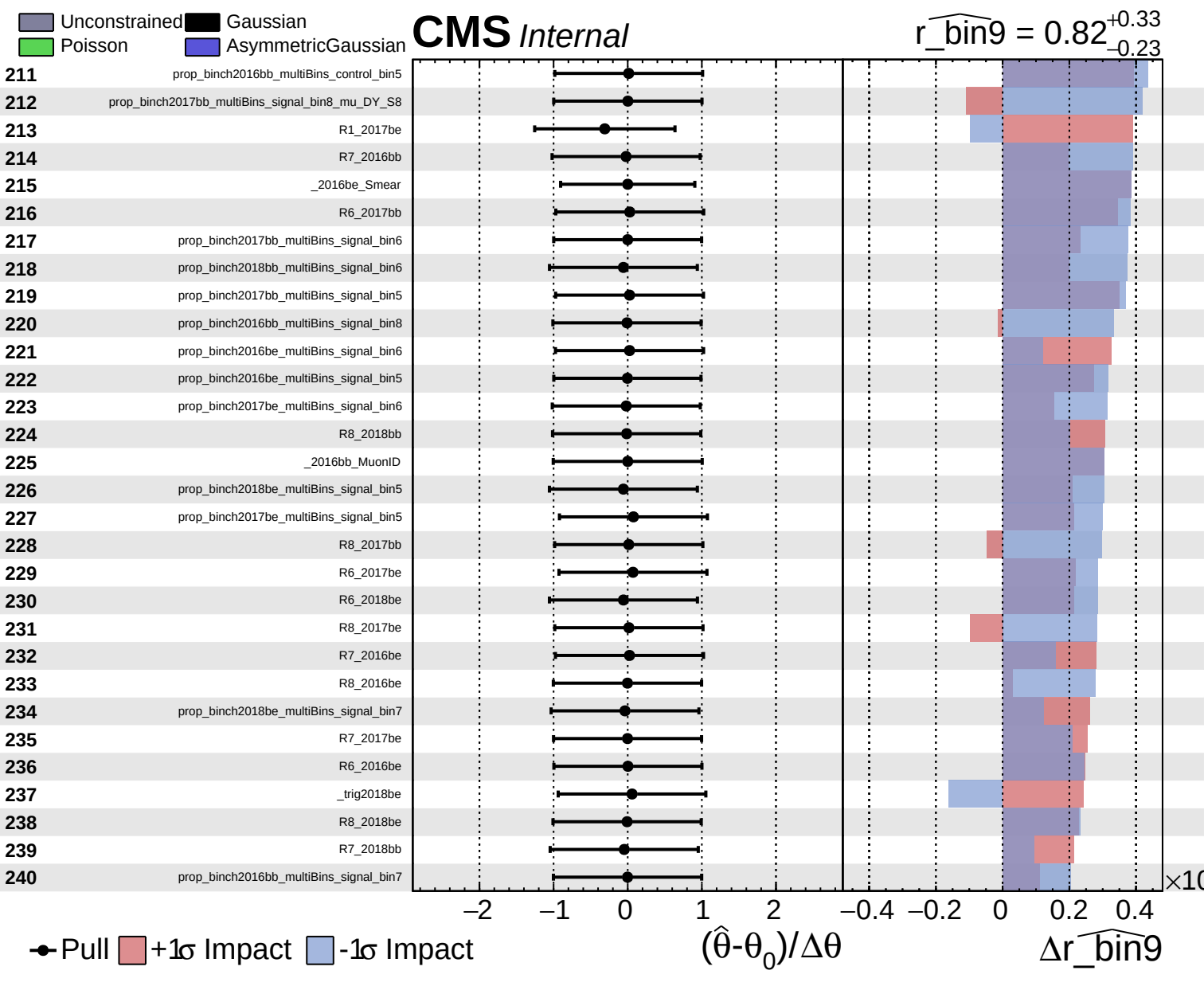

Unconstrained
Gaussian
Poisson
AsymmetricGaussian
CMS Internal
r_bin9 = 0.82 +0.33 −0.23
61 _2017be_elMassScale
62 _2016bbbe_muMassScale
63 Rel8_2016bb
64 _MuonID
65 _2018be_elMassScale
66 prop_binch2018bb_multiBins_control_bin8
67 R1_2017bb
68 prop_binch2016be_multiBins_signal_bin7
69 Rel8_2017bb
70 prop_binch2018be_multiBins_control_bin0
71 prop_binch2017be_multiBins_signal_bin8
72 prop_binch2017be_multiBins_control_bin8
73 _PUScale
74 prop_binch2016bb_multiBins_control_bin8
75 R9_2018be
76 prop_binch2018be_multiBins_signal_bin8
77 _muMassScale
78 prop_binch2018bb_multiBins_control_bin0
79 _Prefire
80 prop_binch2018be_multiBins_control_bin1
81 _2016be_MuonID
82 prop_binch2017bb_multiBins_control_bin8
83 _2018be_MuonID
84 R5_2017bb
85 R9_2018bb
86 R9_2016be
87 R2_2016be
88 _2016be_elMassScale
89 prop_binch2016be_multiBins_control_bin1
90 prop_binch2018bb_multiBins_control_bin1
3.8 +2.3 −1.7
10.9 +3.9 −3.1
−2
−1
0
1
2
−0.005
0
0.005
Pull
+1σ Impact
-1σ Impact
(θ̂-θ0)/Δθ
Δr_bin9

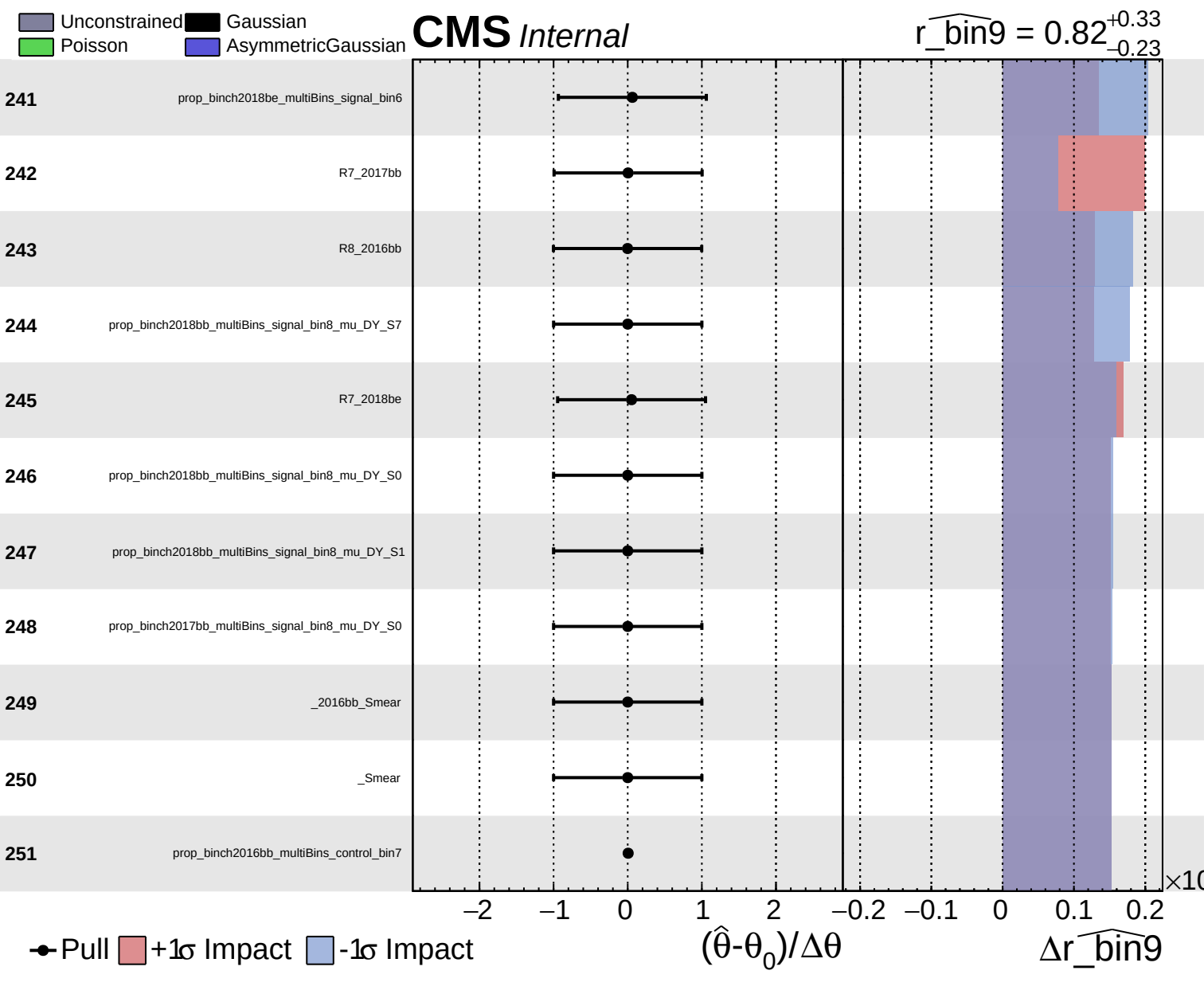

Unconstrained
Gaussian
Poisson
AsymmetricGaussian
CMS Internal
r_bin9 = 0.82 +0.33 −0.23
91 prop_binch2017bb_multiBins_signal_bin4
92 R1_2018bb
93 R1_2016bb
94 prop_binch2018be_multiBins_control_bin4
95 prop_binch2016be_multiBins_control_bin0
96 prop_binch2018bb_multiBins_signal_bin8_mu_DY_S9
97 prop_binch2018bb_multiBins_signal_bin0
98 prop_binch2016bb_multiBins_signal_bin0
99 prop_binch2018be_multiBins_control_bin7
100 prop_binch2016be_multiBins_signal_bin8
101 prop_binch2018bb_multiBins_control_bin2
102 prop_binch2016be_multiBins_control_bin7
103 R5_2018be
104 _trig2018bb
105 _2017be_Smear
106 R3_2018be
107 R1_2016be
108 R9_2017be
109 R9_2017bb
110 prop_binch2018bb_multiBins_control_bin3
111 R3_2016be
112 R5_2017be
113 prop_binch2018be_multiBins_signal_bin4
114 _trig2016be
115 prop_binch2018be_multiBins_control_bin2
116 _2017be_MuonID
117 prop_binch2017be_multiBins_control_bin4
118 R2_2017be
119 R4_2016bb
120 R4_2016be
−2 −1 0 1 2
−0.002 −0.001 0 0.001 0.002
Pull
+1σ Impact
-1σ Impact
(θ̂-θ0)/Δθ
Δr_bin9


Unconstrained
Gaussian
Poisson
AsymmetricGaussian
CMS Internal
r_bin9 = 0.82 +0.33 −0.23
121 R4_2017bb
122 _trig2016bb
123 R5_2016bb
124 prop_binch2017bb_multiBins_signal_bin7
125 prop_binch2016be_multiBins_signal_bin2
126 prop_binch2016bb_multiBins_signal_bin3
127 prop_binch2017be_multiBins_signal_bin7
128 R4_2018bb
129 prop_binch2018be_multiBins_control_bin5
130 prop_binch2018bb_multiBins_signal_bin1
131 prop_binch2018be_multiBins_signal_bin2
132 prop_binch2017bb_multiBins_control_bin1
133 R2_2018be
134 prop_binch2017be_multiBins_signal_bin4
135 prop_binch2018bb_multiBins_control_bin4
136 prop_binch2016be_multiBins_signal_bin0
137 prop_binch2018bb_multiBins_signal_bin3
138 prop_binch2017bb_multiBins_signal_bin8_mu_DY_S9
139 prop_binch2016be_multiBins_signal_bin3
140 prop_binch2017bb_multiBins_control_bin0
141 _2018be_Smear
142 R3_2018bb
143 prop_binch2018bb_multiBins_signal_bin2
144 prop_binch2017bb_multiBins_control_bin2
145 prop_binch2016be_multiBins_control_bin2
146 prop_binch2017be_multiBins_signal_bin0
147 R2_2016bb
148 prop_binch2018be_multiBins_control_bin3
149 R5_2018bb
150 prop_binch2017bb_multiBins_control_bin4
−2 −1 0 1 2
−0.001 −0.0005 0 0.0005 0.001
Pull
+1σ Impact
-1σ Impact
(θ̂-θ0)/Δθ
Δr_bin9


Unconstrained
Gaussian
Poisson
AsymmetricGaussian
CMS Internal
r_bin9 = 0.82 +0.33 −0.23
151 prop_binch2016be_multiBins_control_bin3
152 prop_binch2017be_multiBins_control_bin0
153 R4_2018be
154 R2_2017bb
155 prop_binch2016bb_multiBins_signal_bin1
156 prop_binch2017be_multiBins_signal_bin1
157 prop_binch2016bb_multiBins_control_bin0
158 prop_binch2016be_multiBins_signal_bin1
159 _trig2017be
160 prop_binch2018be_multiBins_signal_bin3
161 prop_binch2018bb_multiBins_signal_bin4
162 prop_binch2017bb_multiBins_control_bin3
163 prop_binch2018be_multiBins_signal_bin1
164 prop_binch2016be_multiBins_control_bin4
165 prop_binch2017be_multiBins_control_bin7
166 prop_binch2016be_multiBins_control_bin6
167 R6_2018bb
168 prop_binch2018bb_multiBins_signal_bin5
169 prop_binch2017bb_multiBins_signal_bin1
170 prop_binch2018be_multiBins_signal_bin0
171 prop_binch2017bb_multiBins_signal_bin0
172 prop_binch2017be_multiBins_control_bin1
173 prop_binch2016be_multiBins_signal_bin4
174 prop_binch2017bb_multiBins_control_bin7
175 prop_binch2016bb_multiBins_signal_bin2
176 prop_binch2017bb_multiBins_signal_bin2
177 R4_2017be
178 _trig2017bb
179 R3_2016bb
180 R3_2017bb
−2 −1 0 1 2
−0.5 0 0.5
×10
Pull
+1σ Impact
-1σ Impact
(θ̂-θ0)/Δθ
Δr_bin9


Unconstrained
Gaussian
Poisson
AsymmetricGaussian
CMS Internal
r_bin9 = 0.82 +0.33 −0.23
181 prop_binch2017be_multiBins_signal_bin2
182 prop_binch2016bb_multiBins_control_bin1
183 prop_binch2016bb_multiBins_signal_bin4
184 prop_binch2017be_multiBins_control_bin3
185 prop_binch2016bb_multiBins_control_bin3
186 R5_2016be
187 prop_binch2017be_multiBins_control_bin6
188 prop_binch2018bb_multiBins_control_bin6
189 prop_binch2017be_multiBins_control_bin2
190 prop_binch2016bb_multiBins_control_bin4
191 prop_binch2016bb_multiBins_control_bin2
192 prop_binch2016be_multiBins_control_bin5
193 prop_binch2018bb_multiBins_control_bin5
194 R2_2018bb
195 prop_binch2017be_multiBins_control_bin5
196 prop_binch2017bb_multiBins_control_bin6
197 prop_binch2018be_multiBins_control_bin6
198 prop_binch2016bb_multiBins_signal_bin5
199 R3_2017be
200 prop_binch2017bb_multiBins_control_bin5
201 prop_binch2018bb_multiBins_signal_bin7
202 prop_binch2017bb_multiBins_signal_bin3
203 prop_binch2018bb_multiBins_signal_bin8_mu_DY_S8
204 R6_2016bb
205 prop_binch2017be_multiBins_signal_bin3
206 prop_binch2018bb_multiBins_control_bin7
207 R9_2016bb
208 prop_binch2016bb_multiBins_control_bin6
209 R1_2018be
210 prop_binch2016bb_multiBins_signal_bin6
−2 −1 0 1 2
−0.5 0 0.5
×10
Pull
+1σ Impact
-1σ Impact
(θ̂-θ0)/Δθ
Δr_bin9


Unconstrained
Gaussian
Poisson
AsymmetricGaussian
CMS Internal
r_bin9 = 0.82 +0.33 −0.23
211 prop_binch2016bb_multiBins_control_bin5
212 prop_binch2017bb_multiBins_signal_bin8_mu_DY_S8
213 R1_2017be
214 R7_2016bb
215 _2016be_Smear
216 R6_2017bb
217 prop_binch2017bb_multiBins_signal_bin6
218 prop_binch2018bb_multiBins_signal_bin6
219 prop_binch2017bb_multiBins_signal_bin5
220 prop_binch2016bb_multiBins_signal_bin8
221 prop_binch2016be_multiBins_signal_bin6
222 prop_binch2016be_multiBins_signal_bin5
223 prop_binch2017be_multiBins_signal_bin6
224 R8_2018bb
225 _2016bb_MuonID
226 prop_binch2018be_multiBins_signal_bin5
227 prop_binch2017be_multiBins_signal_bin5
228 R8_2017bb
229 R6_2017be
230 R6_2018be
231 R8_2017be
232 R7_2016be
233 R8_2016be
234 prop_binch2018be_multiBins_signal_bin7
235 R7_2017be
236 R6_2016be
237 _trig2018be
238 R8_2018be
239 R7_2018bb
240 prop_binch2016bb_multiBins_signal_bin7
−2 −1 0 1 2
−0.4 −0.2 0 0.2 0.4
×10
Pull
+1σ Impact
-1σ Impact
(θ̂-θ0)/Δθ
Δr_bin9


Unconstrained
Gaussian
Poisson
AsymmetricGaussian
CMS Internal
r_bin9 = 0.82 +0.33 −0.23
241
prop_binch2018be_multiBins_signal_bin6
242
R7_2017bb
243
R8_2016bb
244
prop_binch2018bb_multiBins_signal_bin8_mu_DY_S7
245
R7_2018be
246
prop_binch2018bb_multiBins_signal_bin8_mu_DY_S0
247
prop_binch2018bb_multiBins_signal_bin8_mu_DY_S1
248
prop_binch2017bb_multiBins_signal_bin8_mu_DY_S0
249
_2016bb_Smear
250
_Smear
251
prop_binch2016bb_multiBins_control_bin7
−2
−1
0
1
2
−0.2
−0.1
0
0.1
0.2
×10
Pull
+1σ Impact
-1σ Impact
(θ̂-θ0)/Δθ
Δr_bin9