What's wrong with MC prediction?

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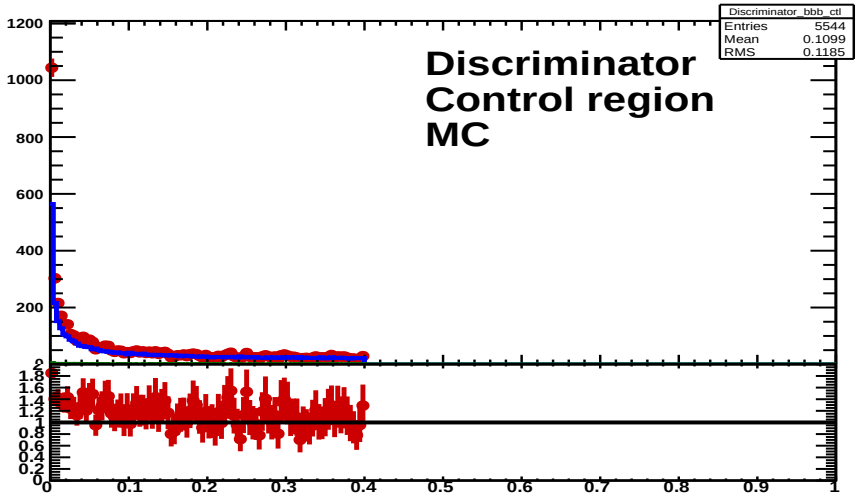
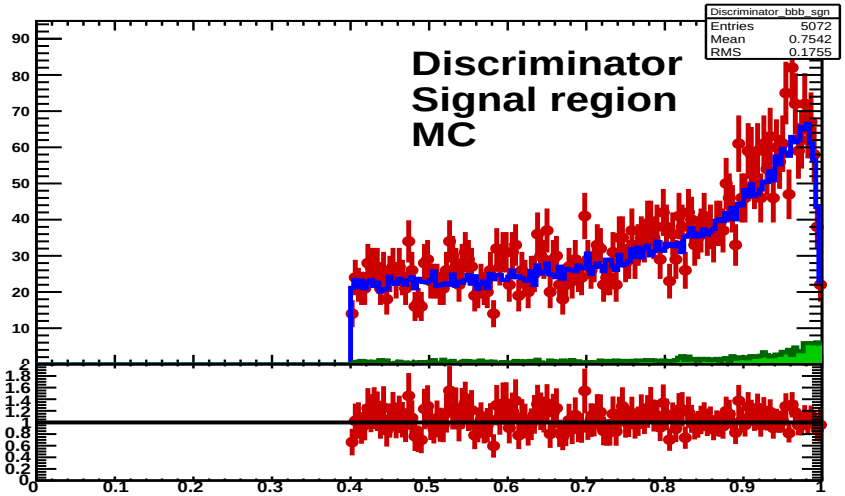
Intro

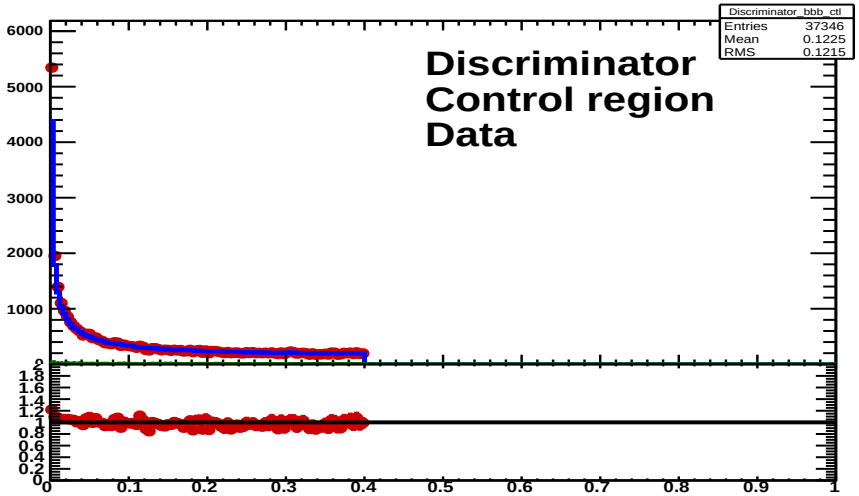
What is about

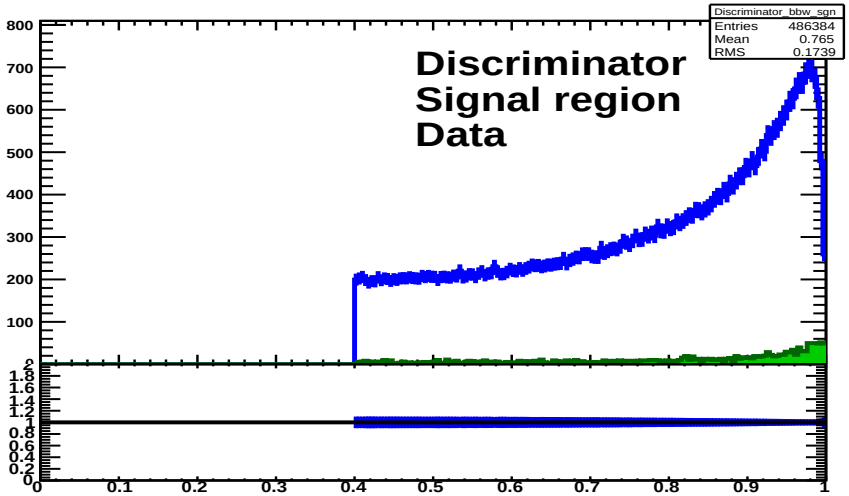
- Ok, so we have a problem in MC prediction (120 GeV)
- while data is much better
- it seems that the disagreement comes from Discriminator$\sim$ 0
- So:
  1. Zoom discriminator around D$\sim$ 0 and see what it looks like
  2. select only the very low value of Discriminator as a control region, and see how the distribution looks like
  3. try if it makes sense to remove the very first bin (in data and MC) and check how things are looking in this way
- try eff only and fb/c from MC truth, with full statistics.

Discriminator

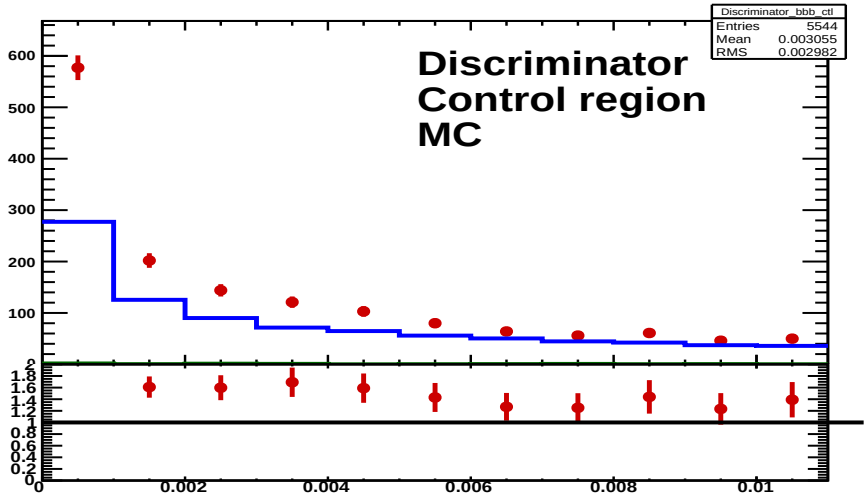


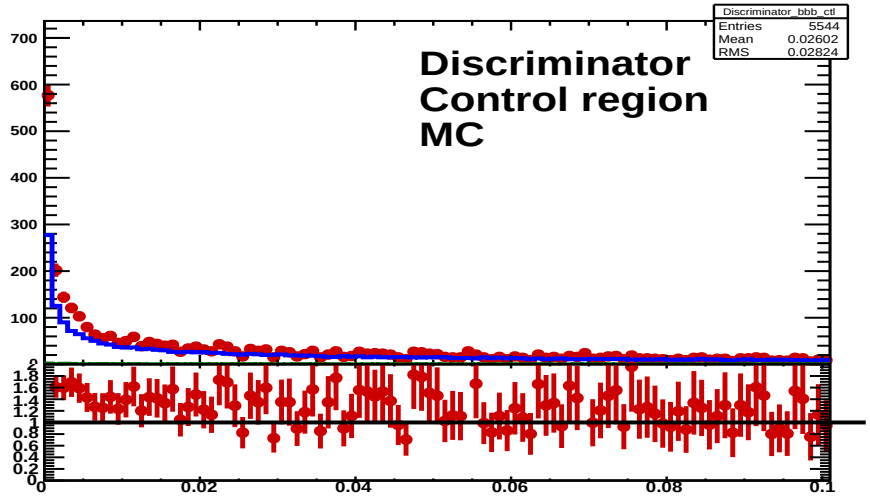


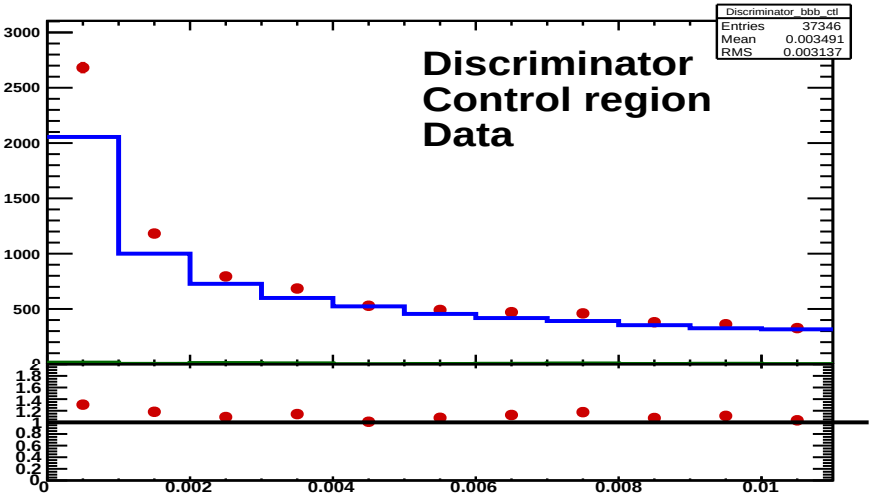


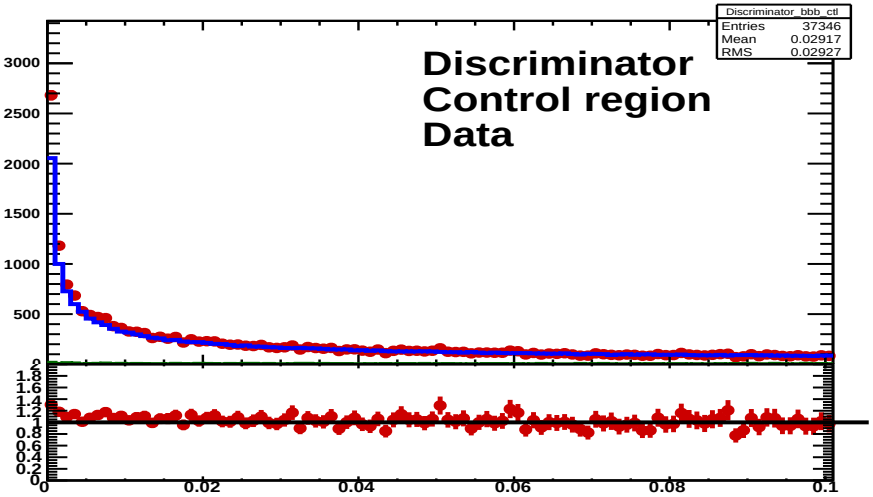


Discriminator Zoom



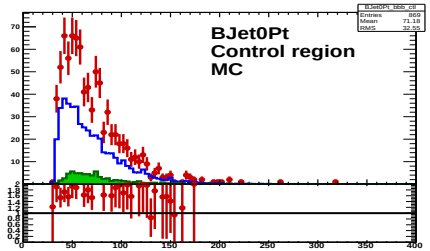


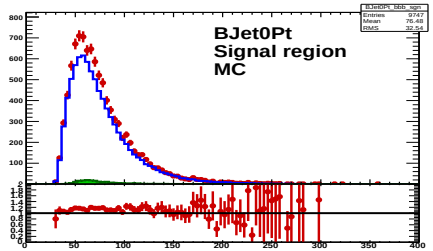


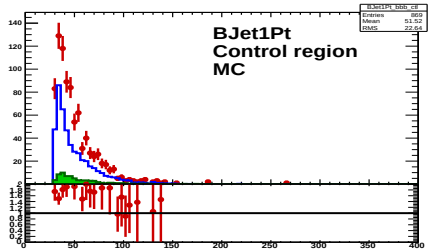


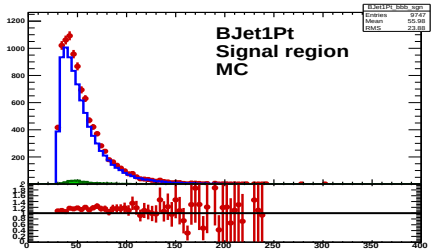
Second try

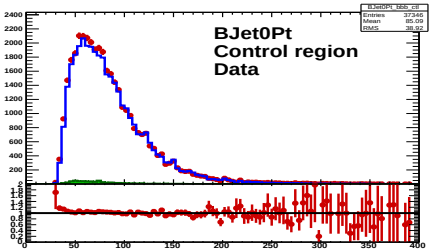
Ok, define (for MC only) control region as $D < 0.01$, so to see the distribution of all variables in the problematic region (control region) and everywhere else (signal region).
Same plots for $D < 0.001$ in the backup.

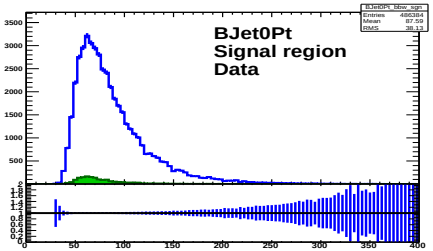

BJet0Pt
Control region
MC

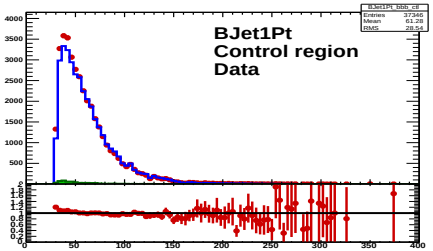

BJet0Pt
Signal region
MC

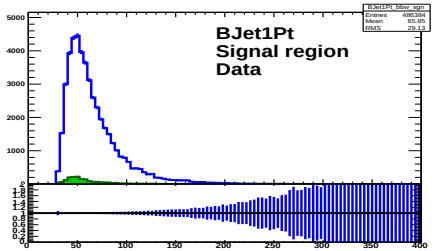

BJet1Pt
Control region
MC

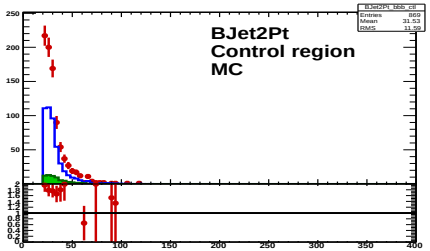

BJet1Pt
Signal region
MC

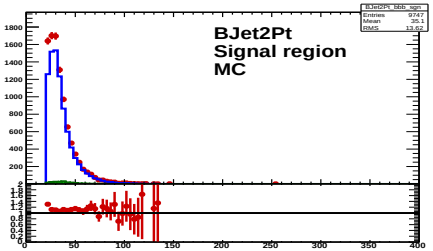

BJet0Pt
Control region
Data

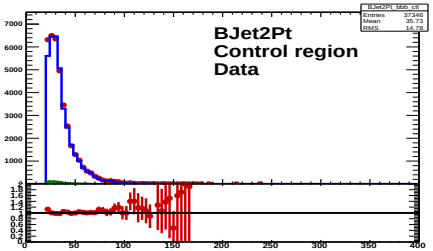

BJet0Pt
Signal region
Data

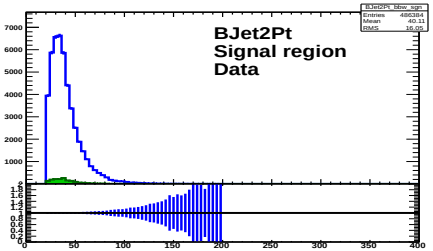

BJet1Pt
Control region
Data

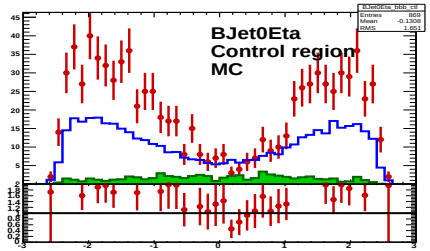

BJet1Pt
Signal region
Data

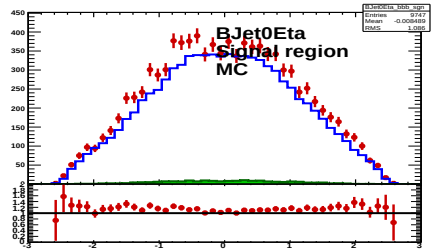

BJet2Pt
Control region
MC

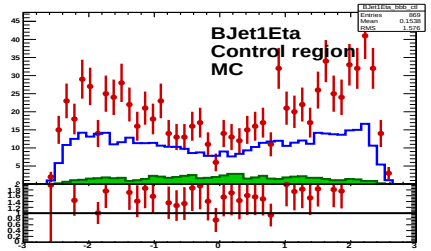

BJet2Pt
Signal region
MC

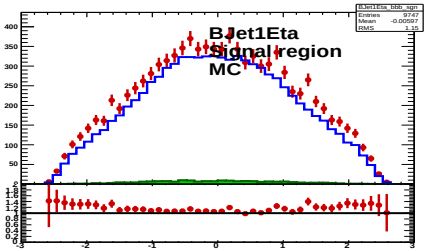

BJet2Pt
Control region
Data

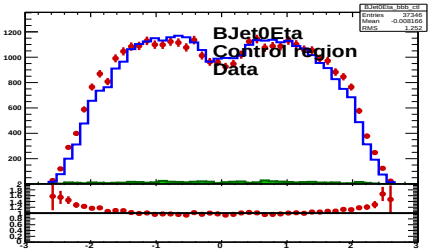

BJet2Pt
Signal region
Data

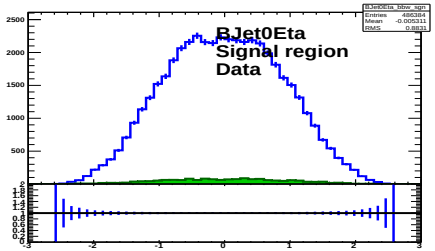

BJet0Eta
Control region
MC


BJet0Eta
Signal region
MC


BJet1Eta
Control region
MC


BJet1Eta
Signal region
MC


BJet0Eta
Control region
Data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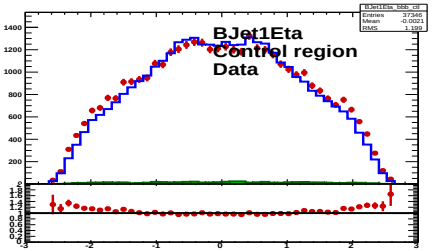
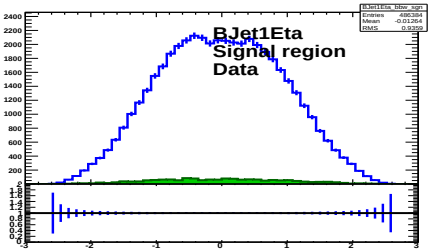
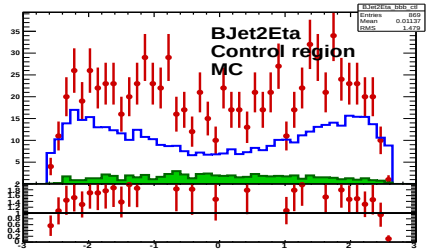
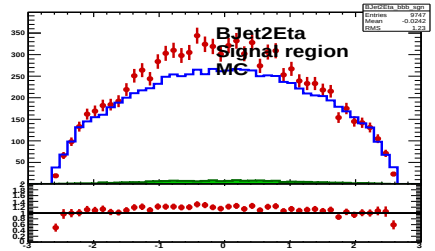
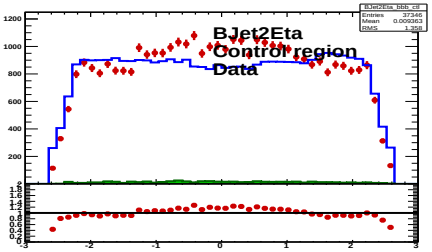
Signal region
Data

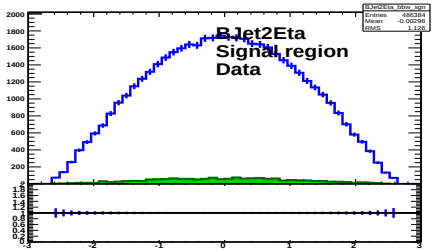

BJet1Eta
Control region
Data

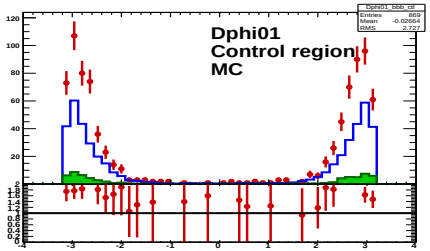

BJet1Eta
Signal region
Data

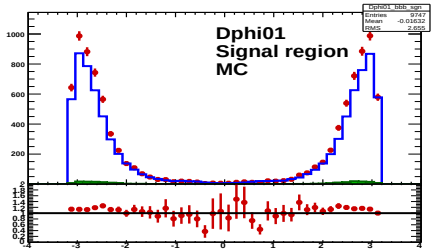

BJet2Eta
Control region
MC

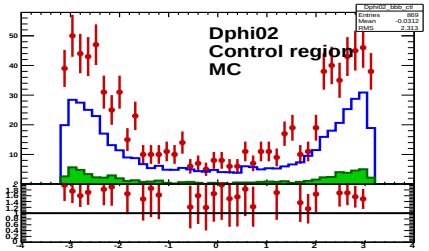

BJet2Eta
Signal region
MC

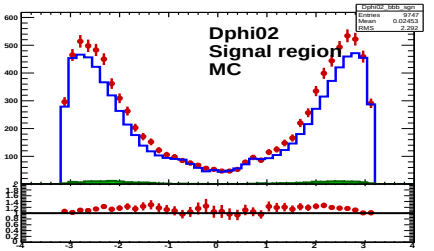

BJet2Eta
Control region
Data

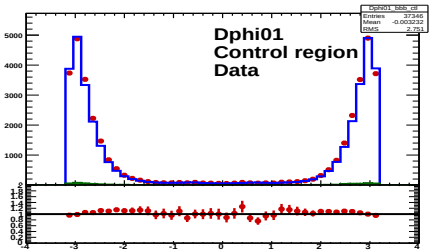

BJet2Eta
Signal region
Data

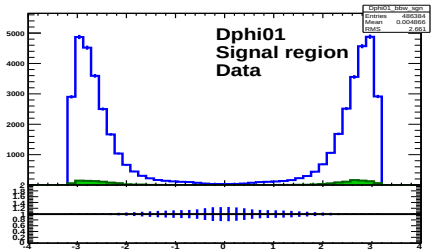

Dphi01
Control region
MC

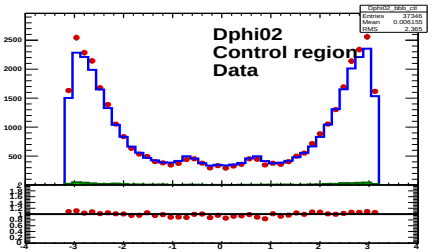

Dphi01
Signal region
MC

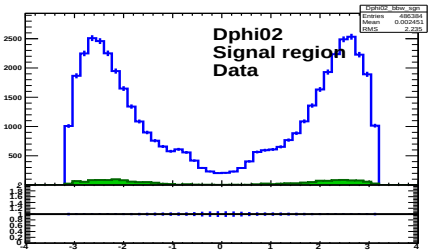

Dphi02
Control region
MC


Dphi02
Signal region
MC


Dphi01
Control region
Data


Dphi01
Signal region
Data


Dphi02
Control region
Data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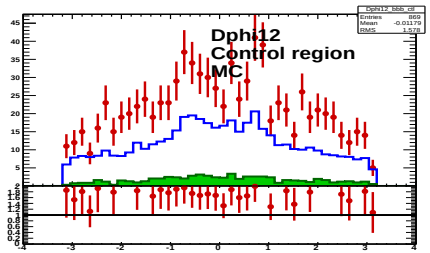
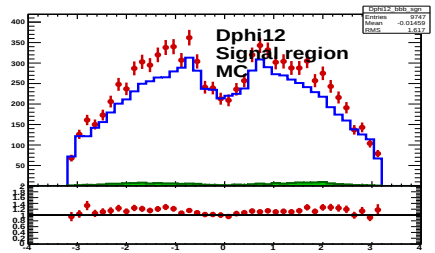
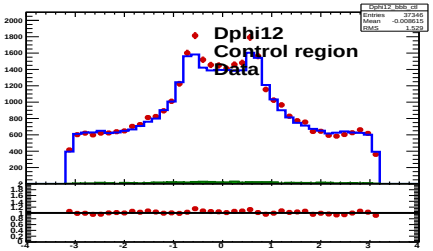
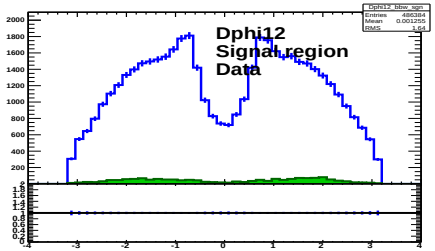
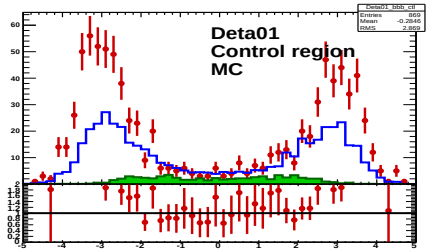
Signal region
Data

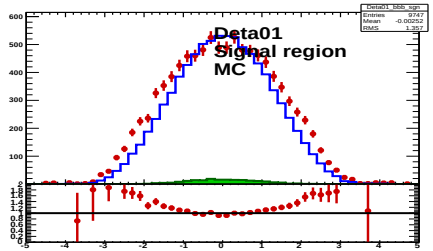

Dphi12
Control region
MC

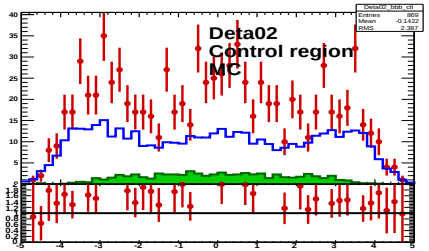

Dphi12
Signal region
MC

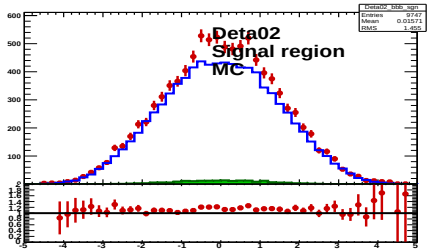

Dphi12
Control region
Data

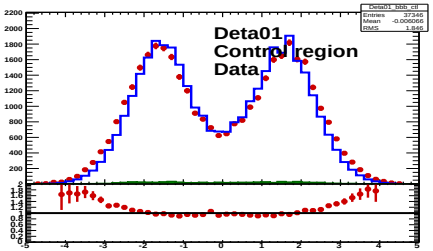

Dphi12
Signal region
Data

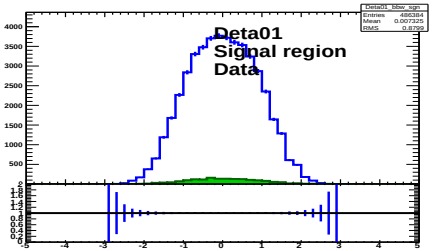

Deta01
Control region
MC

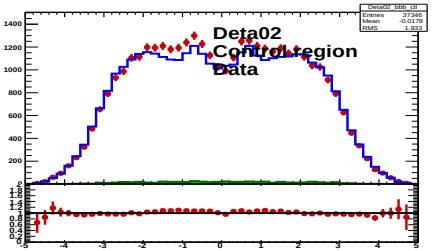

Deta01
Signal region
MC

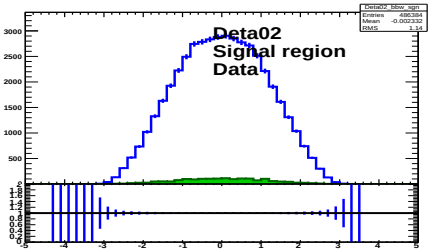

Deta02
Control region
MC

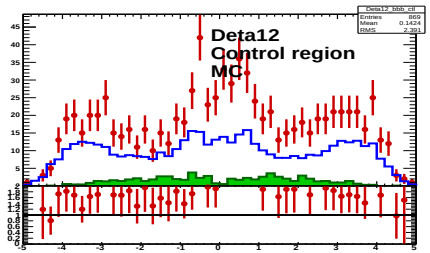

Deta02
Signal region
MC

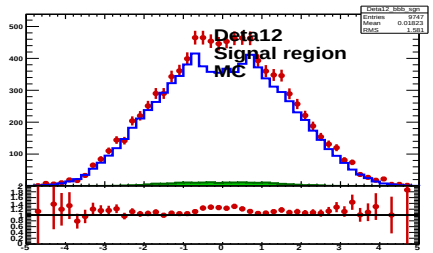

Deta01
Control region
Data

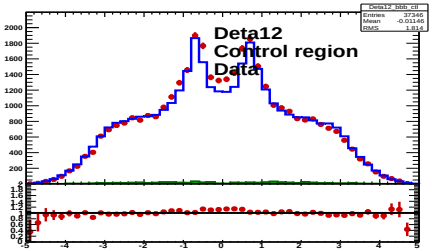

Deta01
Signal region
Data

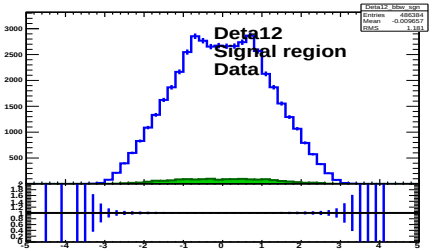

Deta02
Control region
Data

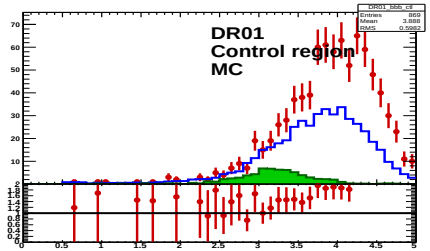

Deta02
Signal region
Data

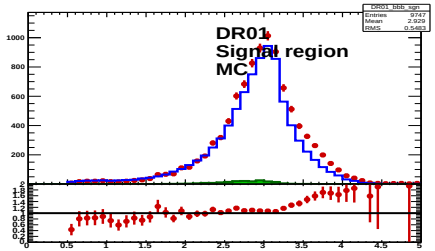

Deta12
Control region
MC

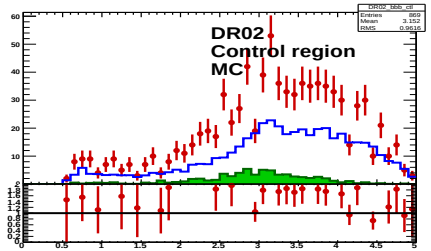

Deta12
Signal region
MC

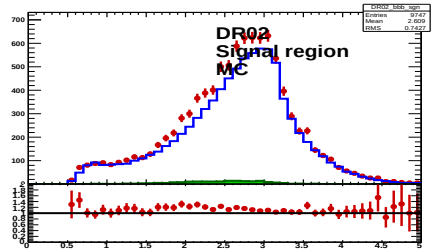

Deta12
Control region
Data

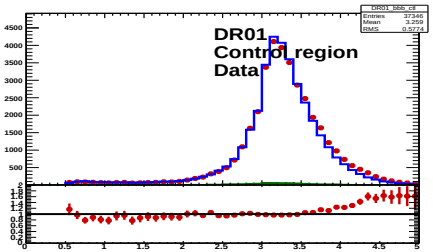

Deta12
Signal region
Data

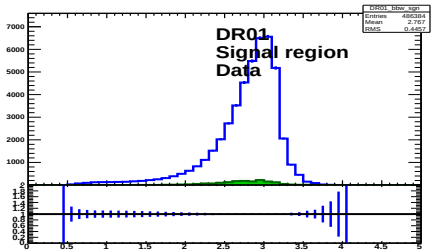

DR01
Control region
MC

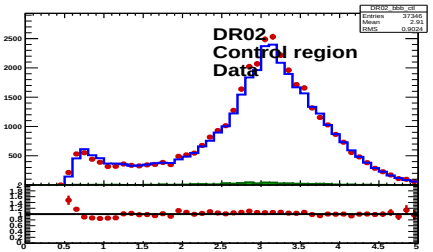

DR01
Signal region
MC

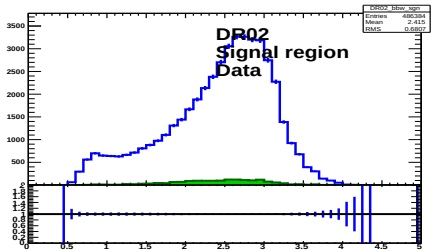

DR02
Control region
MC

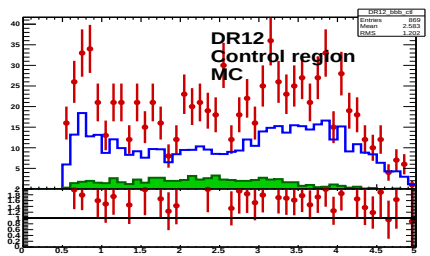

DR02
Signal region
MC

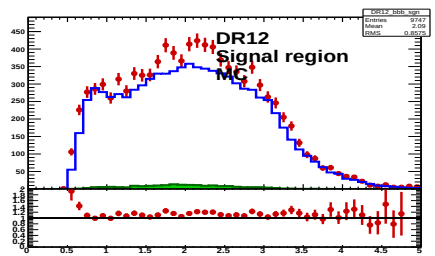

DR01
Control region
Data

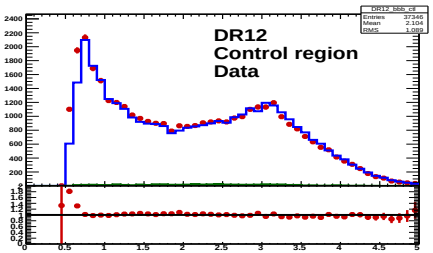

DR01
Signal region
Data

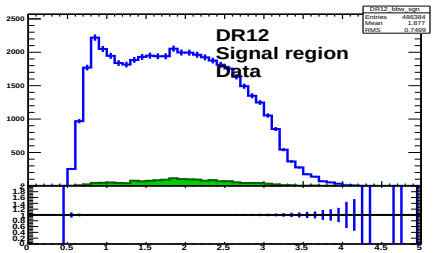

DR02
Control region
Data

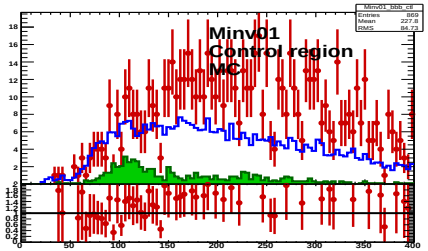

DR02
Signal region
Data

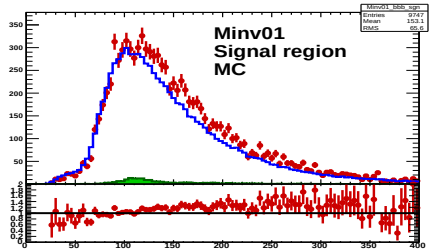

DR12
Control region
MC

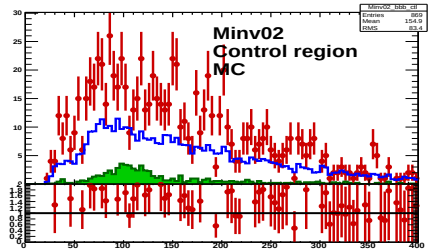

DR12
Signal region
MC

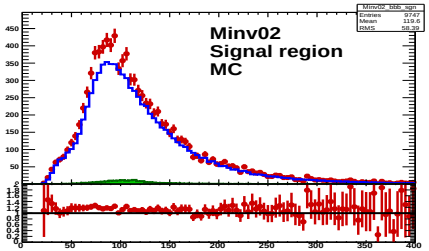

DR12
Control region
Data

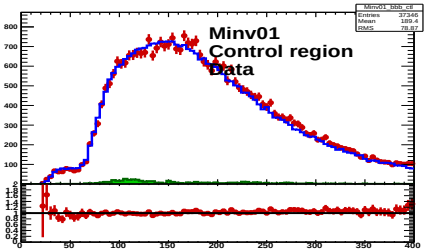

DR12
Signal region
Data

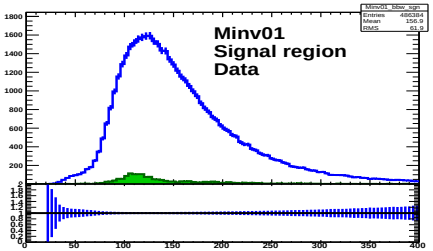

Minv01
Control region
MC

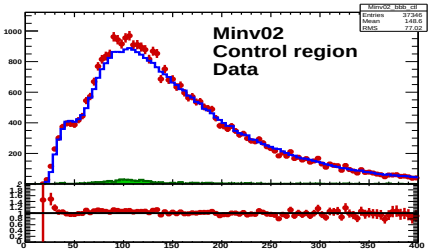

Minv01
Signal region
MC

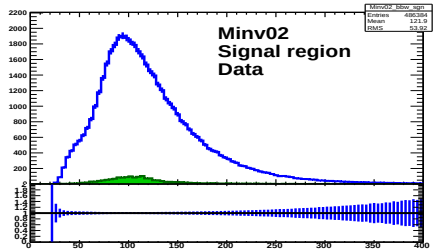

Minv02
Control region
MC

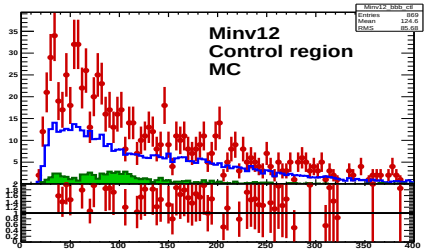

Minv02
Signal region
MC

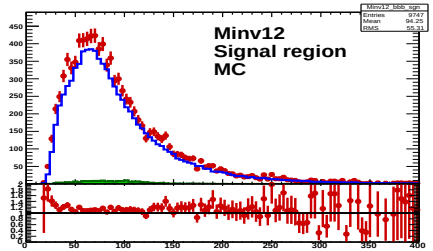

Minv01
Control region
Data

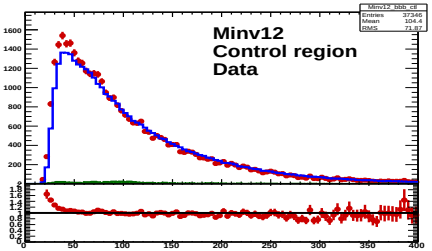

Minv01
Signal region
Data

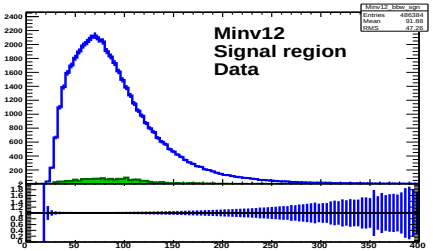

Minv02
Control region
Data

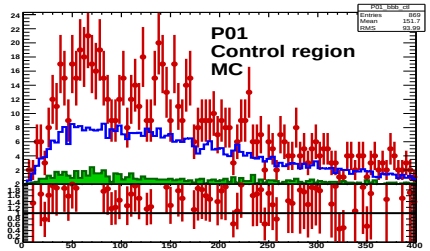

Minv02
Signal region
Data

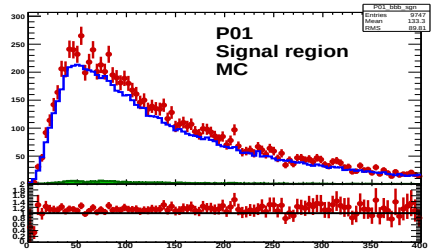

Minv12
Control region
MC

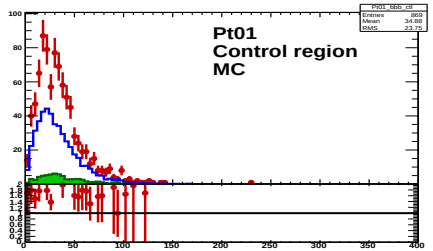

Minv12
Signal region
MC

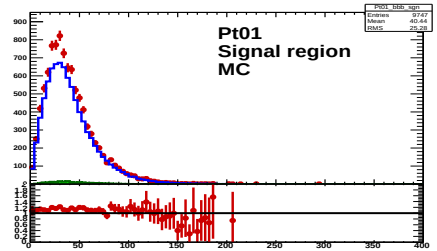

Minv12
Control region
Data

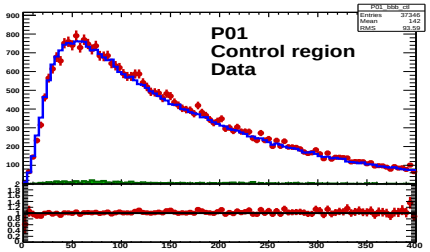

Minv12
Signal region
Data

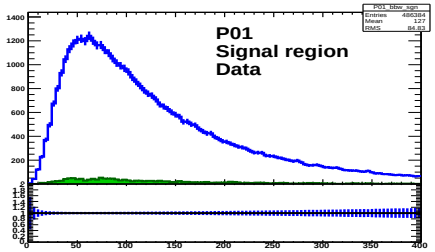

P01
Control region
MC

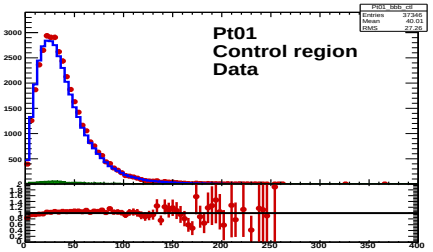

P01
Signal region
MC

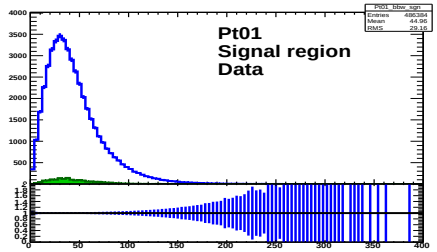

Pt01
Control region
MC

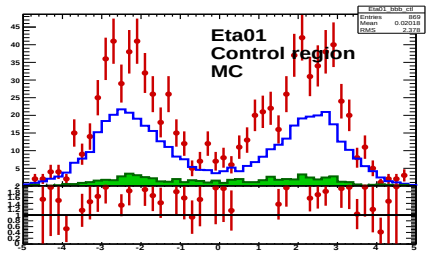

Pt01
Signal region
MC

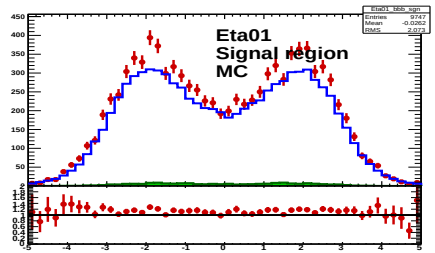

P01
Control region
Data

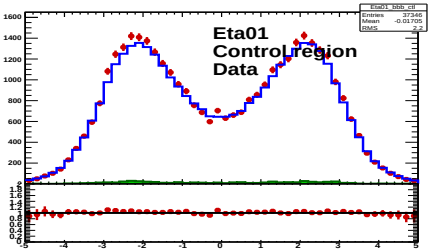

P01
Signal region
Data

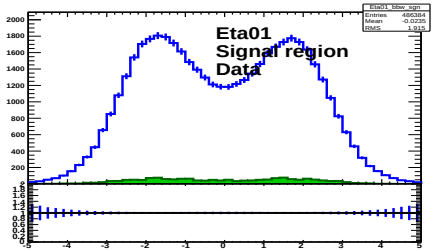

Pt01
Control region
Data


Pt01
Signal region
Data


Eta01
Control region
MC

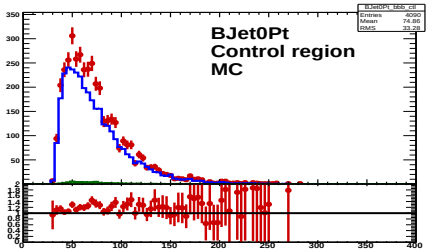

Eta01
Signal region
MC

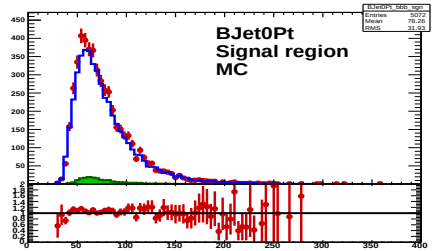

Eta01
Control region
Data

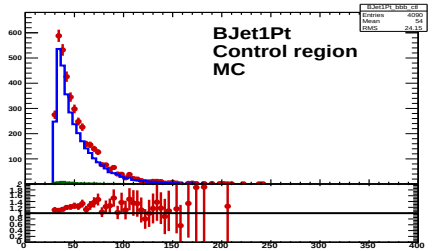

Eta01
Signal region
Data

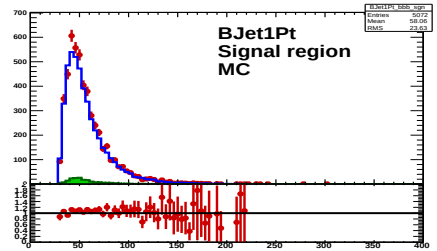
Third try

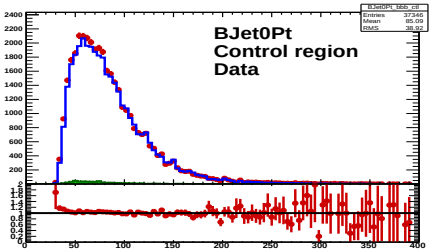
Ok, define (for MC only) control region as $0.01 < D < 0.04$ and signal region as $0.04 < D < 1.$ and see what happen
Same plots for $0.05 < D < 0.04$ in the backup.

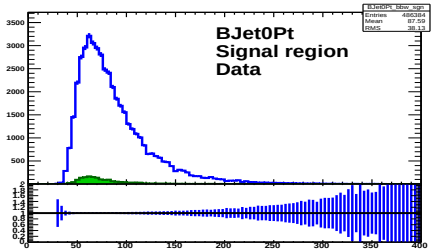

BJet0Pt
Control region
MC

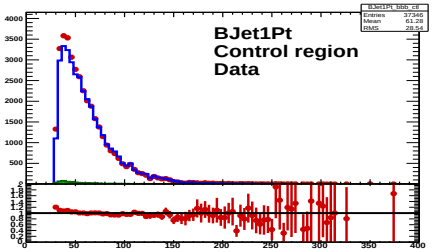

BJet0Pt
Signal region
MC

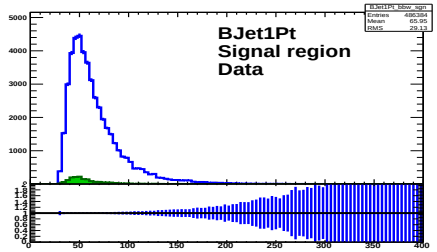

BJet1Pt
Control region
MC

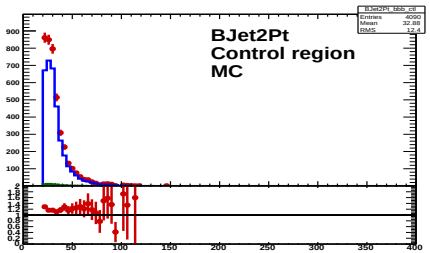

BJet1Pt
Signal region
MC

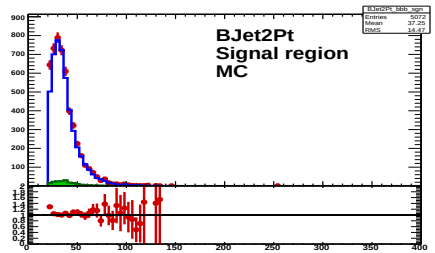

BJet0Pt
Control region
Data

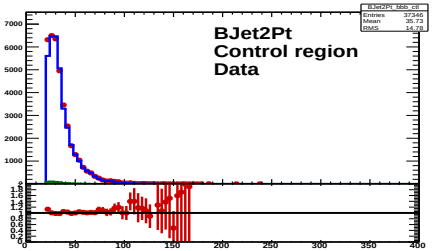

BJet0Pt
Signal region
Data

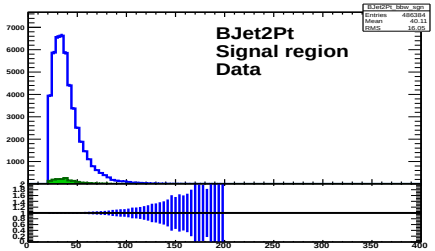

BJet1Pt
Control region
Data

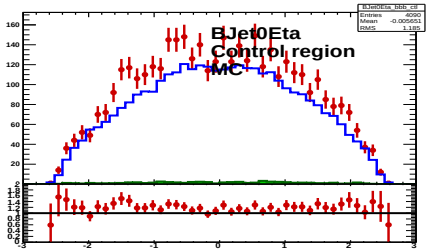

BJet1Pt
Signal region
Data

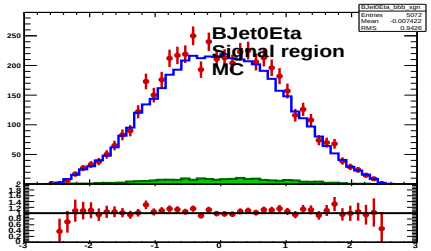

BJet2Pt
Control region
MC

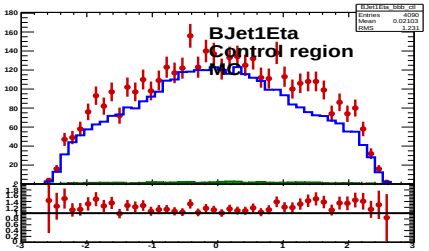

BJet2Pt
Signal region
MC

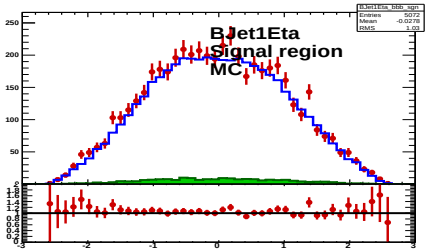

BJet2Pt
Control region
Data

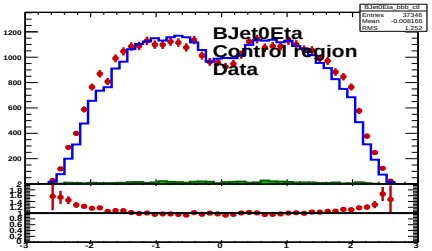

BJet2Pt
Signal region
Data

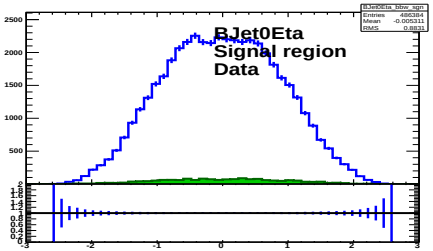

BJet0Eta
Control region
MC

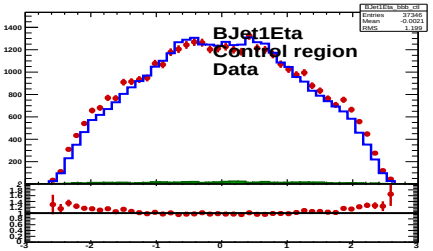

BJet0Eta
Signal region
MC

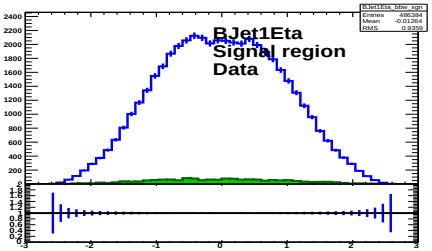

BJet1Eta
Control region
MC

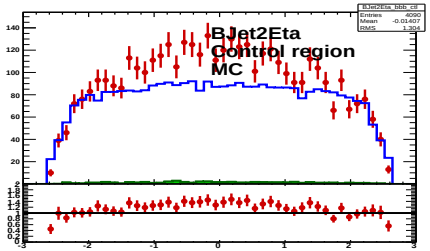

BJet1Eta
Signal region
MC

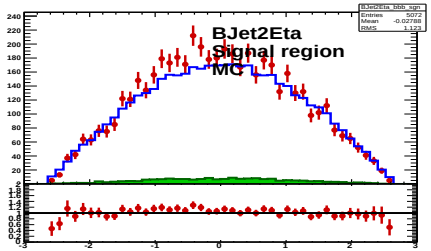

BJet0Eta
Control region
Data

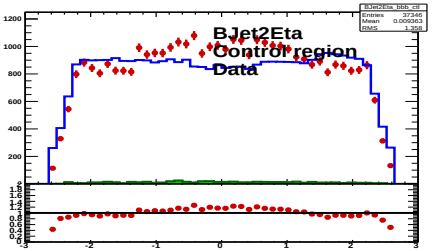

BJet0Eta
Signal region
Data

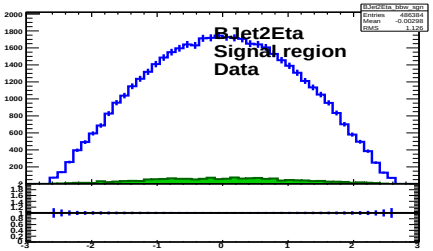

BJet1Eta
Control region
Data

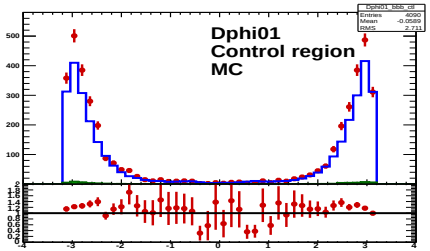

BJet1Eta
Signal region
Data

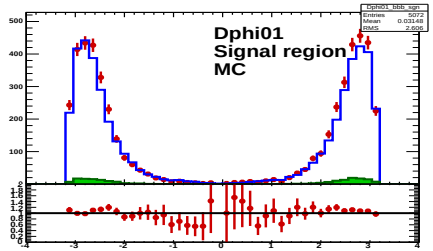

BJet2Eta
Control region
MC


BJet2Eta
Signal region
MC


BJet2Eta
Control region
Data


BJet2Eta
Signal region
Data


Dphi01
Control region
MC


Dphi01
Signal region
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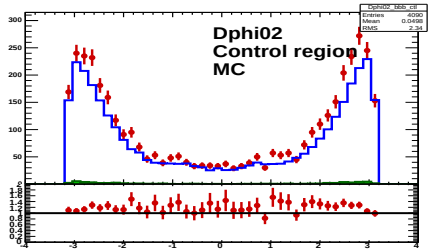
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Control region
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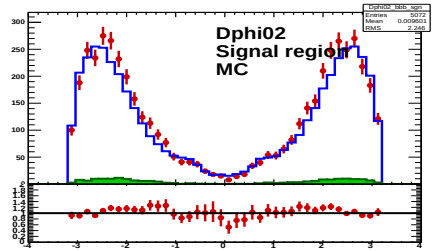
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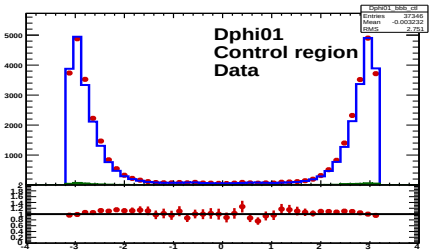
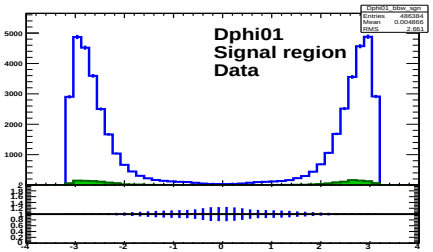
Signal region
MC


Dphi01
Control region
Data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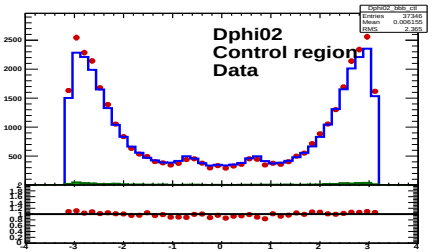
Signal region
Data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Control region
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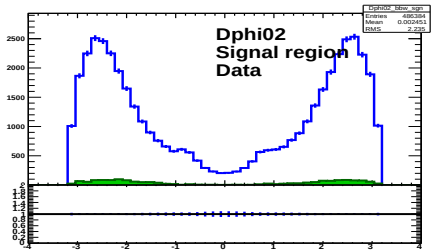
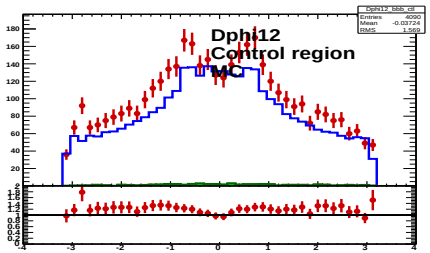
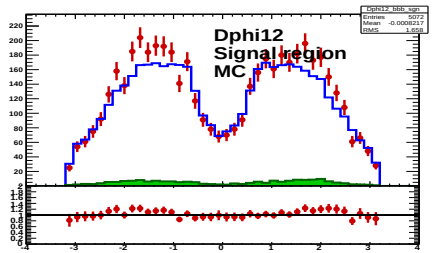
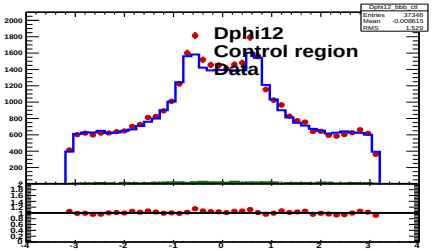

Dphi02
Signal region
Data


Dphi12
Control region
MC


Dphi12
Signal region
MC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Control region
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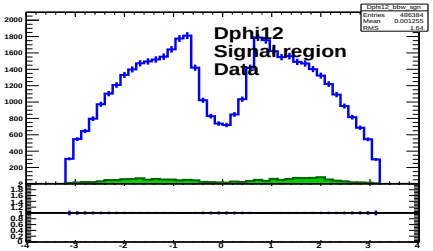
Dphi12
Signal region
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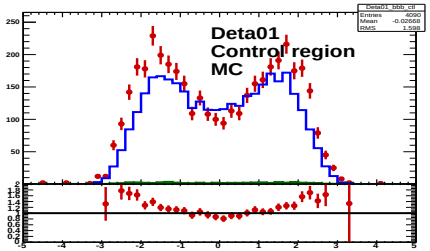
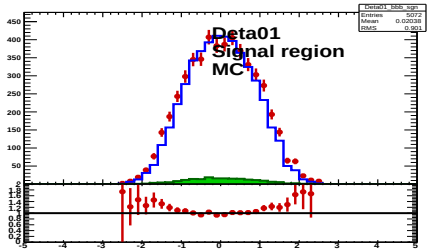
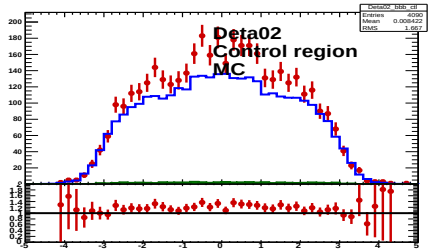
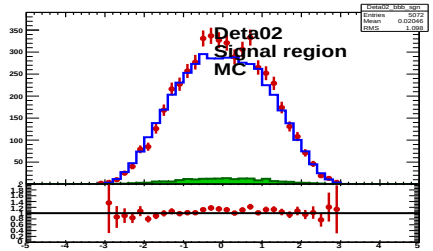
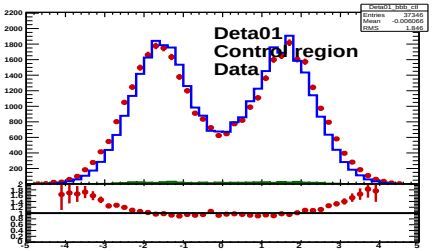

Deta01
Control region
MC


Deta01
Signal region
MC


Deta02
Control region
MC


Deta02
Signal region
MC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Control region
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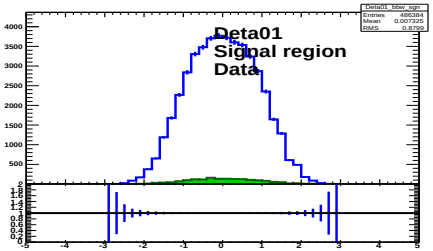
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Signal region
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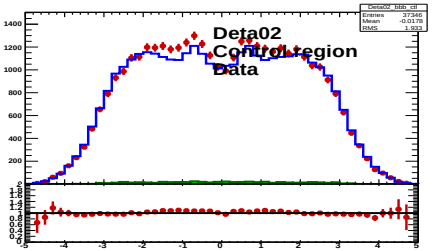
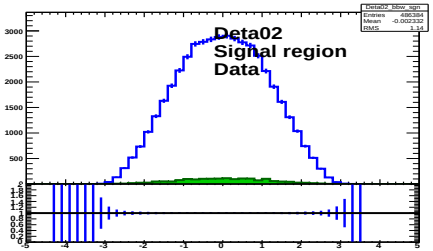

Deta02
Control region
Data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Signal region
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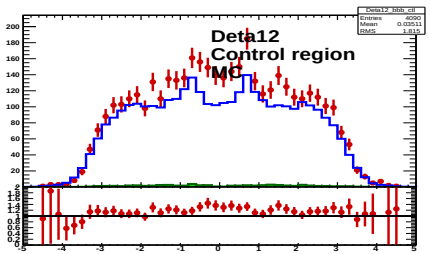
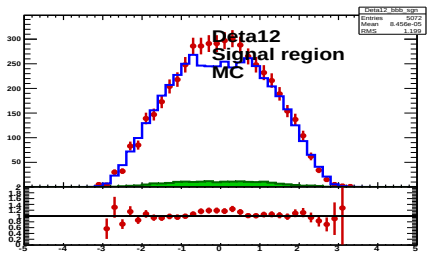

Deta12
Control region
MC


Deta12
Signal region
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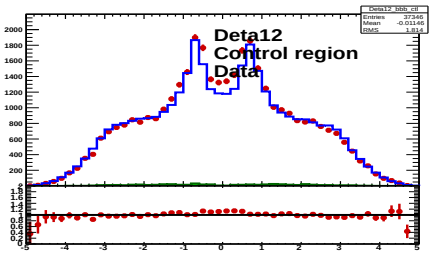
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Control region
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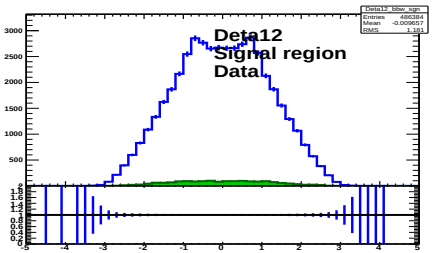
Deta12
Signal region
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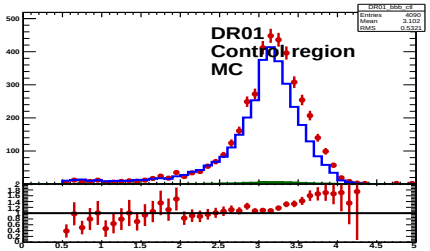
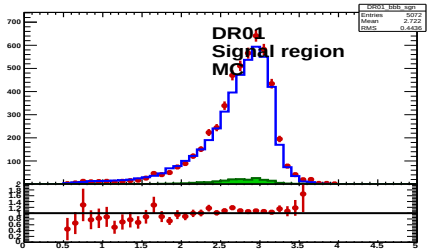
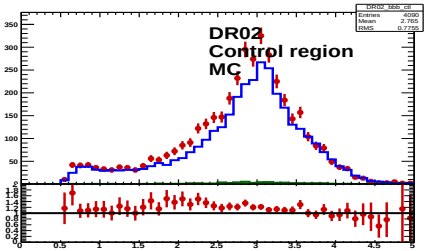
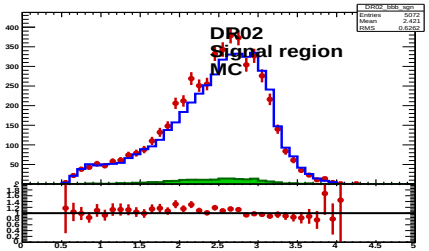
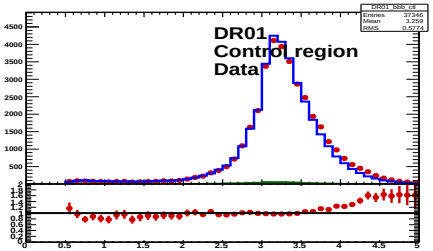

DR01
Control region
MC


DR01
Signal region
MC


DR02
Control region
MC


DR02
Signal region
MC


DR01
Control region
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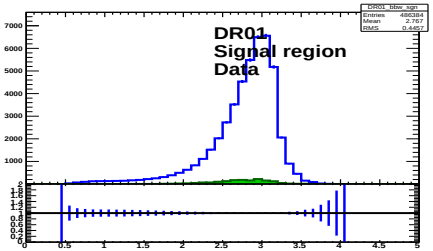
DR01
Signal region
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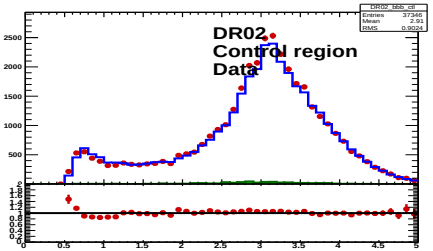
DR02
Control region
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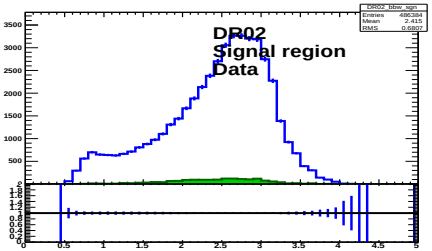
DR02
Signal region
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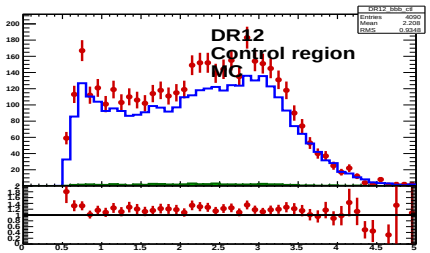
DR12
Control region
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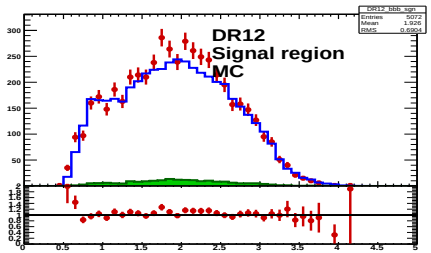
DR12
Signal region
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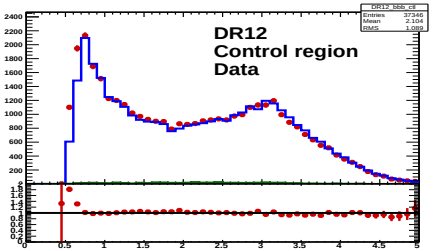
DR12
Control region
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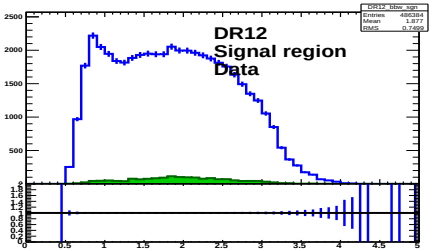
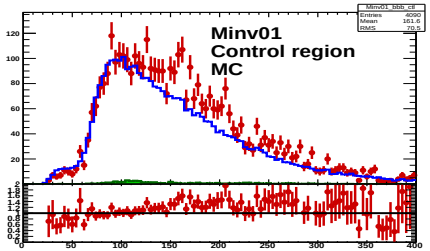
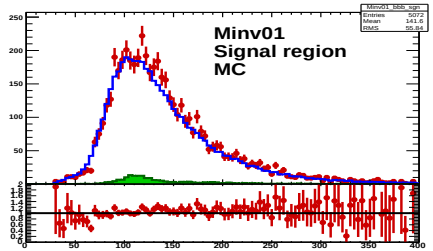
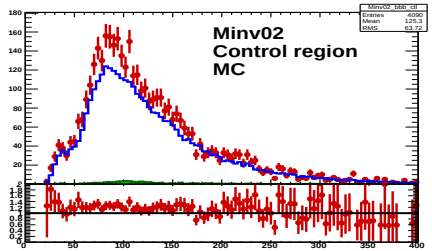

DR12
Signal region
Data


Minv01
Control region
MC


Minv01
Signal region
MC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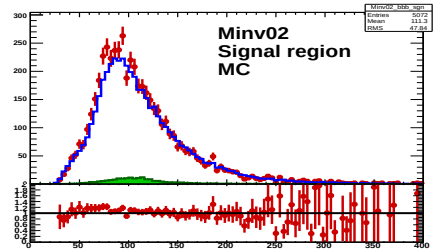
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Signal region
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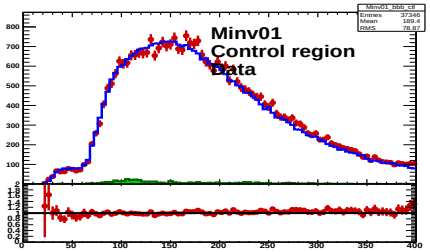
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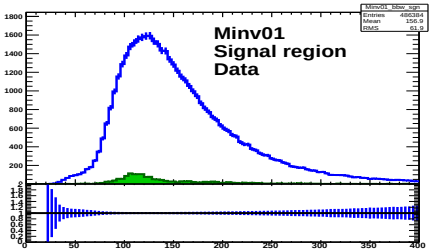
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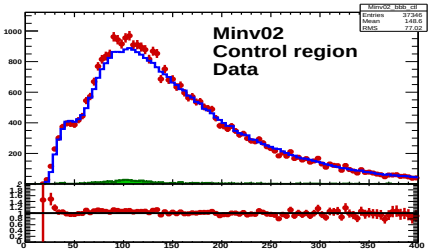
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Control region
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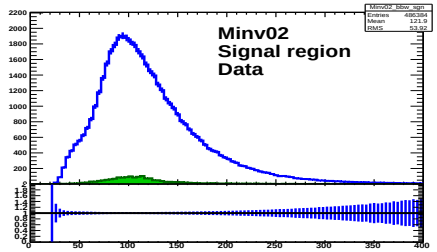
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Signal region
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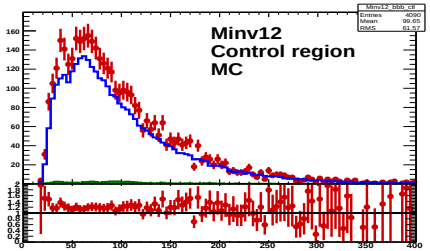
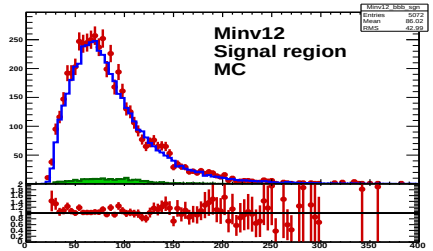

Minv12
Control region
MC


Minv12
Signal region
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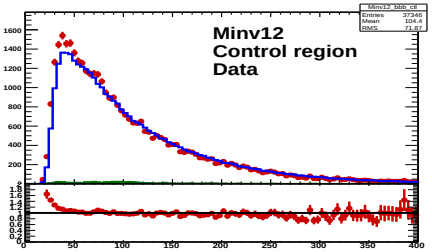
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Control region
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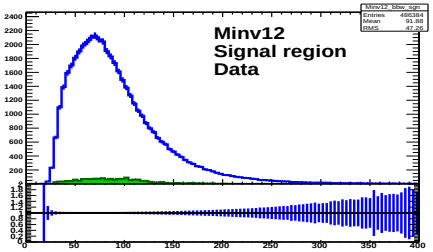
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Signal region
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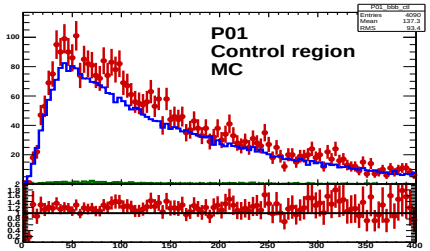
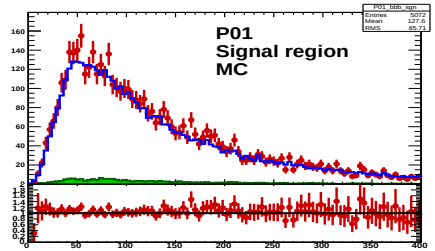
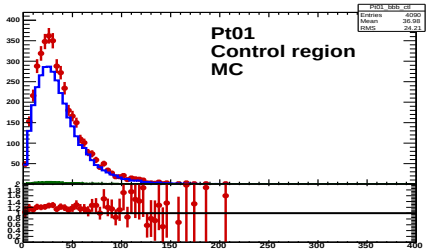
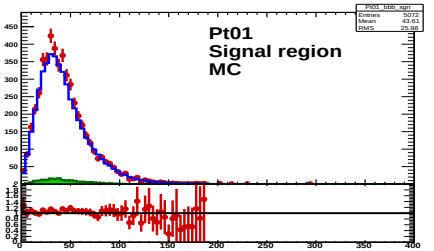

P01
Control region
MC


P01
Signal region
MC


Pt01
Control region
MC


Pt01
Signal region
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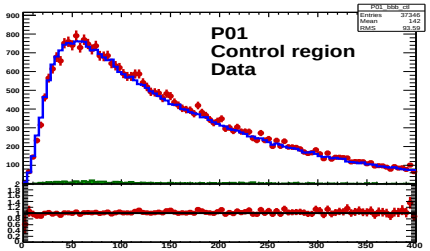
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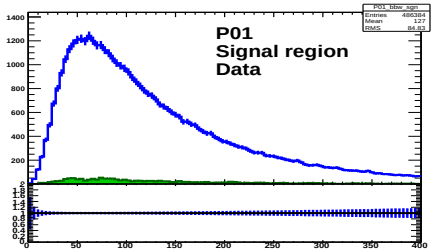
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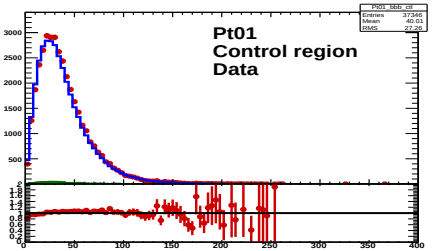
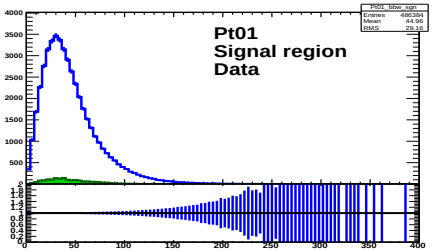
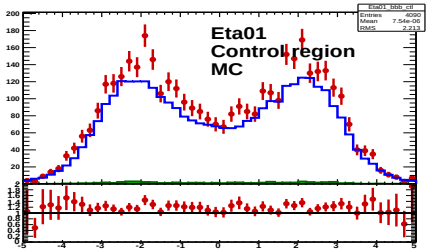
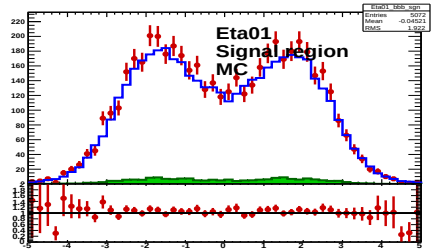
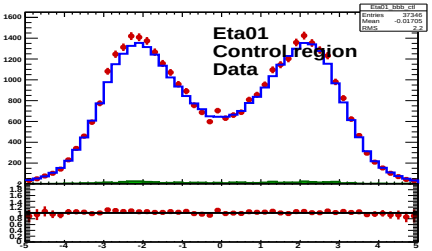
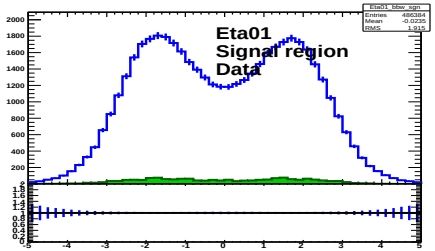

Pt01
Control region
Data


Pt01
Signal region
Data


Eta01
Control region
MC


Eta01
Signal region
MC


Eta01
Control region
Data


Eta01
Signal region
Data

Going back to Fb/c

Ok, let's see where the MC non-closure is coming from.
First, try by applying ϵ_x **only**, and taking $F_{b,c}$ from MC truth, *jet per jet*.
Namely:

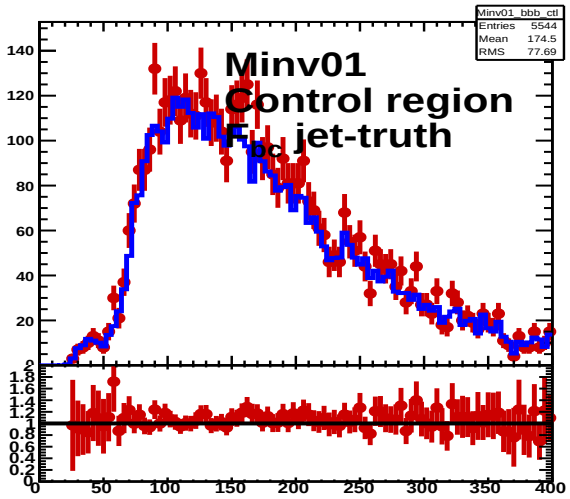
$$P_b^{3rd-j}(j) = \begin{cases} \epsilon_b & \texttt{if jet is B} \\ \epsilon_c & \texttt{if jet is C} \\ \epsilon_{light} & \texttt{otherwise} \end{cases}$$

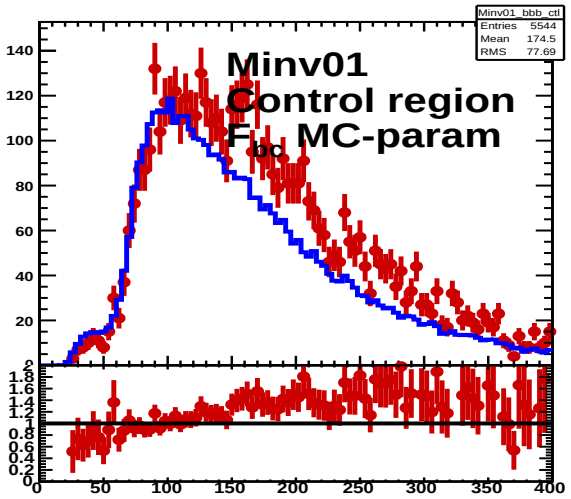
Compare, for MC control region only,

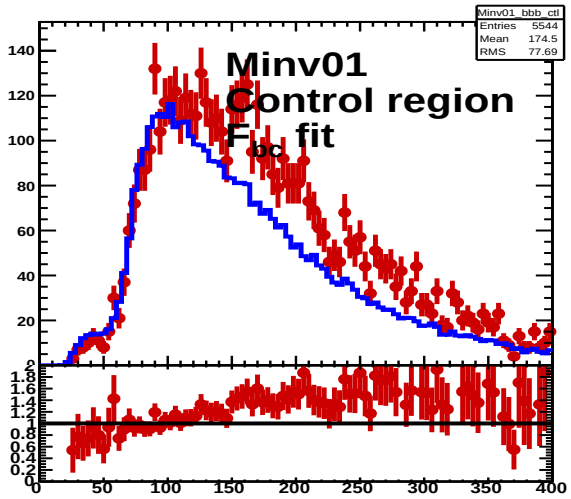
- the predictions with the above P_b (jet-truth)
- MC truth parametrized vs $(E_t^{(3)},\ \Delta R_{min})$ (MC-param)
- F_{bc} from Fit.

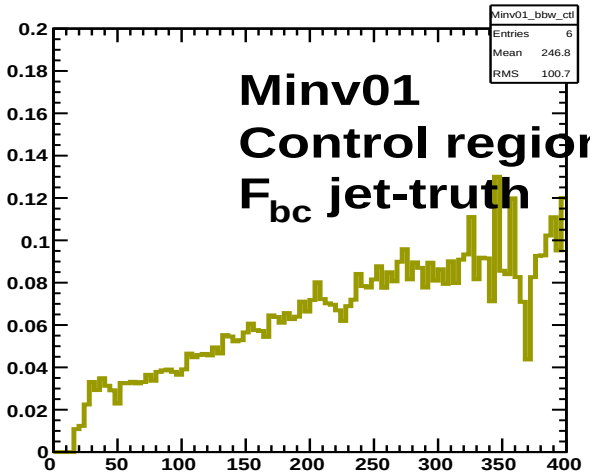
Plot P_b vs the chosen variable as well, and compare. Bottom row (yellowish line).

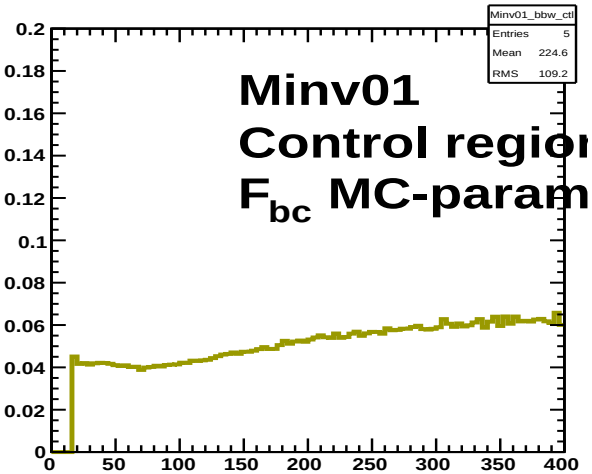
Comparing distribution from MC

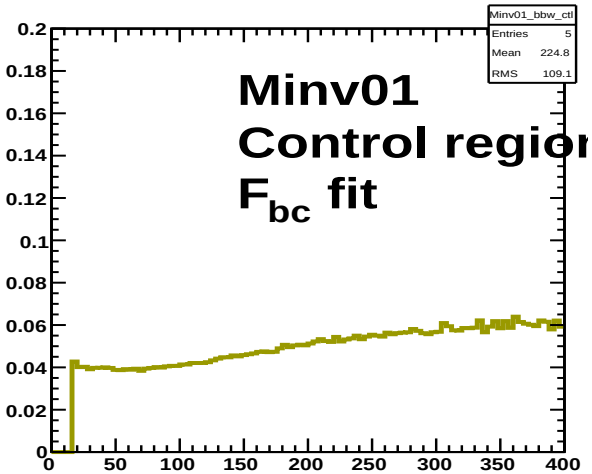


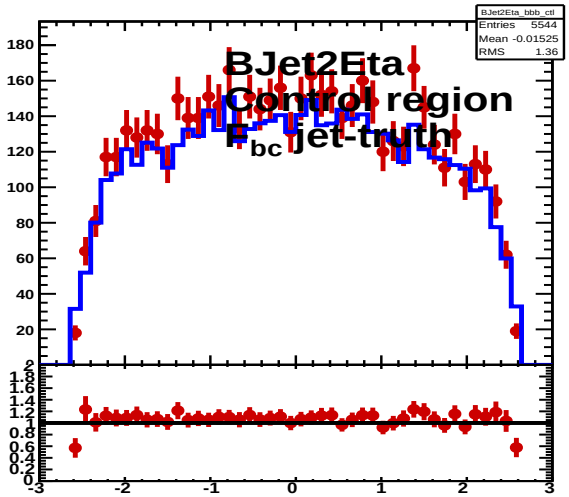


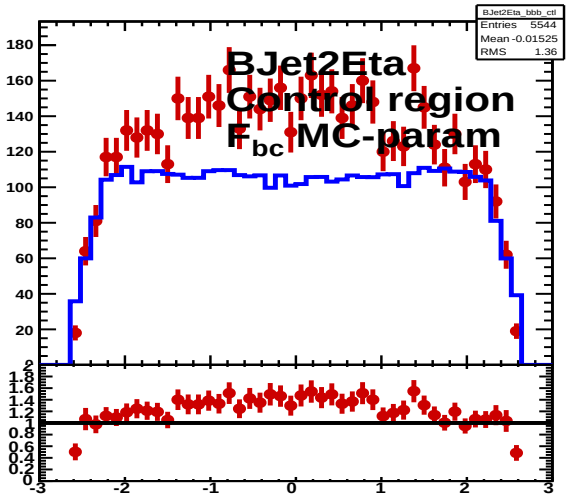


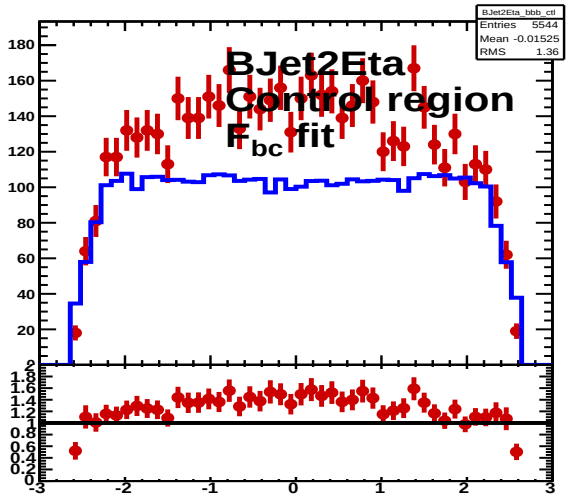


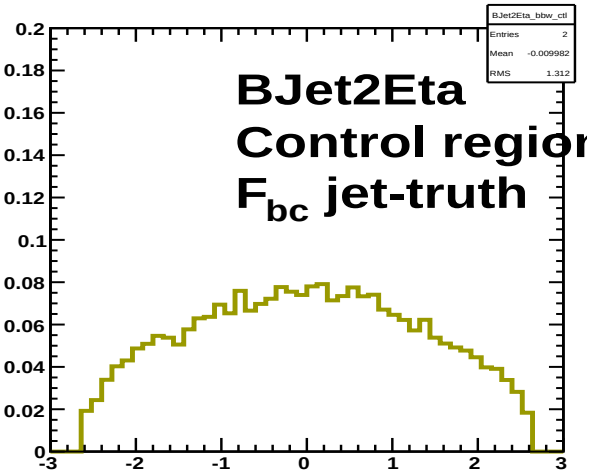


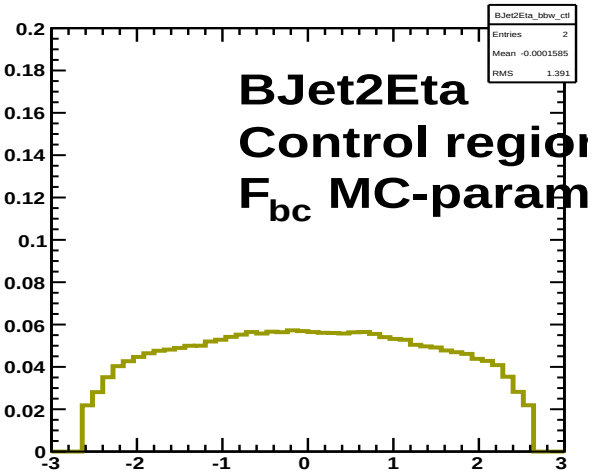


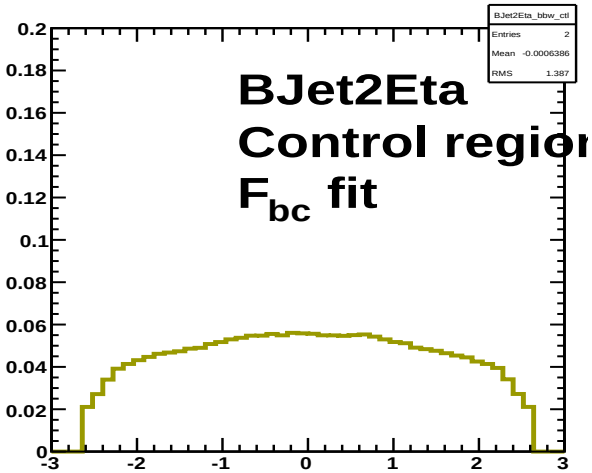

BJet2Eta_bbb_ctl
Entries 5544
Mean -0.01525
RMS 1.36
BJet2Eta
Control region
F_bc jet-truth

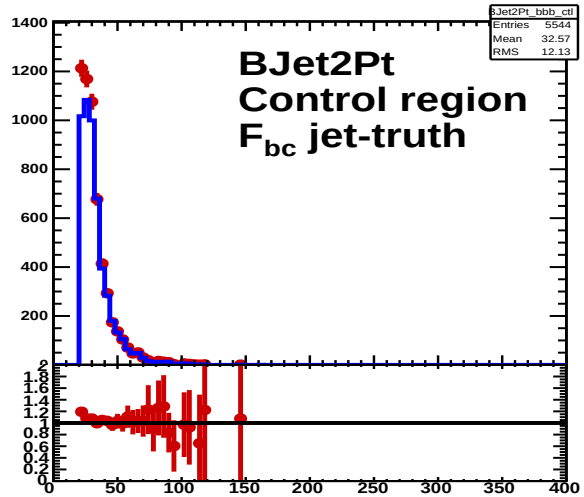

BJet2Eta_bbb_ctl
Entries 5544
Mean -0.01525
RMS 1.36
BJet2Eta
Control region
F_bc MC-param

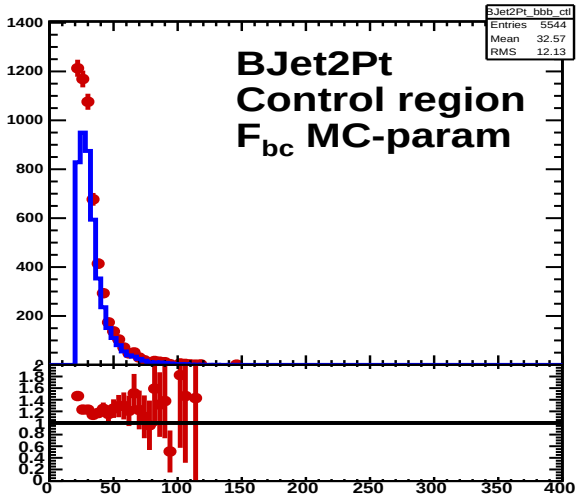

BJet2Eta_bbb_ctl
Entries 5544
Mean -0.01525
RMS 1.36
BJet2Eta
Control region
F_bc fit

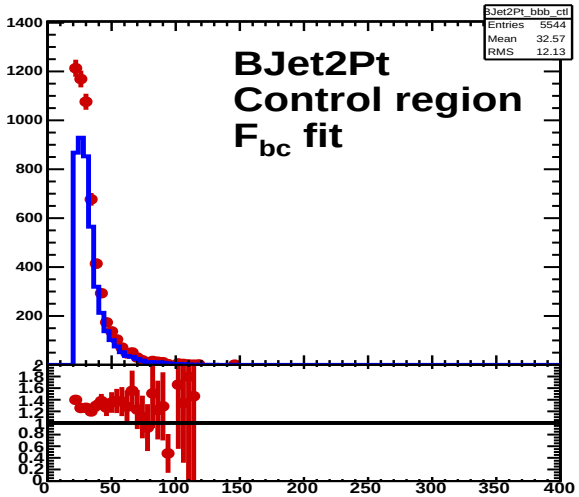

BJet2Eta_bbw_ctl
Entries 2
Mean -0.009982
RMS 1.312
BJet2Eta
Control regio
F_bc jet-truth

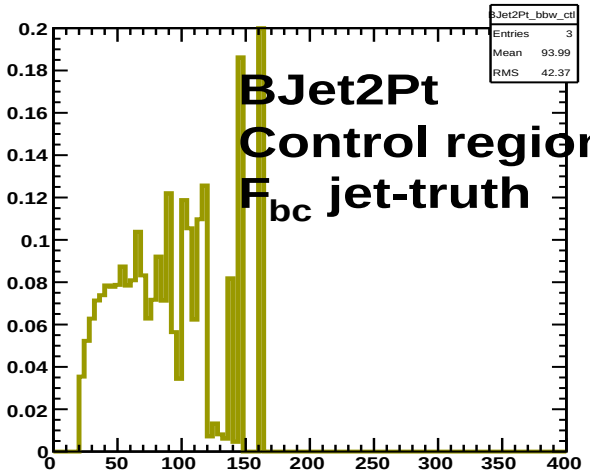

BJet2Eta_bbw_ctl
Entries 2
Mean -0.0001585
RMS 1.391
BJet2Eta
Control regio
F_bc MC-param

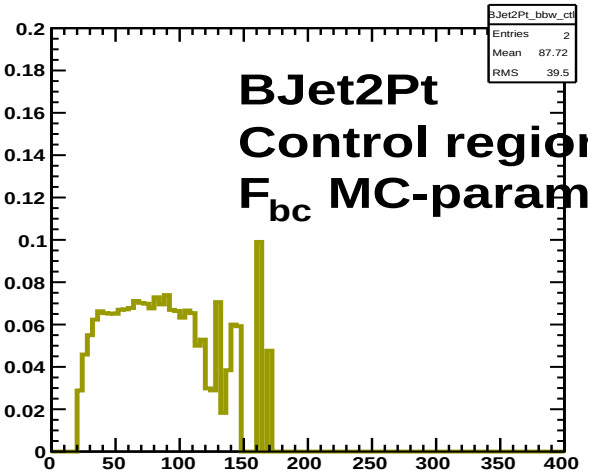

BJet2Eta_bbw_ctl
Entries 2
Mean -0.0006386
RMS 1.387
BJet2Eta
Control regio
F_bc fit

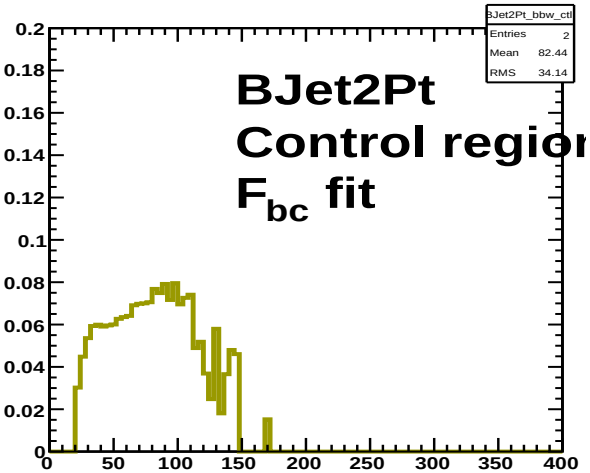

BJet2Pt_bbb_ctl
Entries 5544
Mean 32.57
RMS 12.13
BJet2Pt
Control region
F_bc jet-truth

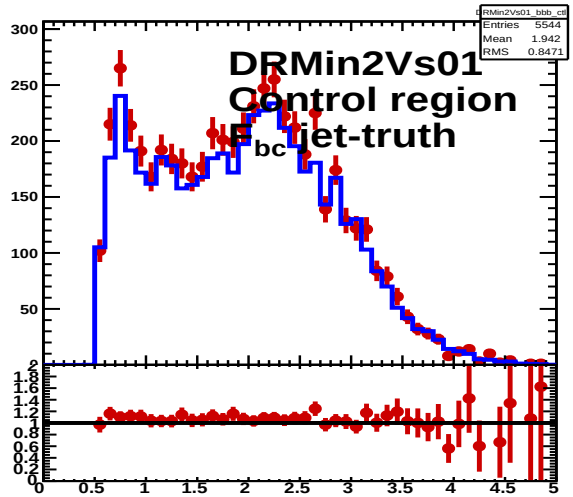

BJet2Pt_bbb_ctl
Entries 5544
Mean 32.57
RMS 12.13
BJet2Pt
Control region
F_bc MC-param

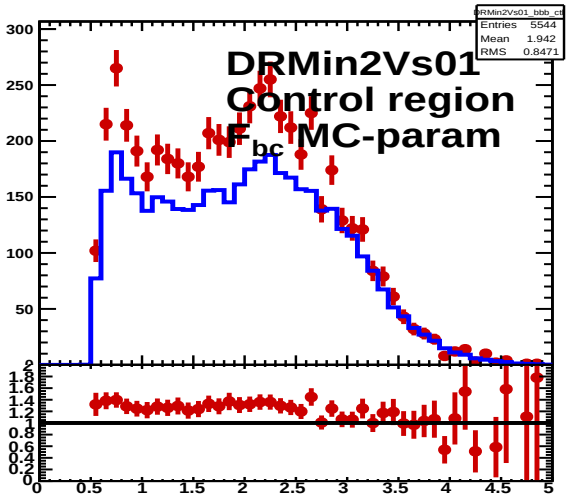

BJet2Pt_bbb_ctl
Entries 5544
Mean 32.57
RMS 12.13
BJet2Pt
Control region
F_bc fit

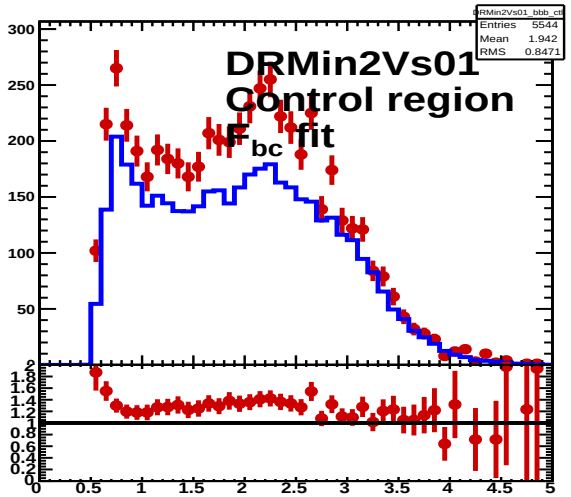

BJet2Pt_bbw_ctl
Entries 3
Mean 93.99
RMS 42.37
BJet2Pt
Control regio
F_bc jet-truth

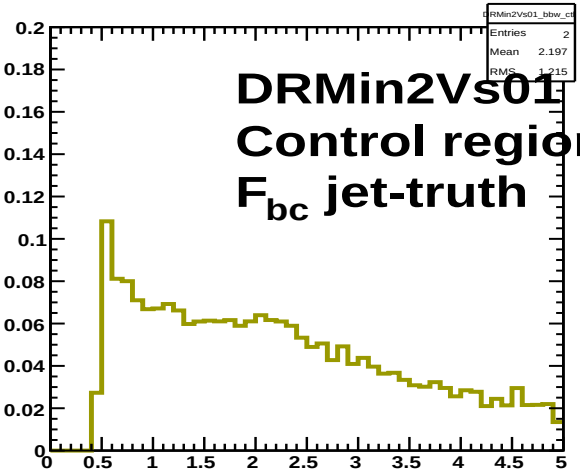

BJet2Pt_bbw_ctl
Entries 2
Mean 87.72
RMS 39.5
BJet2Pt
Control regio
F_bc MC-param

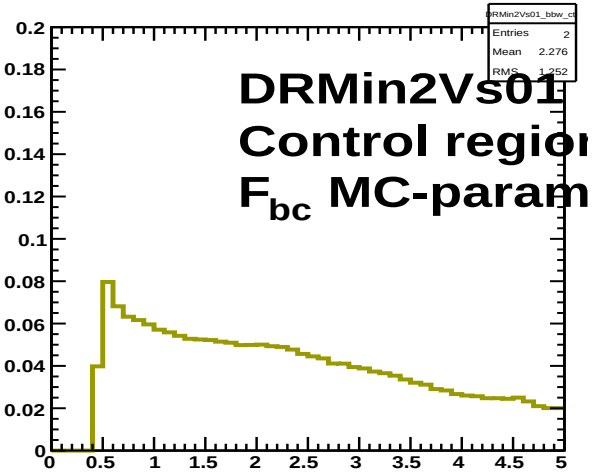

BJet2Pt_bbw_ctl
Entries 2
Mean 82.44
RMS 34.14
BJet2Pt
Control regio
F_bc fit

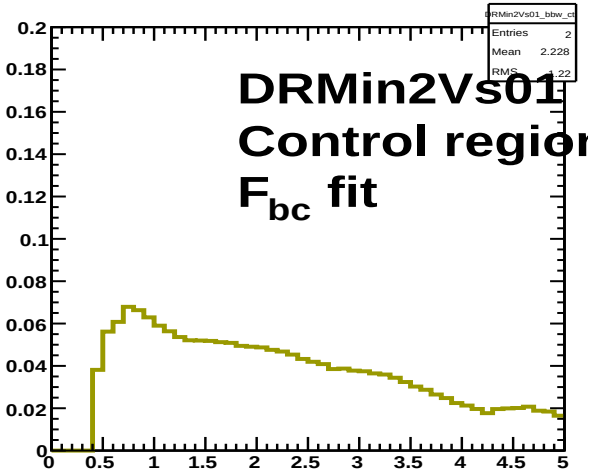

DRMin2Vs01_bbb_ctl
Entries 5544
Mean 1.942
RMS 0.8471
DRMin2Vs01
Control region
F_bc jet-truth

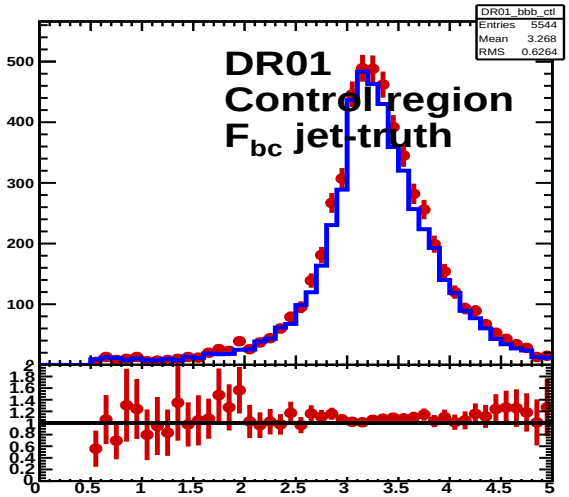

DRMin2Vs01_bbb_ctl
Entries 5544
Mean 1.942
RMS 0.8471
DRMin2Vs01
Control region
F_bc MC-param

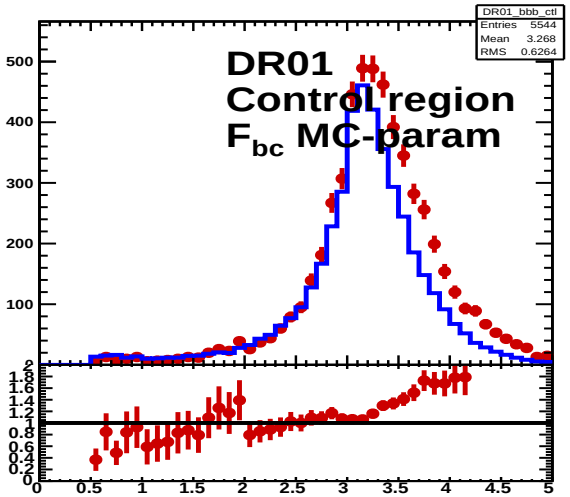

DRMin2Vs01_bbb_ctl
Entries 5544
Mean 1.942
RMS 0.8471
DRMin2Vs01
Control region
F_bc fit

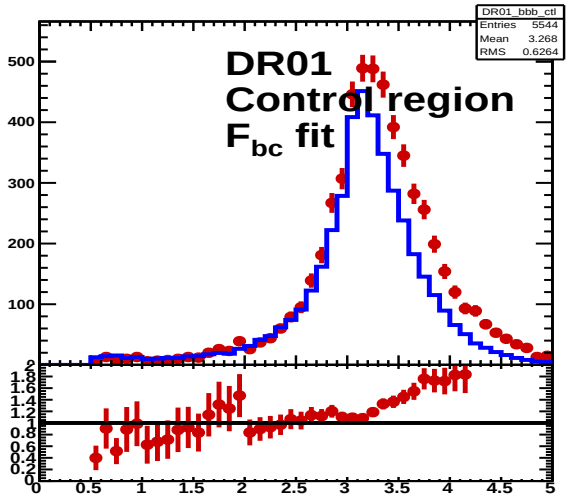

DRMin2Vs01_bbw_ctl
Entries 2
Mean 2.197
RMS 1.215
DRMin2Vs01
Control regio
F_bc jet-truth

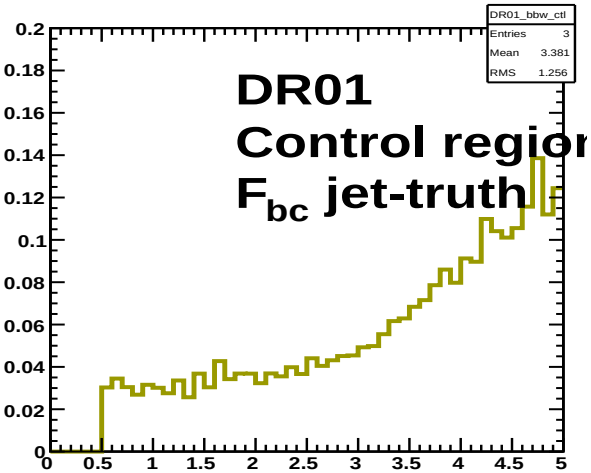

DRMin2Vs01_bbw_ctl
Entries 2
Mean 2.276
RMS 1.252
DRMin2Vs01
Control regio
F_bc MC-param

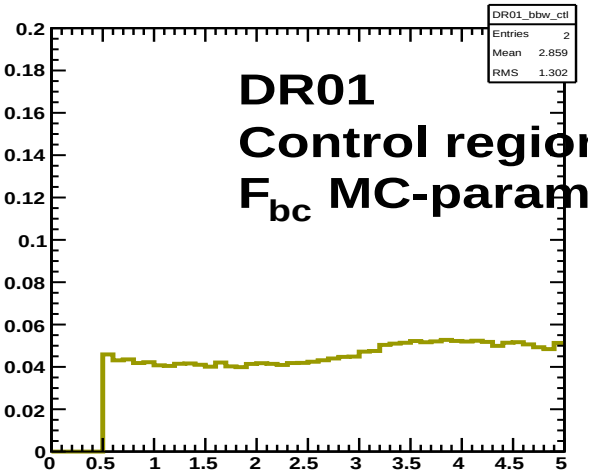

DRMin2Vs01_bbw_ctl
Entries 2
Mean 2.228
RMS 1.22
DRMin2Vs01
Control regio
F_bc fit

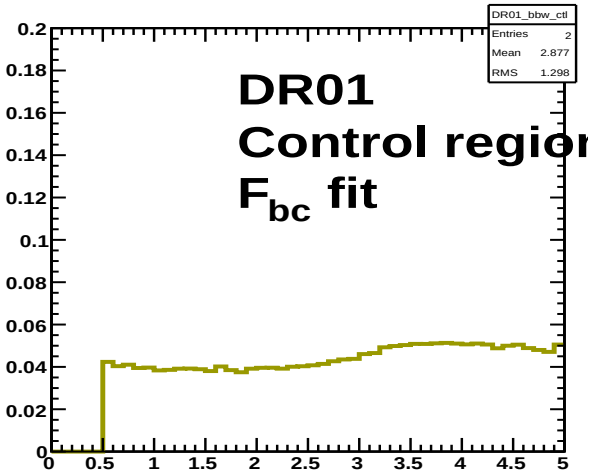

DR01_bbb_ctl
Entries 5544
Mean 3.268
RMS 0.6264
DR01
Control region
F_{bc} jet-truth

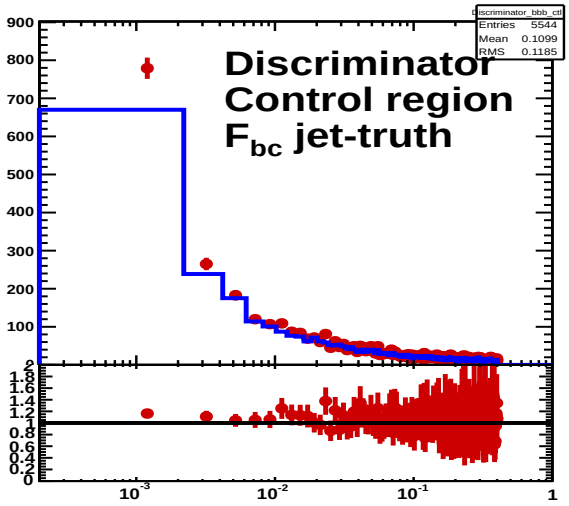

DR01_bbb_ctl
Entries 5544
Mean 3.268
RMS 0.6264
DR01
Control region
F_{bc} MC-param

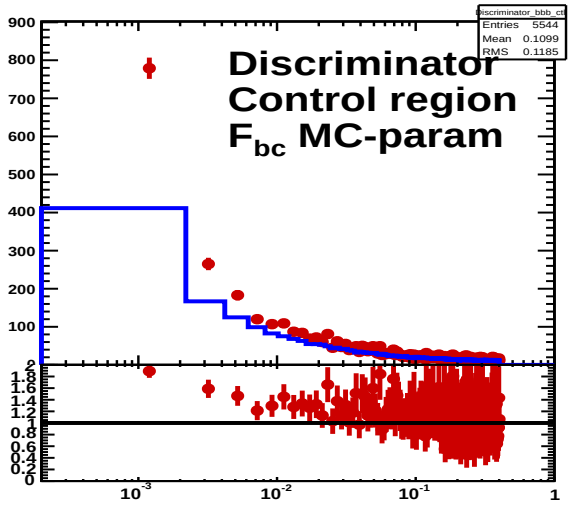

DR01_bbb_ctl
Entries 5544
Mean 3.268
RMS 0.6264
DR01
Control region
F_{bc} fit

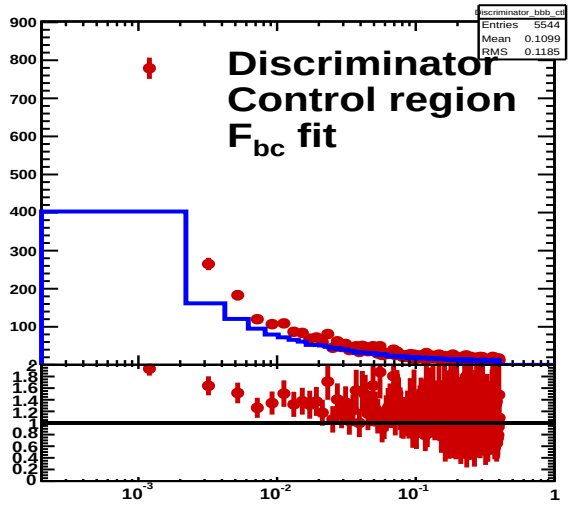

DR01_bbw_ctl
Entries 3
Mean 3.381
RMS 1.256
DR01
Control regio
F_{bc} jet-truth

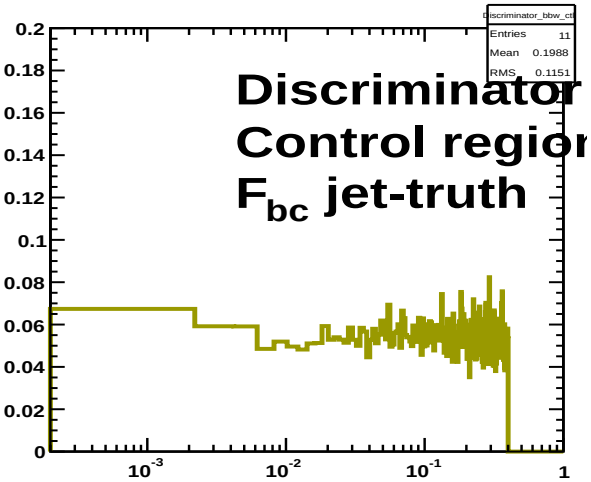

DR01_bbw_ctl
Entries 2
Mean 2.859
RMS 1.302
DR01
Control regio
F_{bc} MC-param

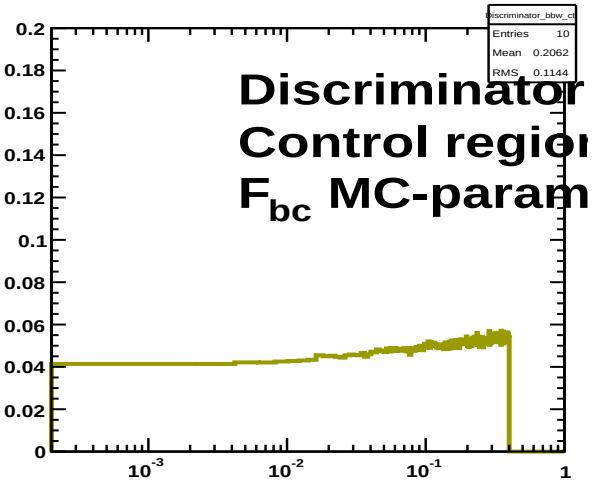

DR01_bbw_ctl
Entries 2
Mean 2.877
RMS 1.298
DR01
Control regio
F_{bc} fit

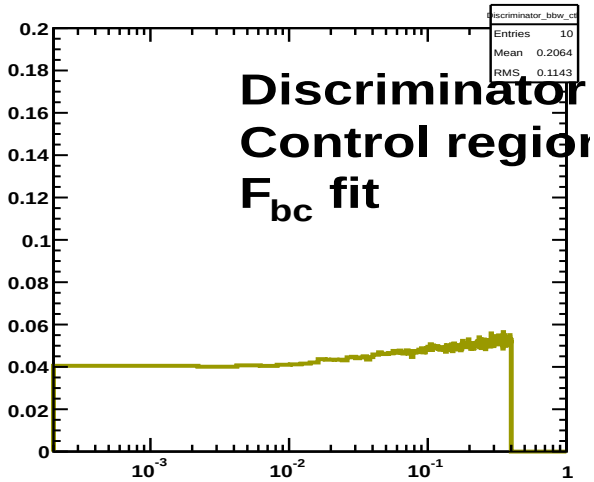

Discriminator_bbb_ctl
Entries 5544
Mean 0.1099
RMS 0.1185
Discriminator
Control region
F_{bc} jet-truth


Discriminator_bbb_ctl
Entries 5544
Mean 0.1099
RMS 0.1185
Discriminator
Control region
F_{bc} MC-param


Discriminator_bbb_ctl
Entries 5544
Mean 0.1099
RMS 0.1185
Discriminator
Control region
F_{bc} fit


Discriminator_bbw_ctl
Entries 11
Mean 0.1988
RMS 0.1151
Discriminator
Control region
F_{bc} jet-truth


Discriminator_bbw_ctl
Entries 10
Mean 0.2062
RMS 0.1144
Discriminator
Control region
F_{bc} MC-param


Discriminator_bbw_ctl
Entries 10
Mean 0.2064
RMS 0.1143
Discriminator
Control region
F_{bc} fit

Update

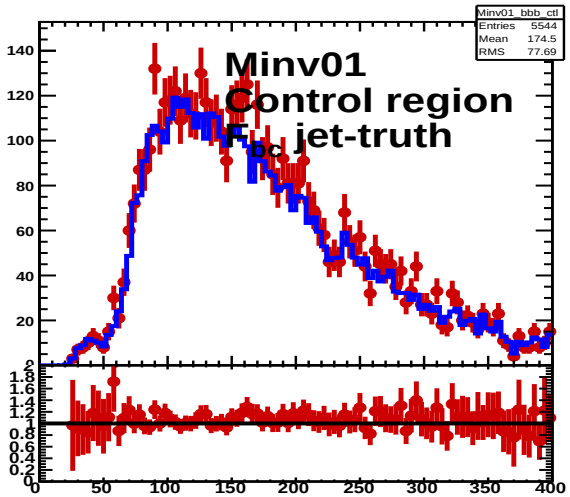
Alert!

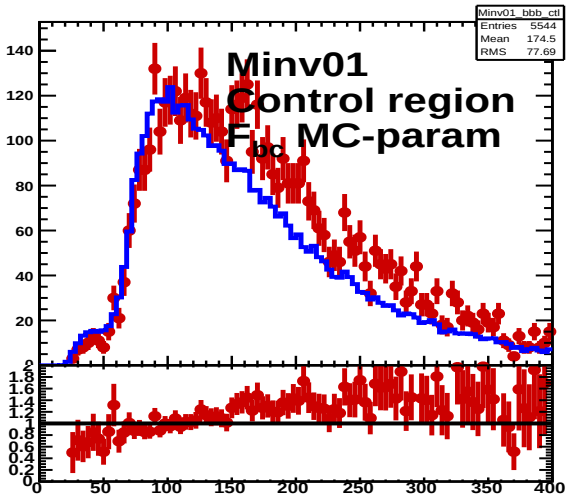
Found a bug, in the normalization of all jets for Fb, Fc: the Fl was taken twice. Fb from 0.081 to 0.086 ($\sim 5\%$).

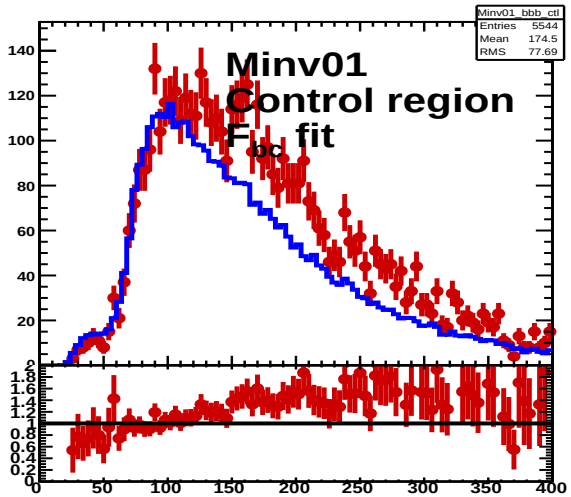
Re-run the btagging matrixes on the skim sample;
Check also with flat $F_{b,c}$, namely one hardcoded number for all events.
The ratio seen/predicted is like the following:

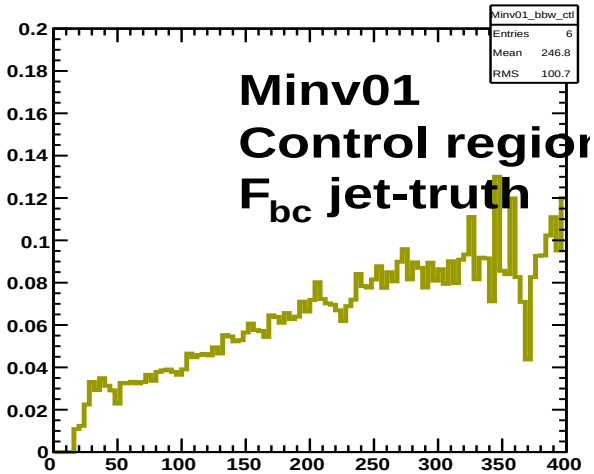
- Jet-truth (Seen) 5544/ (pred) 5148.19 = 1.07688
- Fit (Seen) 5544/ (pred) 4284.66 = 1.29392
- Param-truth (Seen) 5544/ (pred) 4402.88 = 1.25917 (with bug in)
- (Seen) 5544/ (pred) 4557.15 = 1.21655 (w/o bug)
- (Seen) 5544/ (pred) 4858.45 = 1.1411 w/ fB=8.59%; fC=4.67%; fL 86.7%;
- (Seen) 5544/ (pred) 4596.07 = 1.2062 (w/o bug and using skim)

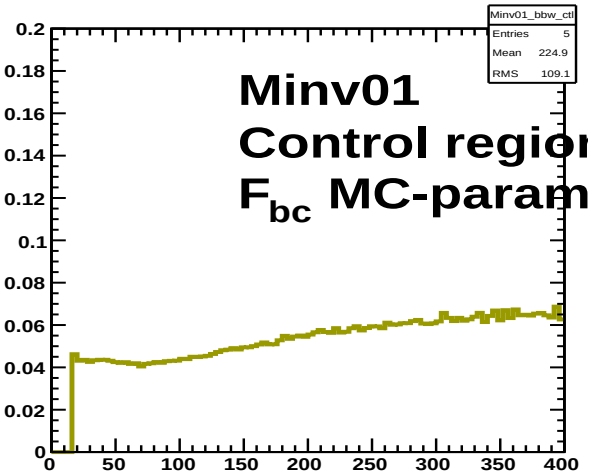
Comparing distribution from MC with improvement

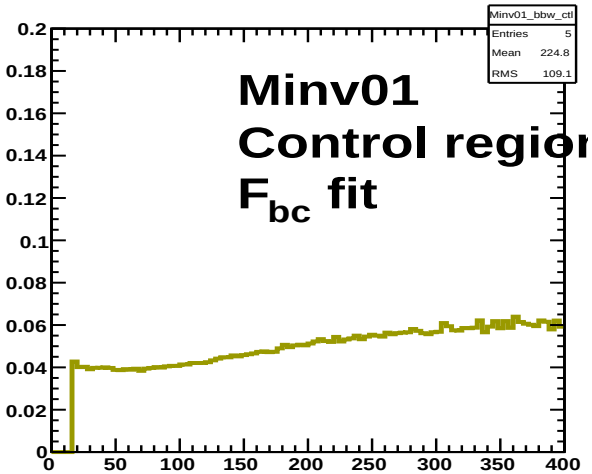


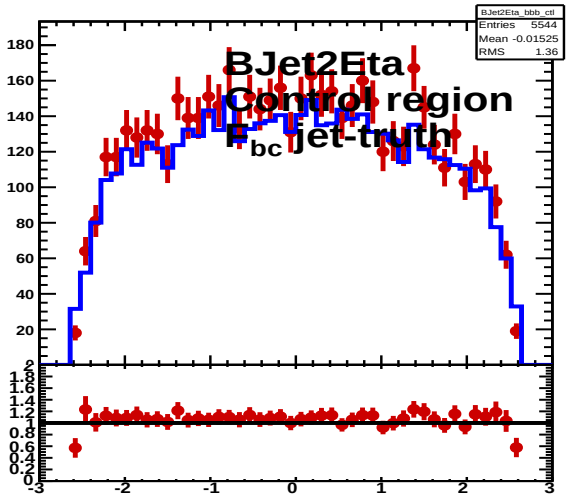


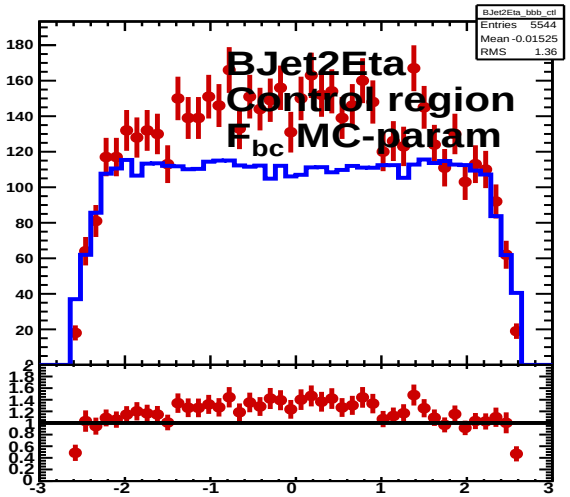


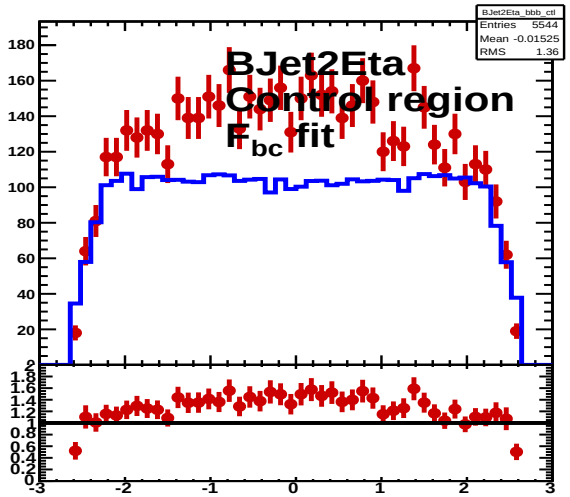


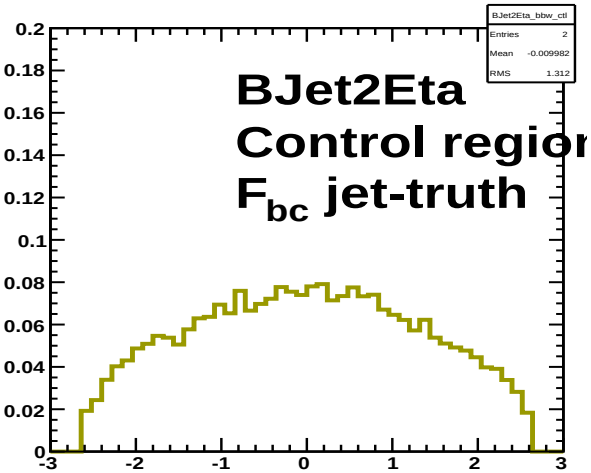


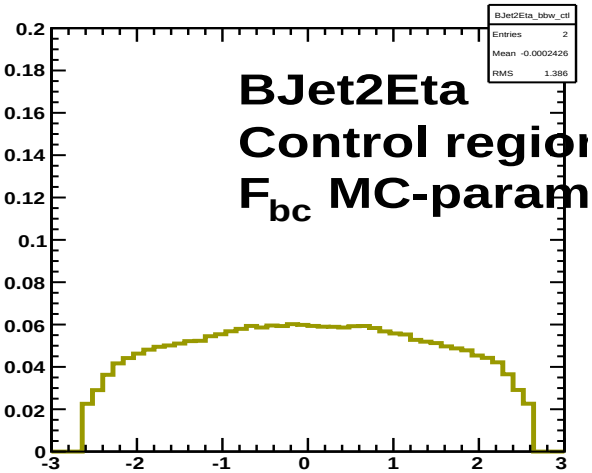


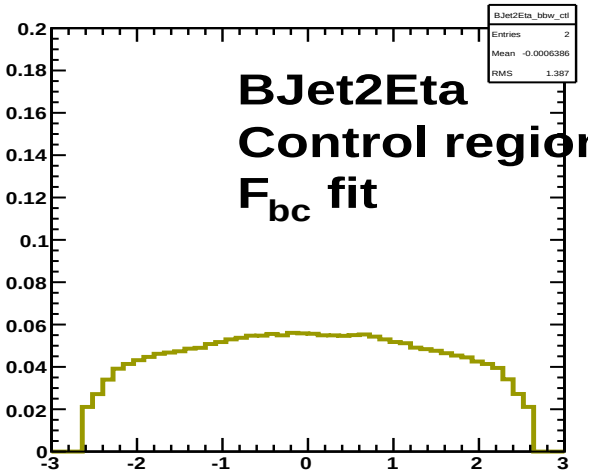

BJet2Eta_bbb_ctl
Entries 5544
Mean -0.01525
RMS 1.36
BJet2Eta
Control region
F_bc jet-truth

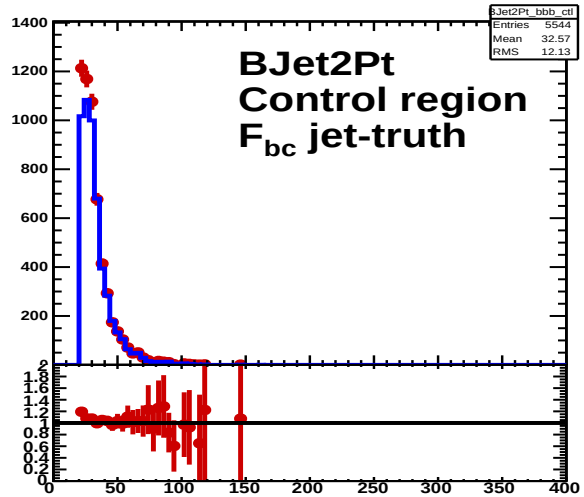

BJet2Eta_bbb_ctl
Entries 5544
Mean -0.01525
RMS 1.36
BJet2Eta
Control region
F_bc MC-param

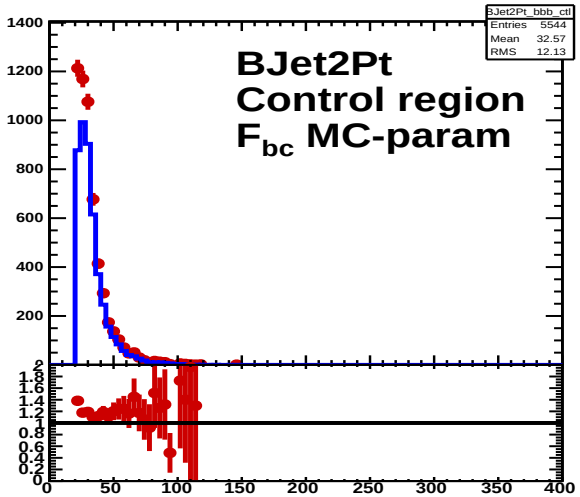

BJet2Eta_bbb_ctl
Entries 5544
Mean -0.01525
RMS 1.36
BJet2Eta
Control region
F_bc fit

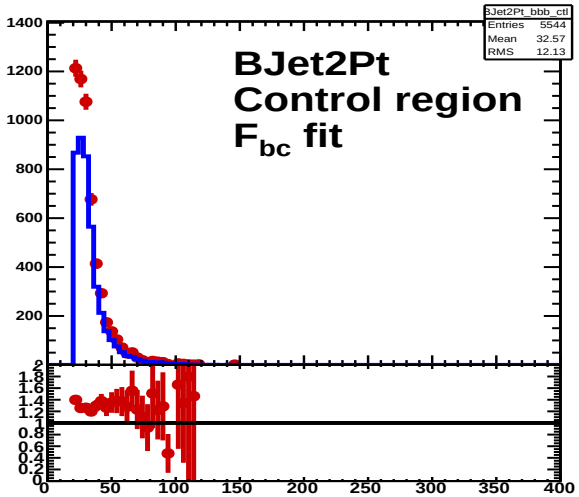

BJet2Eta_bbw_ctl
Entries 2
Mean -0.009982
RMS 1.312
BJet2Eta
Control regio
F_bc jet-truth

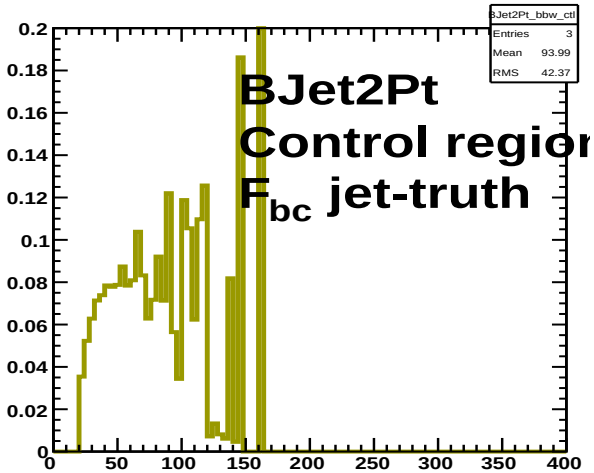

BJet2Eta_bbw_ctl
Entries 2
Mean -0.0002426
RMS 1.386
BJet2Eta
Control regio
F_bc MC-param

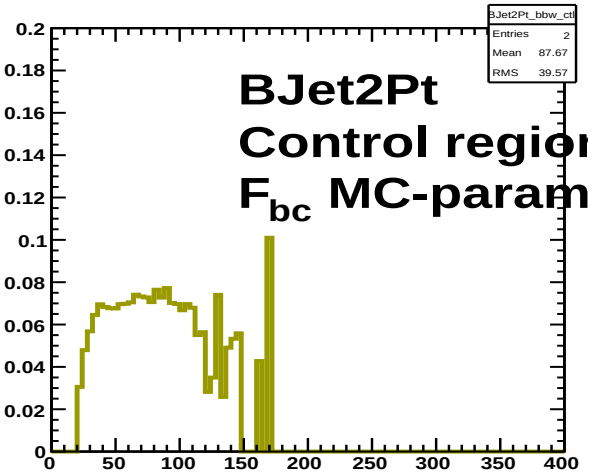

BJet2Eta_bbw_ctl
Entries 2
Mean -0.0006386
RMS 1.387
BJet2Eta
Control regio
F_bc fit

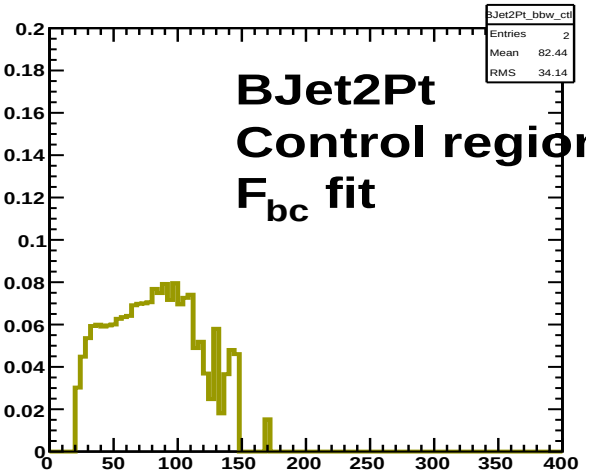

BJet2Pt_bbb_ctl
Entries 5544
Mean 32.57
RMS 12.13
BJet2Pt
Control region
F_bc jet-truth

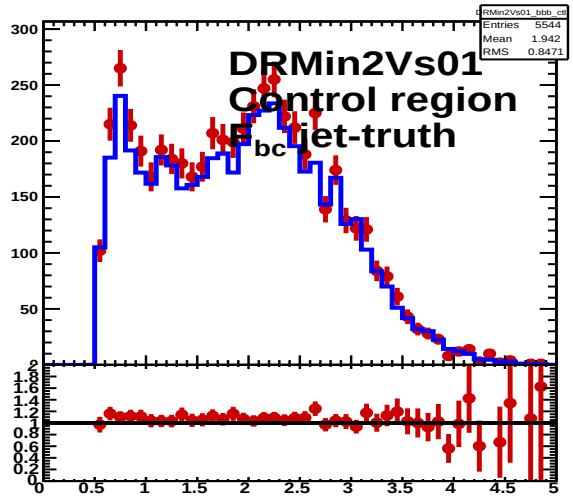

BJet2Pt_bbb_ctl
Entries 5544
Mean 32.57
RMS 12.13
BJet2Pt
Control region
F_bc MC-param

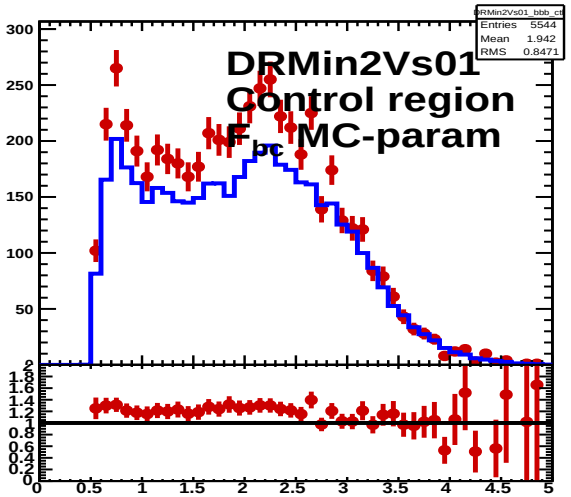

BJet2Pt_bbb_ctl
Entries 5544
Mean 32.57
RMS 12.13
BJet2Pt
Control region
F_bc fit

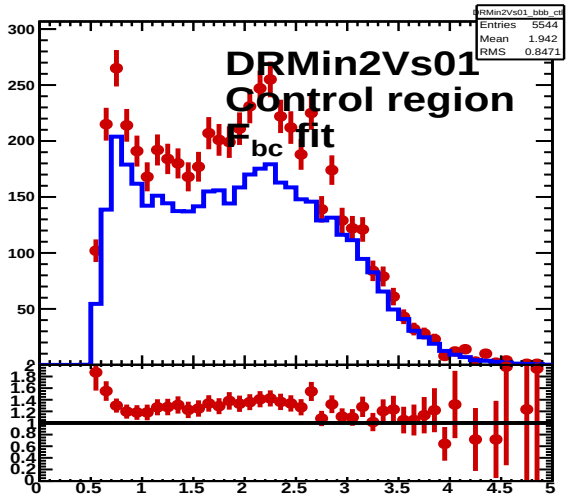

BJet2Pt_bbw_ctl
Entries 3
Mean 93.99
RMS 42.37
BJet2Pt
Control regio
F_bc jet-truth

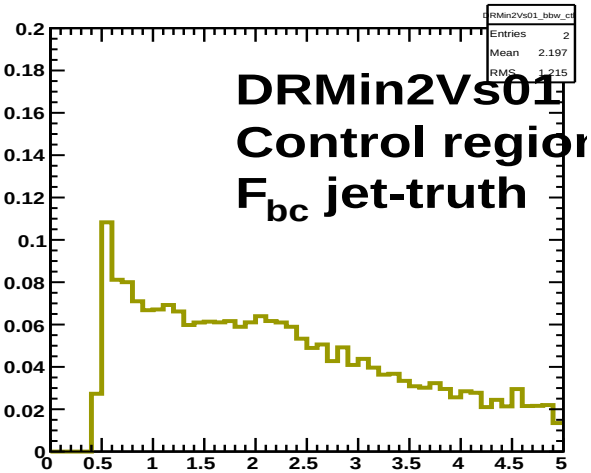

BJet2Pt_bbw_ctl
Entries 2
Mean 87.67
RMS 39.57
BJet2Pt
Control regio
F_bc MC-param

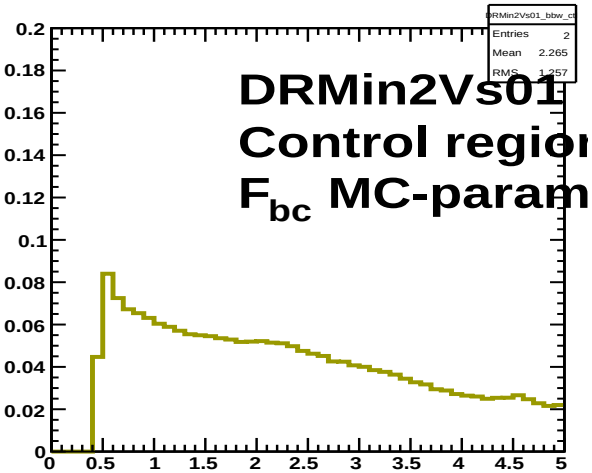

BJet2Pt_bbw_ctl
Entries 2
Mean 82.44
RMS 34.14
BJet2Pt
Control regio
F_bc fit

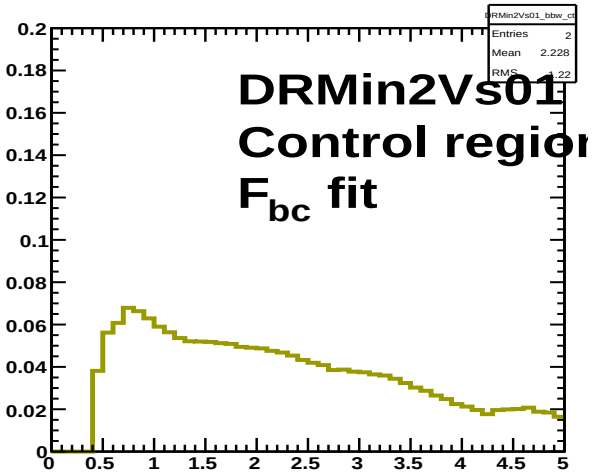

DRMin2Vs01_bbb_ctl
Entries 5544
Mean 1.942
RMS 0.8471
DRMin2Vs01
Control region
F_bc jet-truth

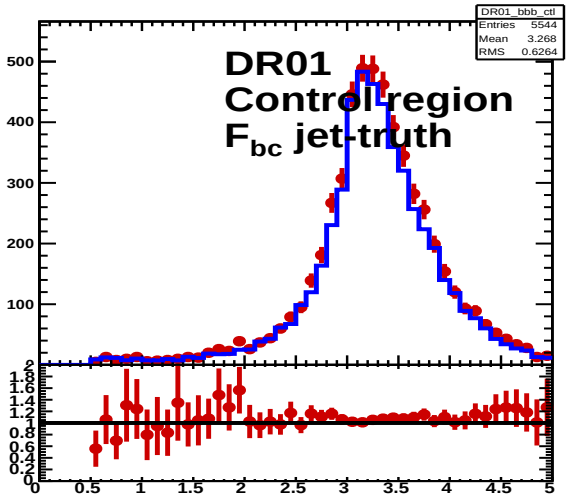

DRMin2Vs01_bbb_ctl
Entries 5544
Mean 1.942
RMS 0.8471
DRMin2Vs01
Control region
F_bc MC-param

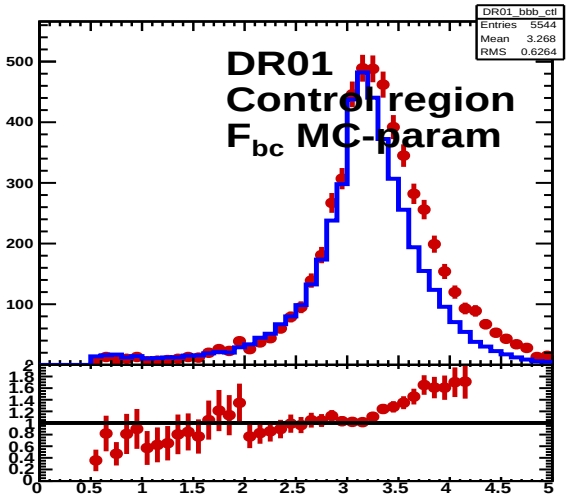

DRMin2Vs01_bbb_ctl
Entries 5544
Mean 1.942
RMS 0.8471
DRMin2Vs01
Control region
F_bc fit

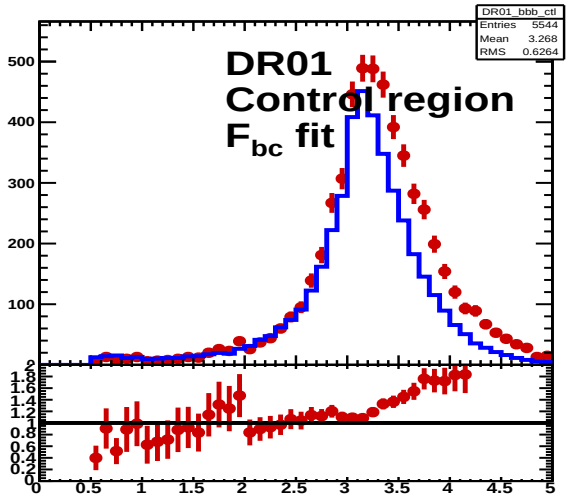

DRMin2Vs01_bbw_ctl
Entries 2
Mean 2.197
RMS 1.215
DRMin2Vs01
Control regio
F_bc jet-truth

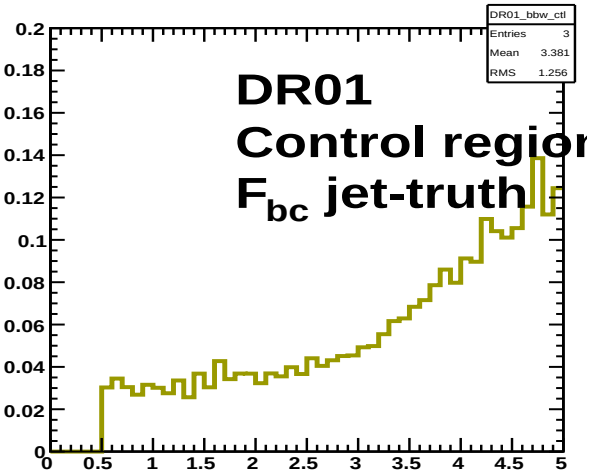

DRMin2Vs01_bbw_ctl
Entries 2
Mean 2.265
RMS 1.257
DRMin2Vs01
Control regio
F_bc MC-param

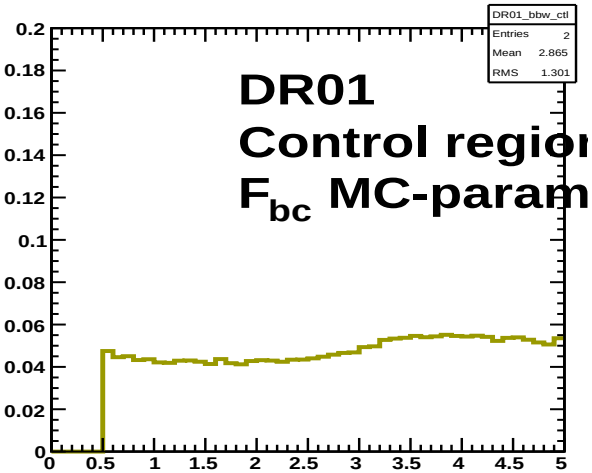

DRMin2Vs01_bbw_ctl
Entries 2
Mean 2.228
DRMin2Vs01
Control regio
F_bc fit

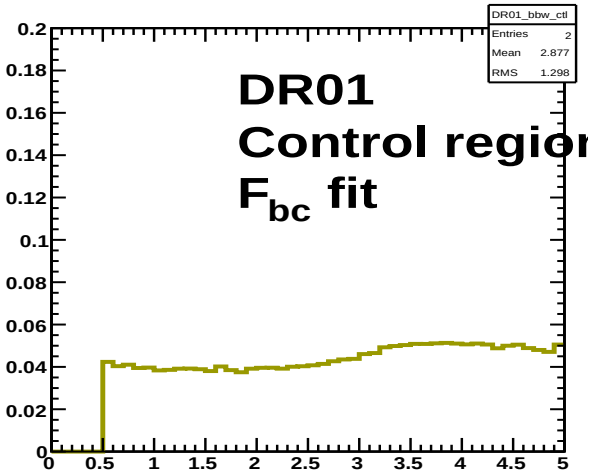

DR01_bbb_ctl
Entries 5544
Mean 3.268
RMS 0.6264
DR01
Control region
F_{bc} jet-truth

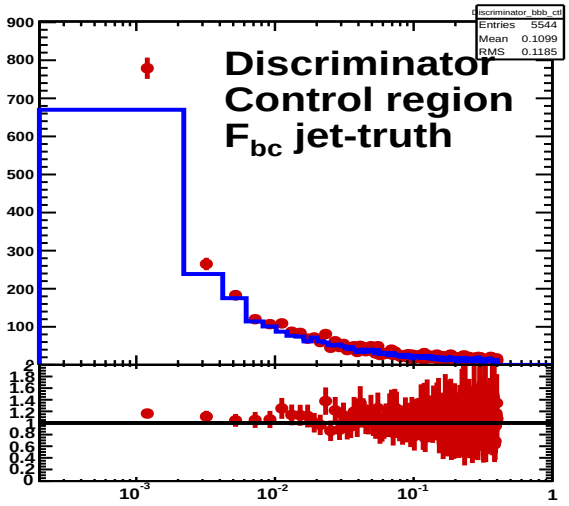

DR01_bbb_ctl
Entries 5544
Mean 3.268
RMS 0.6264
DR01
Control region
F_{bc} MC-param

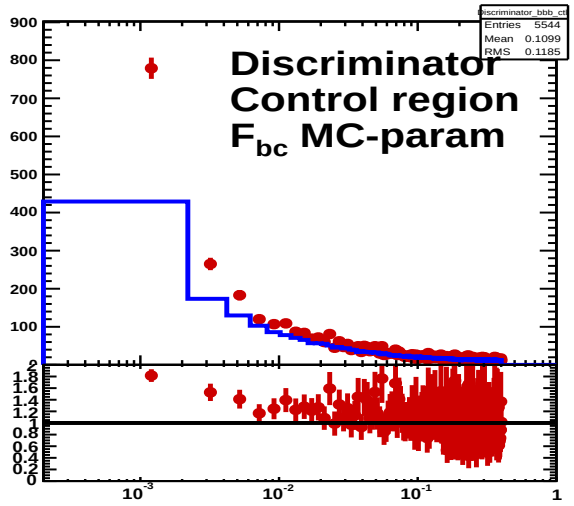

DR01_bbb_ctl
Entries 5544
Mean 3.268
RMS 0.6264
DR01
Control region
F_{bc} fit

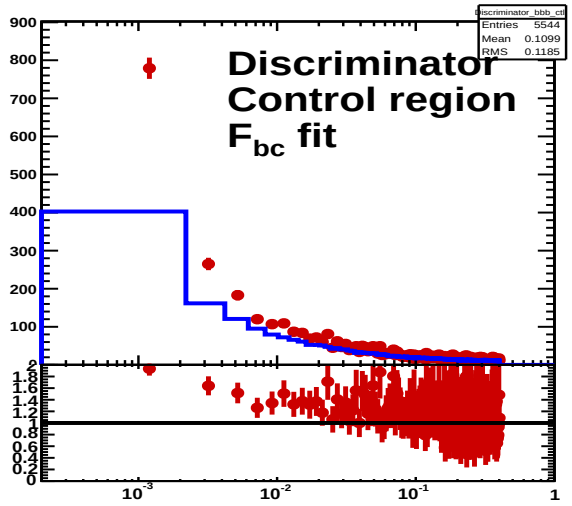

DR01_bbw_ctl
Entries 3
Mean 3.381
RMS 1.256
DR01
Control regio
F_{bc} jet-truth

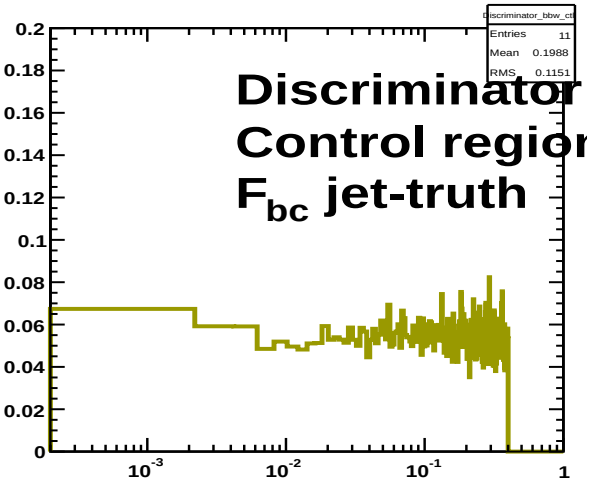

DR01_bbw_ctl
Entries 2
Mean 2.865
RMS 1.301
DR01
Control regio
F_{bc} MC-param

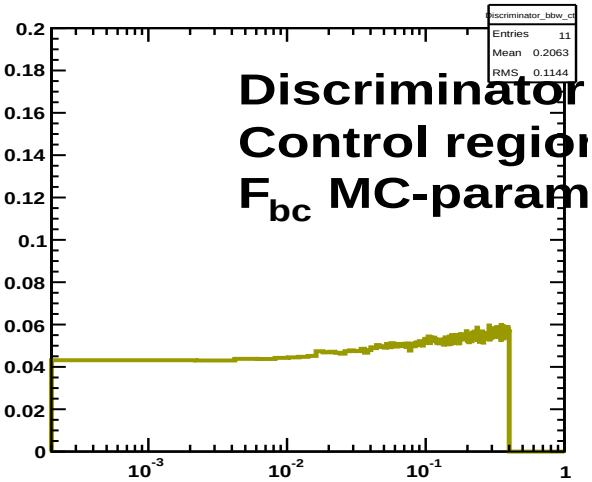

DR01_bbw_ctl
Entries 2
Mean 2.877
RMS 1.298
DR01
Control regio
F_{bc} fit

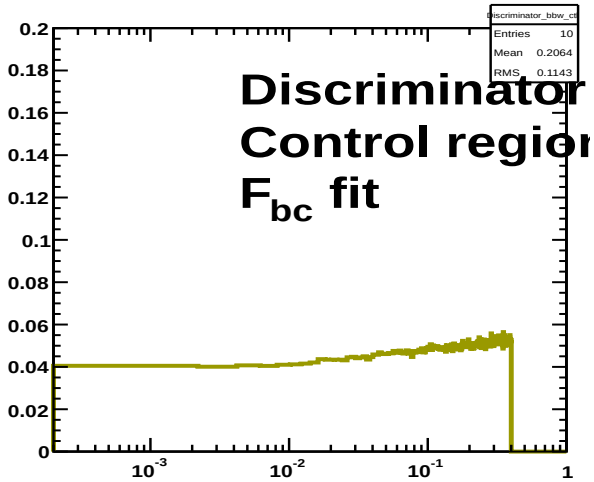

Discriminator_bbb_ctl
Entries 5544
Mean 0.1099
RMS 0.1185
Discriminator
Control region
F_{bc} jet-truth


Discriminator_bbb_ctl
Entries 5544
Mean 0.1099
RMS 0.1185
Discriminator
Control region
F_{bc} MC-param


Discriminator_bbb_ctl
Entries 5544
Mean 0.1099
RMS 0.1185
Discriminator
Control region
F_{bc} fit


Discriminator_bbw_ctl
Entries 11
Mean 0.1988
RMS 0.1151
Discriminator
Control region
F_{bc} jet-truth


Discriminator_bbw_ctl
Entries 11
Mean 0.2063
RMS 0.1144
Discriminator
Control region
F_{bc} MC-param


Discriminator_bbw_ctl
Entries 10
Mean 0.2064
RMS 0.1143
Discriminator
Control region
F_{bc} fit

More Update

Alert!

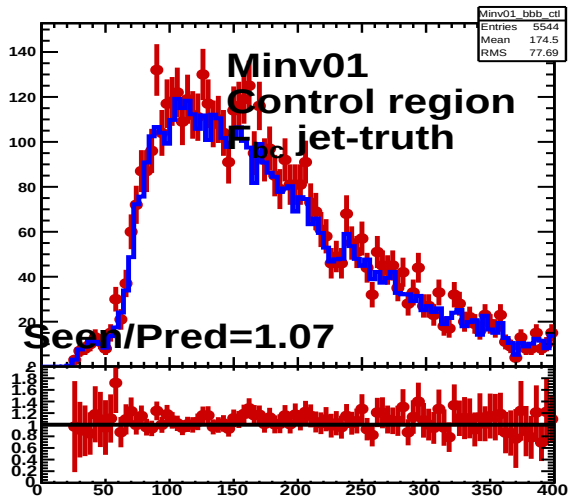
For MC truth, I was evaluating $F_{b,c}$ in all phase space, not only in control region. Fixed.

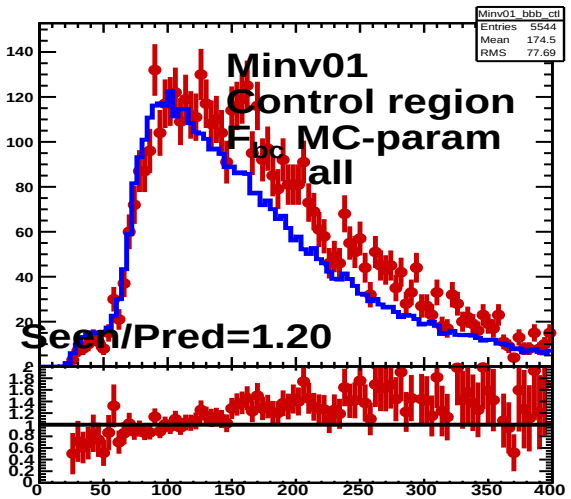
Seen/Pred:

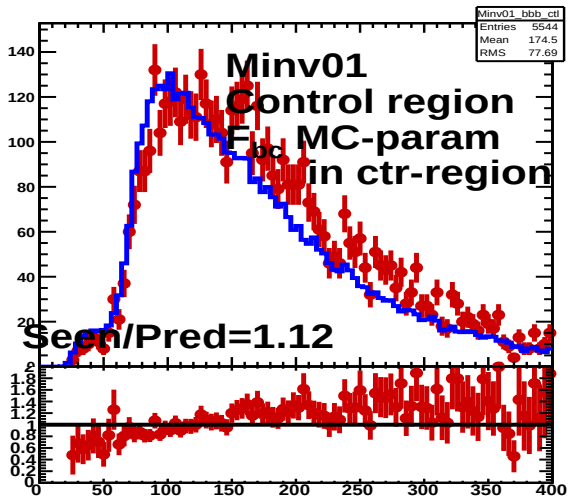
- Jet-truth 5544/5148.19 = 1.07688
- Fit 5544/4284.66 = 1.29392
- Flat 5544/4858.45 = 1.1411 w/ fB=8.59%; fC=4.67%; fL 86.7%;
- Param in control reg. only 5544/4914.52 = 1.12809
- Previous param, whole reg. 5544/4596.07 = 1.2062

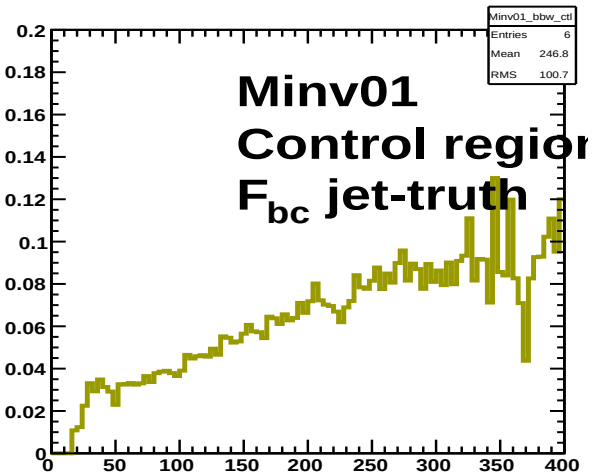
Closer and closer . . .

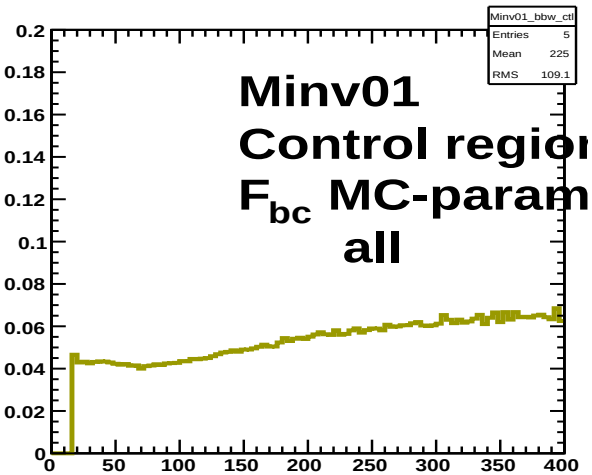
Comparing distribution from MC with further improvement

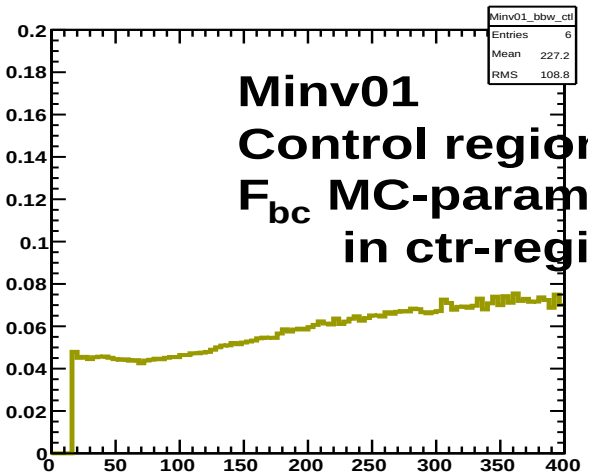


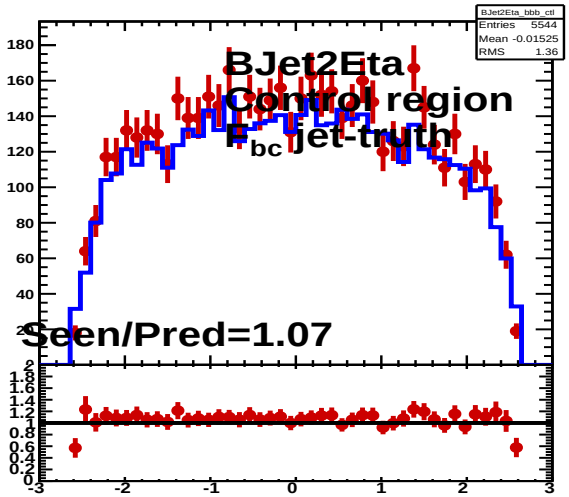


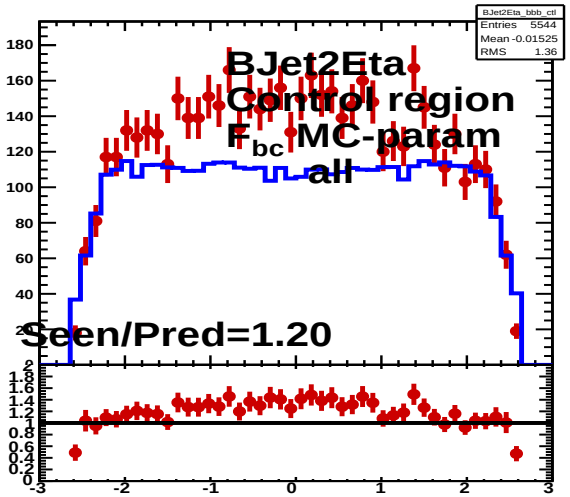


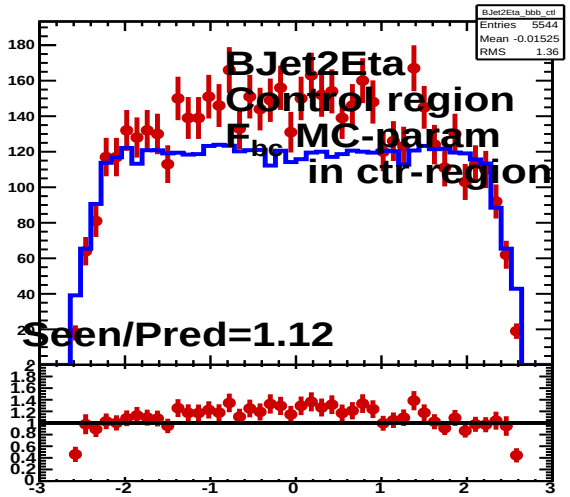


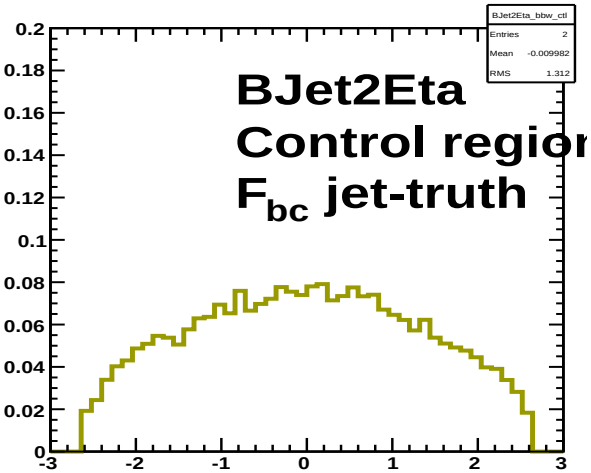


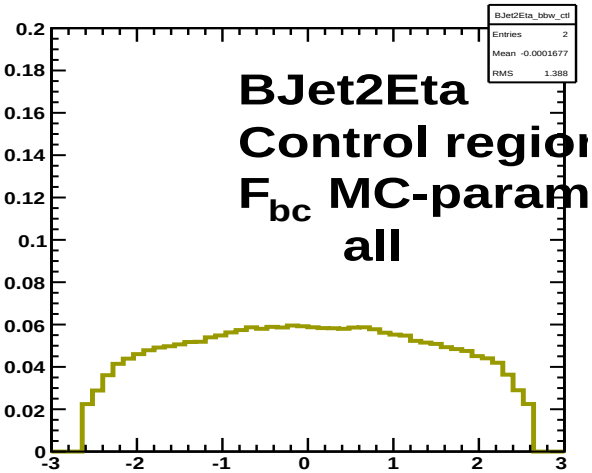


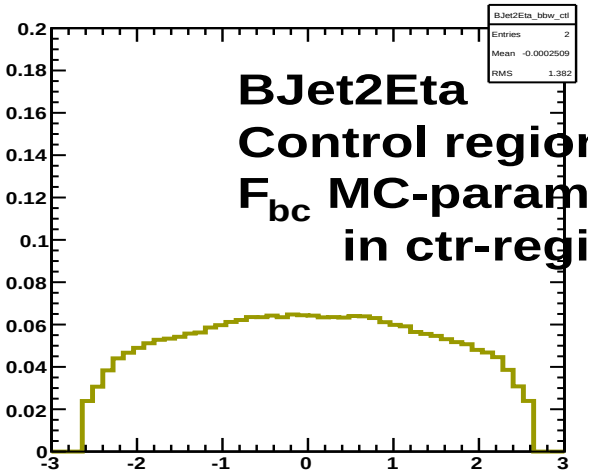

BJet2Eta_bbb_ctl
Entries 5544
Mean -0.01525
RMS 1.36
BJet2Eta
Control region
F_bc jet-truth
Seen/Pred=1.07

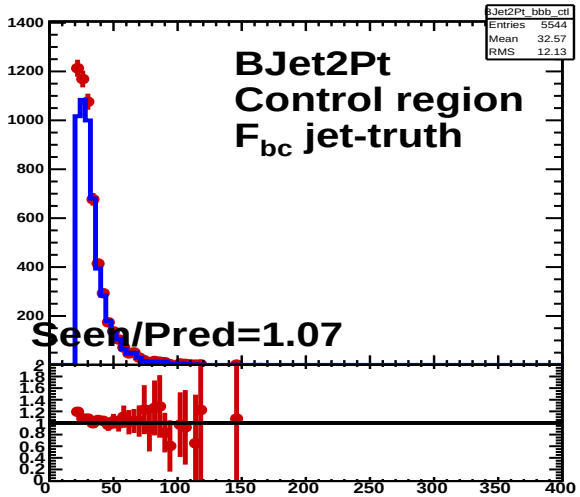

BJet2Eta_bbb_ctl
Entries 5544
Mean -0.01525
RMS 1.36
BJet2Eta
Control region
F_bc MC-param
all
Seen/Pred=1.20

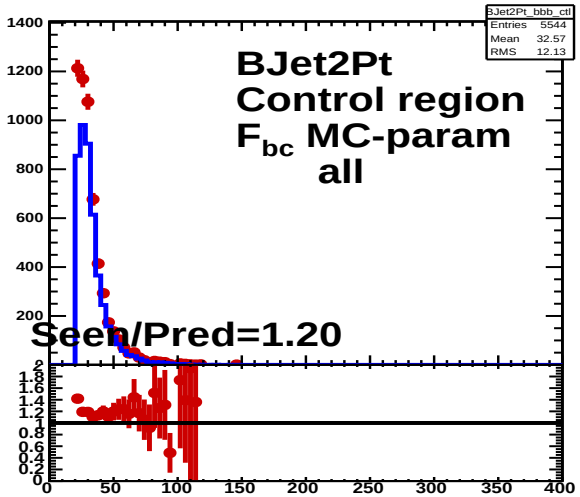

BJet2Eta_bbb_ctl
Entries 5544
Mean -0.01525
RMS 1.36
BJet2Eta
Control region
F_bc MC-param
in ctr-region
Seen/Pred=1.12

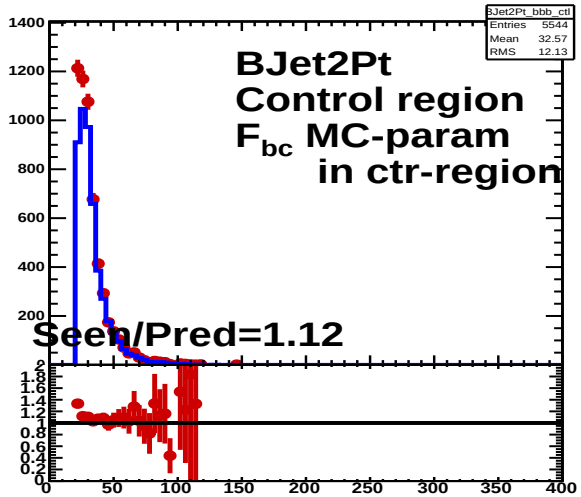

BJet2Eta_bbw_ctl
Entries 2
Mean -0.009982
RMS 1.312
BJet2Eta
Control regio
F_bc jet-truth

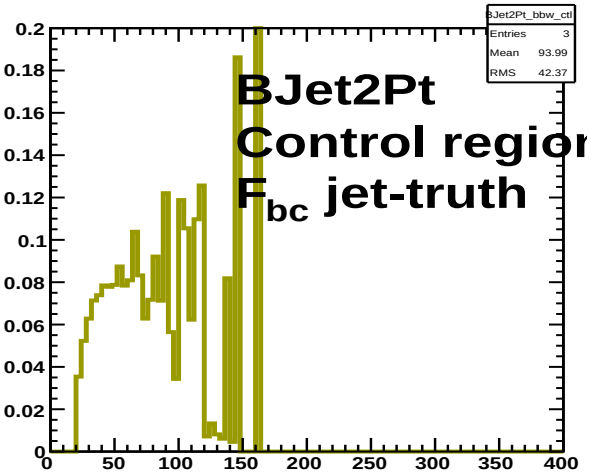

BJet2Eta_bbw_ctl
Entries 2
Mean -0.0001677
RMS 1.388
BJet2Eta
Control regio
F_bc MC-param
all

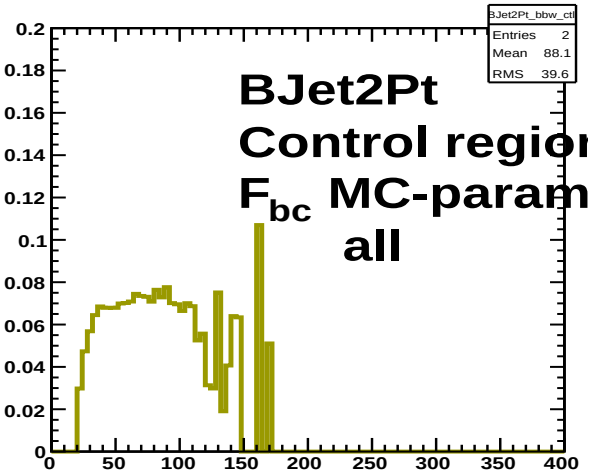

BJet2Eta_bbw_ctl
Entries 2
Mean -0.0002509
RMS 1.382
BJet2Eta
Control regio
F_bc MC-param
in ctr-regi

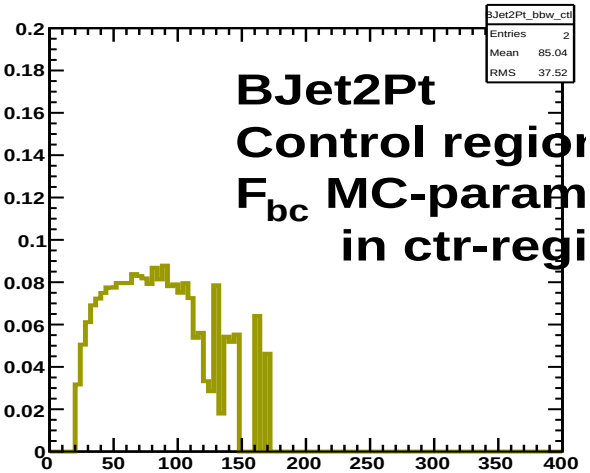

BJet2Pt_bbb_ctl
Entries 5544
Mean 32.57
RMS 12.13
BJet2Pt
Control region
F_{bc} jet-truth
Seen/Pred=1.07

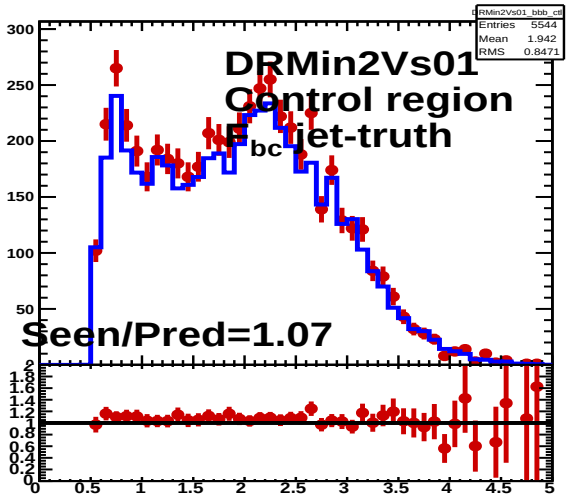

BJet2Pt_bbb_ctl
Entries 5544
Mean 32.57
RMS 12.13
BJet2Pt
Control region
F_{bc} MC-param
all
Seen/Pred=1.20

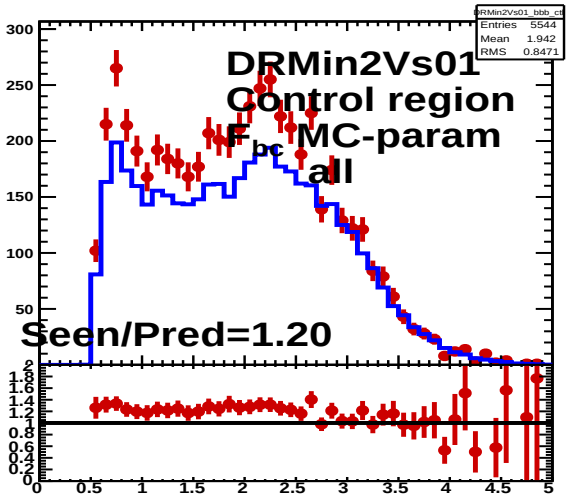

BJet2Pt_bbb_ctl
Entries 5544
Mean 32.57
RMS 12.13
BJet2Pt
Control region
F_{bc} MC-param
in ctr-region
Seen/Pred=1.12


BJet2Pt_bbw_ctl
Entries 3
Mean 93.99
RMS 42.37
BJet2Pt
Control regio
F_{bc} jet-truth


BJet2Pt_bbw_ctl
Entries 2
Mean 88.1
RMS 39.6
BJet2Pt
Control regio
F_{bc} MC-param
all


BJet2Pt_bbw_ctl
Entries 2
Mean 85.04
RMS 37.52
BJet2Pt
Control regio
F_{bc} MC-param
in ctr-regi


DRMin2Vs01_bbb_ctr
Entries 5544
Mean 1.942
RMS 0.8471
DRMin2Vs01
Control region
F_bc jet-truth
Seen/Pred=1.07


DRMin2Vs01_bbb_ctr
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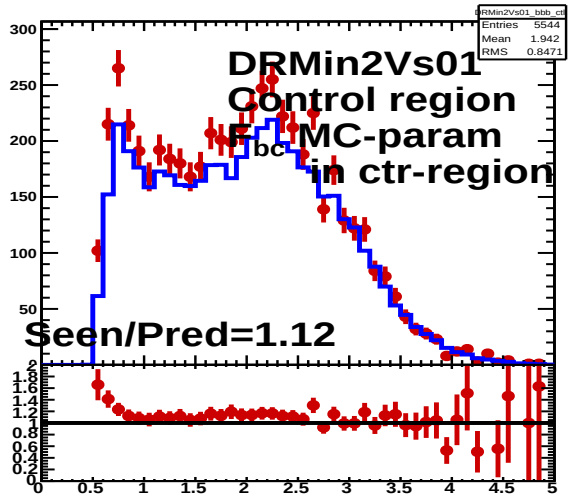
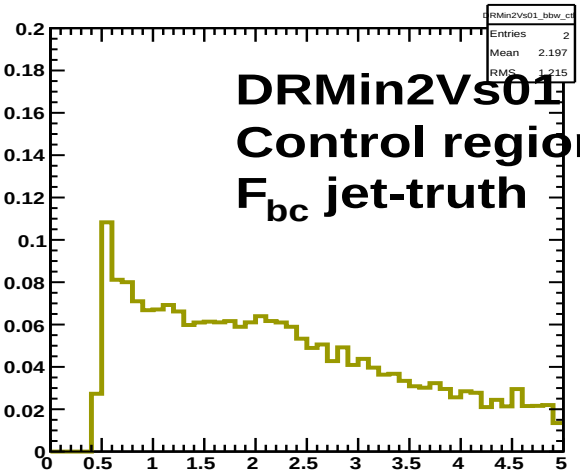
RMS 0.8471
DRMin2Vs01
Control region
F_bc MC-param
all
Seen/Pred=1.20


DRMin2Vs01_bbb_ctr
Entries 5544
Mean 1.942
RMS 0.8471
DRMin2Vs01
Control region
F_bc MC-param
in ctr-region
Seen/Pred=1.12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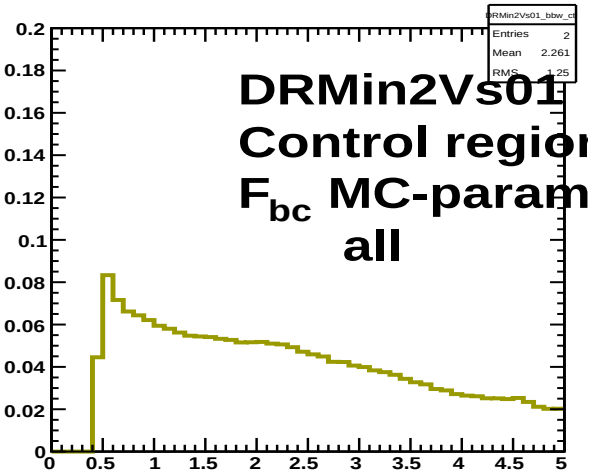
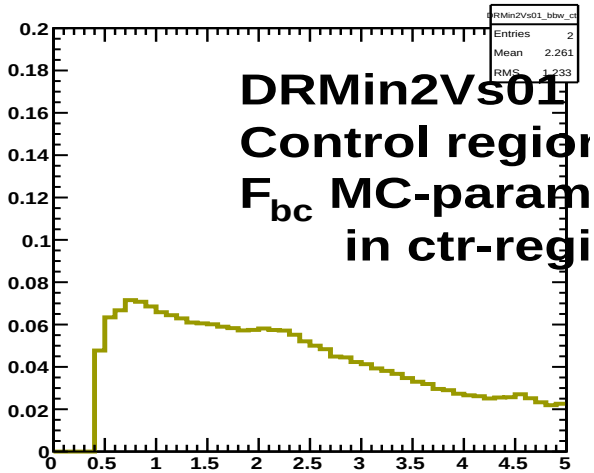
DRMin2Vs01
Control regio
F_bc jet-truth


DRMin2Vs01_bbw_ctr
Entries 2
Mean 2.261
RMS 1.25
DRMin2Vs01
Control regio
F_bc MC-param
all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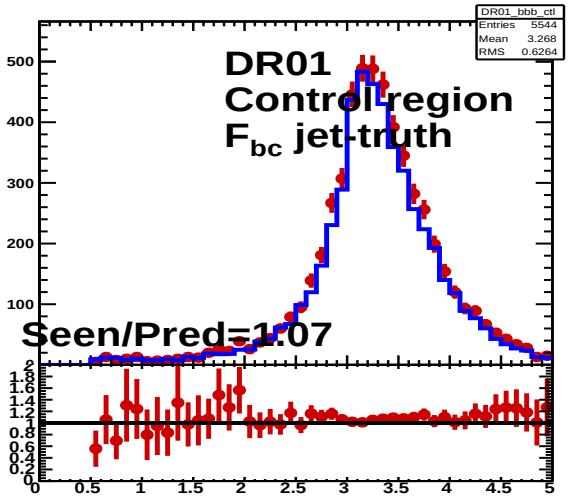
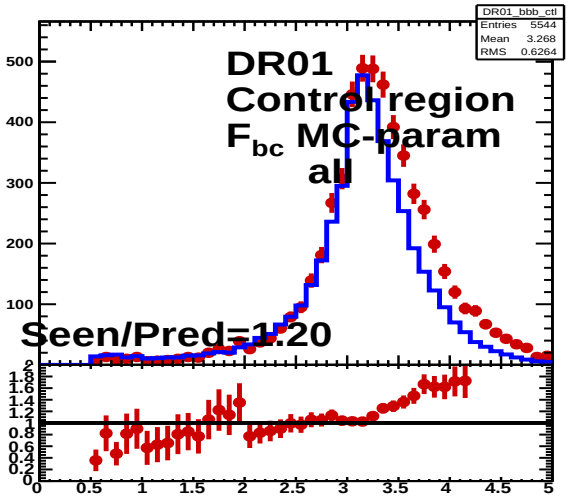
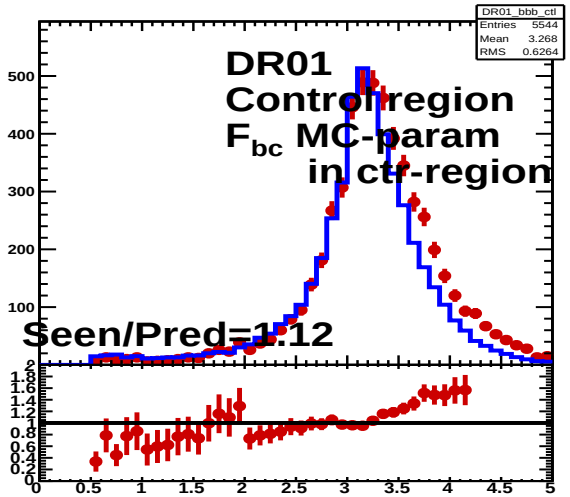
Control regio
F_bc MC-param
in ctr-regi


DR01_bbb_ctl
Entries 5544
Mean 3.268
RMS 0.6264
DR01
Control region
F_{bc} jet-truth
Seen/Pred=1.07


DR01_bbb_ctl
Entries 5544
Mean 3.268
RMS 0.6264
DR01
Control region
F_{bc} MC-param
all
Seen/Pred=1.20


DR01_bbb_ctl
Entries 5544
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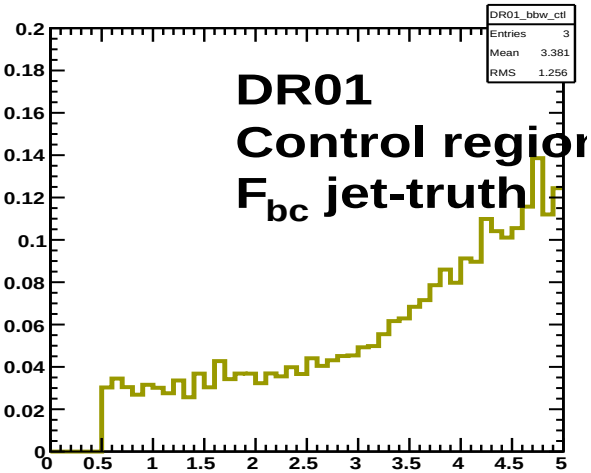
RMS 0.6264
DR01
Control region
F_{bc} MC-param
in ctr-region
Seen/Pred=1.12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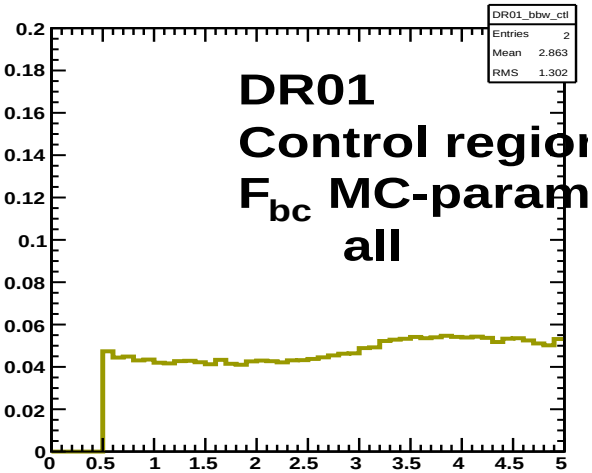
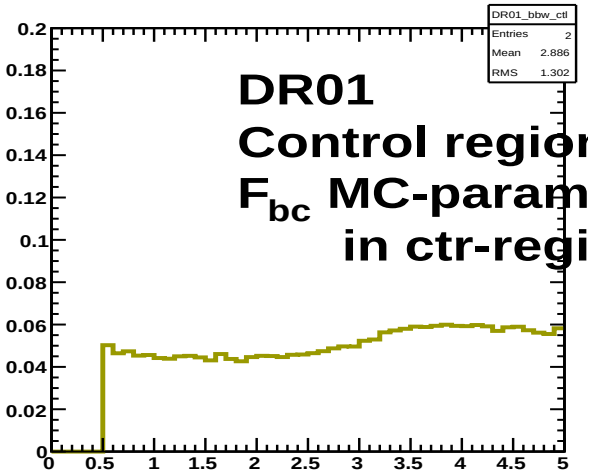
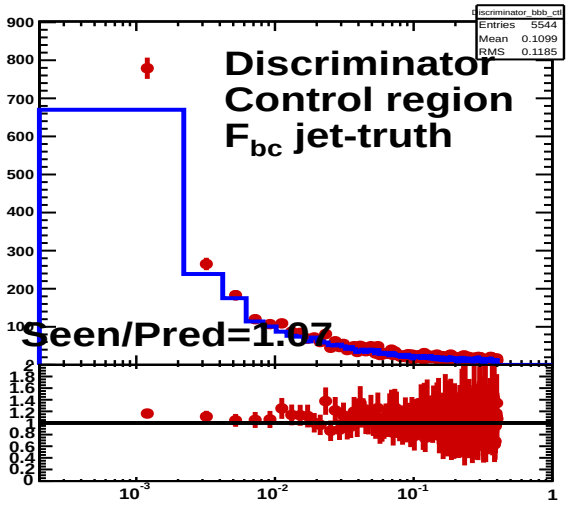
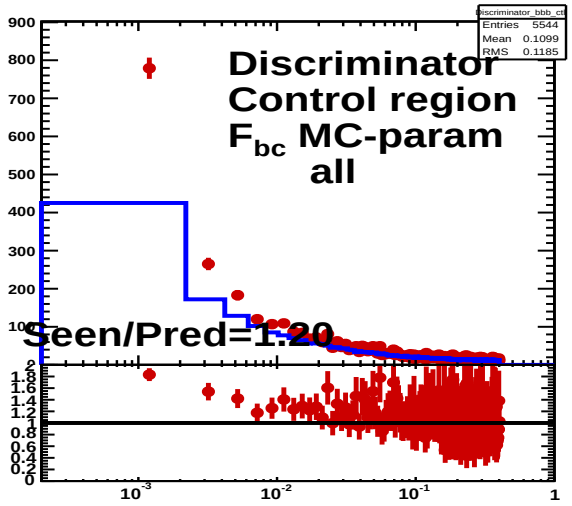
RMS 1.256
DR01
Control regio
F_{bc} jet-truth


DR01_bbw_ctl
Entries 2
Mean 2.863
RMS 1.302
DR01
Control regio
F_{bc} MC-param
all


DR01_bbw_ctl
Entries 2
Mean 2.886
RMS 1.302
DR01
Control regio
F_{bc} MC-param
in ctr-regi


Discriminator_bbb_ctl
Entries 5544
Mean 0.1099
RMS 0.1185
Discriminator
Control region
F_{bc} jet-truth
Seen/Pred=1.07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Entries 5544
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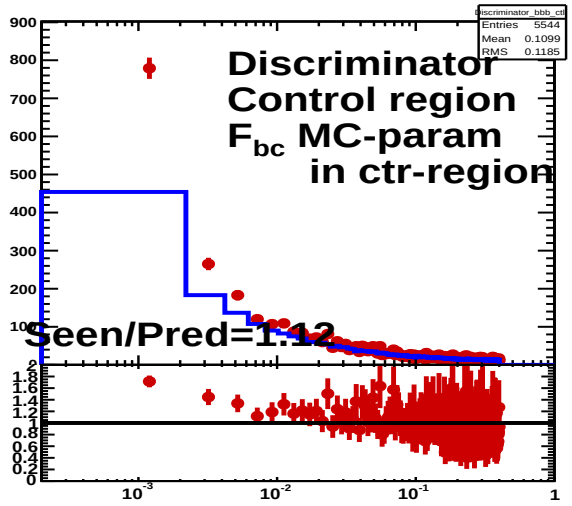
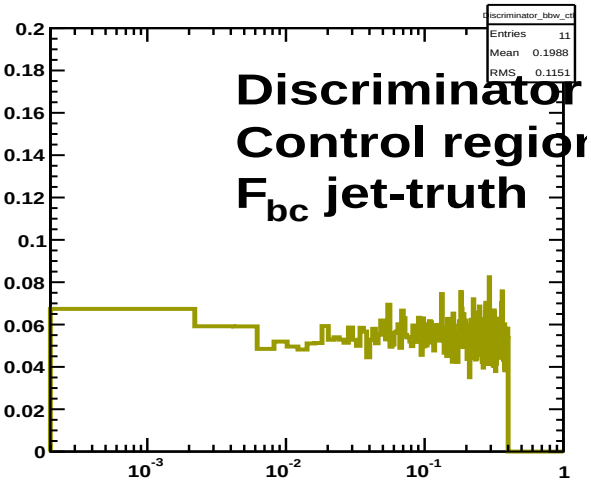
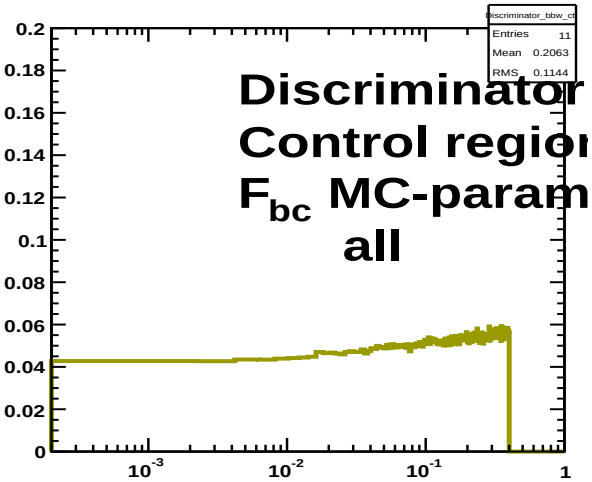
RMS 0.1185
Discriminator
Control region
F_{bc} MC-param
all
Seen/Pred=1.20


Discriminator_bbb_ctl
Entries 5544
Mean 0.1099
RMS 0.1185
Discriminator
Control region
F_{bc} MC-param
in ctr-region
Seen/Pred=1.12


Discriminator_bbw_ctl
Entries 11
Mean 0.1988
RMS 0.1151
Discriminator
Control regior
F_{bc} jet-truth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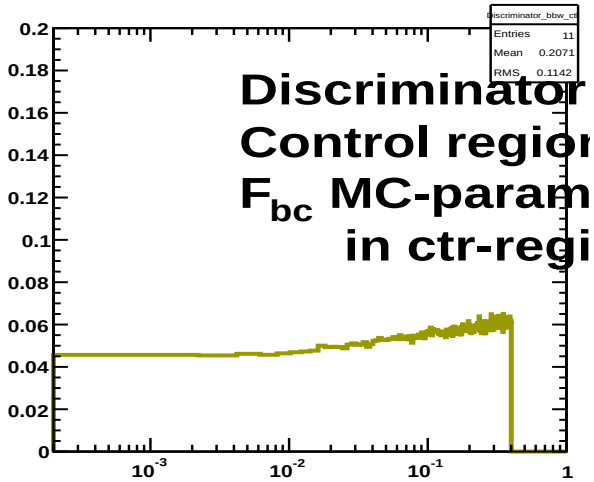
Mean 0.2063
RMS 0.1144
Discriminator
Control regior
F_{bc} MC-param
all


Discriminator_bbw_ctl
Entries 11
Mean 0.2071
RMS 0.1142
Discriminator
Control regior
F_{bc} MC-param
in ctr-regi

Conclusion

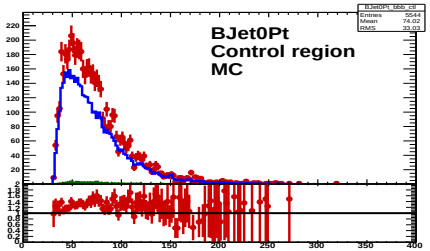
The bad news

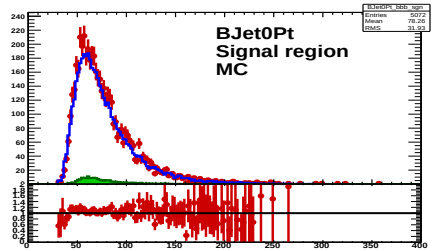
- clear underestimate of prediction for $D < 0.01$ or even $D < 0.001$.
- in DR01 the event excess is clearly visible in the falling edge of the distribution;
- However, excluding these events improve the situation but does not solve the problem

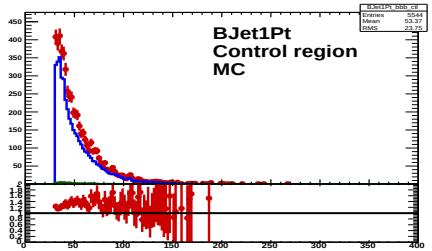
The good(?) news

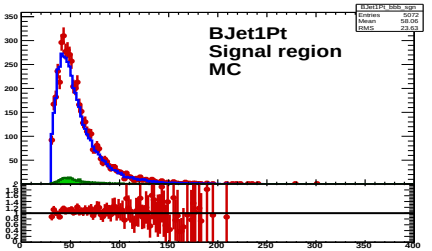
- Using F_x from MC truth, *jet per jet* the agreement is very good, thus ϵ_x are good and well parametrized.
- Using the MC truth, but parametrized, it's the same as using the Fit;
- the probability distribution is clearly different, showing that the problem is maybe in F_x parametrization.

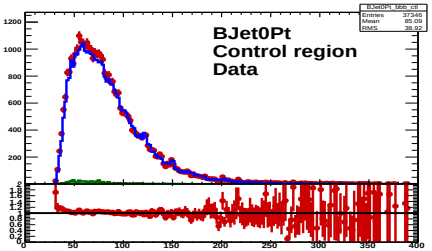
BACKUP

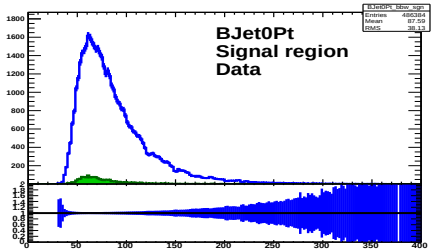

BJet0Pt
Control region
MC

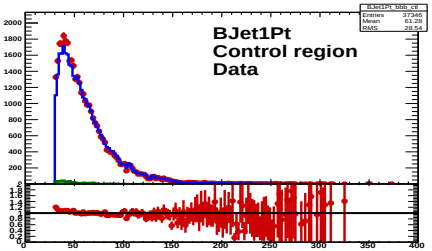

BJet0Pt
Signal region
MC

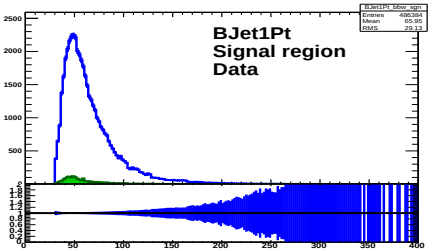

BJet1Pt
Control region
MC

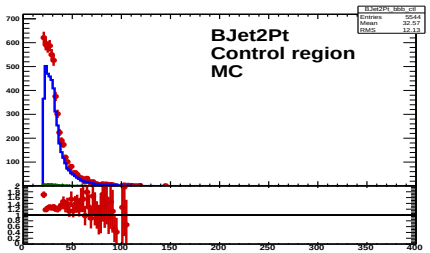

BJet1Pt
Signal region
MC

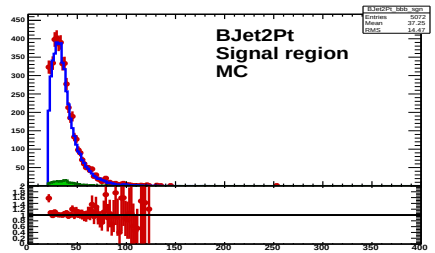

BJet0Pt
Control region
Data

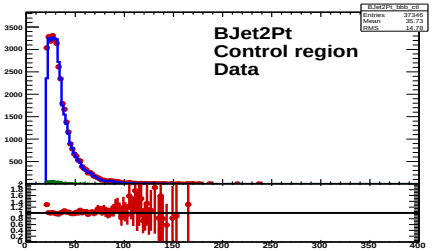

BJet0Pt
Signal region
Data

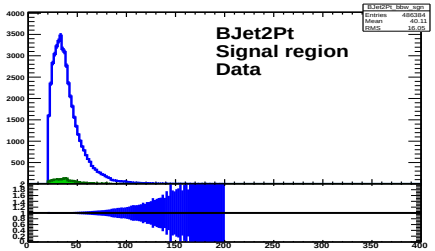

BJet1Pt
Control region
Data

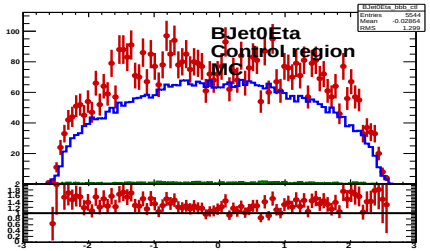

BJet1Pt
Signal region
Data

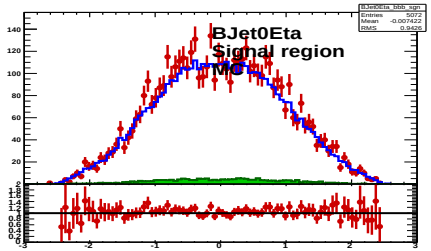

BJet2Pt
Control region
MC

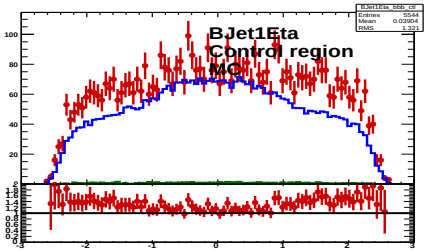

BJet2Pt
Signal region
MC

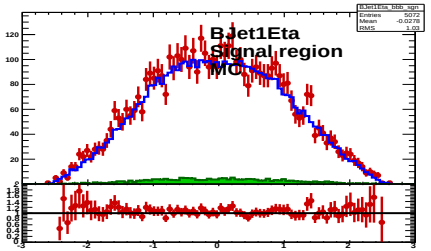

BJet2Pt
Control region
Data


BJet2Pt
Signal region
Data


BJet0Eta
Control region
MC


BJet0Eta
Signal region
MC


BJet1Eta
Control region
MC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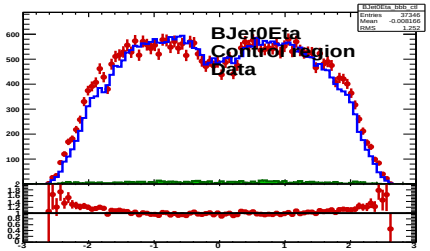
Signal region
MC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Control region
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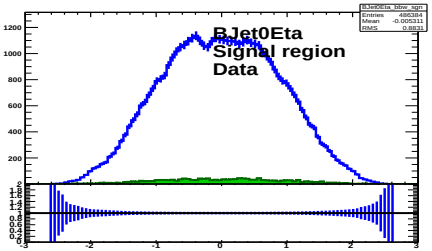
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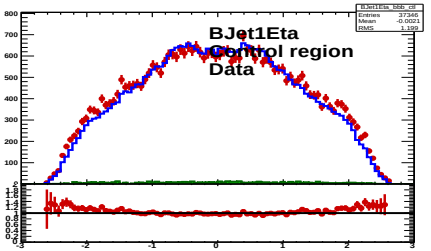
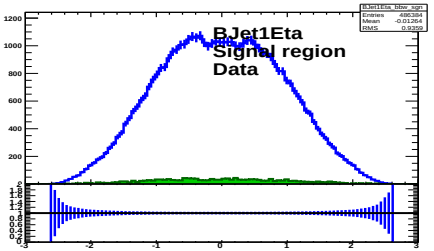
Signal region
Data


BJet1Eta
Control region
Data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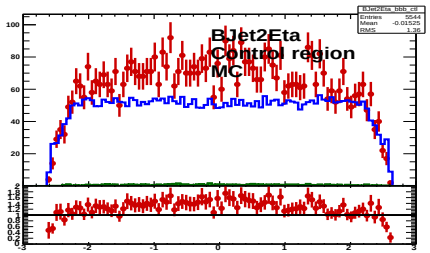
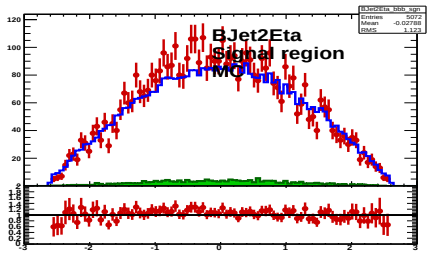
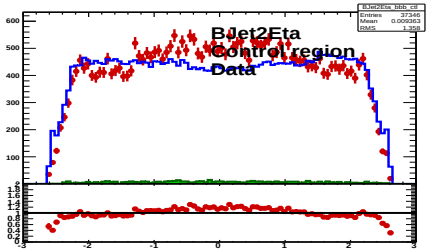
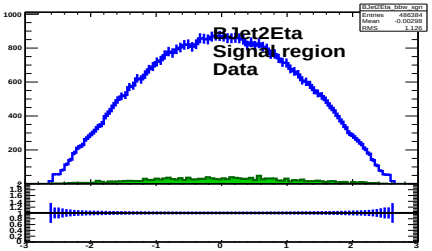
Signal region
Data


BJet2Eta
Control region
MC


BJet2Eta
Signal region
MC


BJet2Eta
Control region
Data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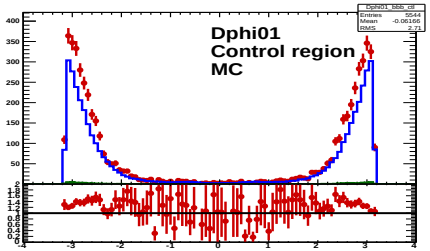
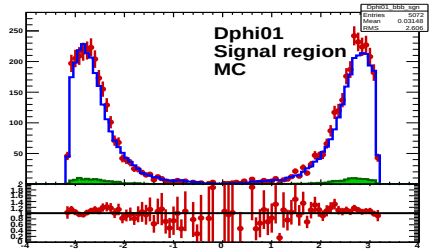
Signal region
Data


Dphi01
Control region
MC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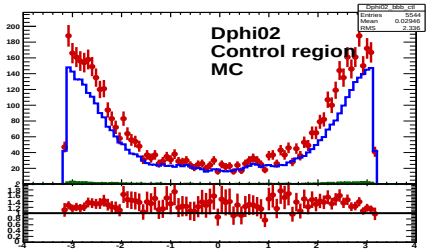
Signal region
MC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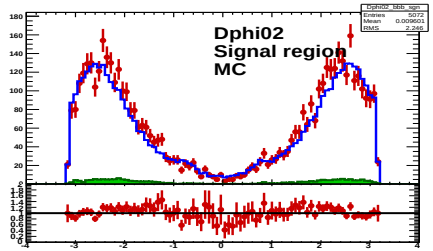
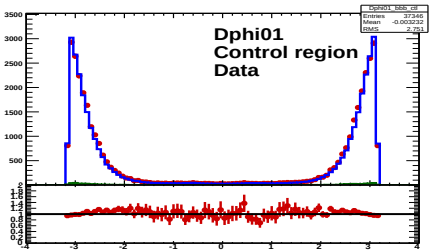
Control region
MC


Dphi02
Signal region
MC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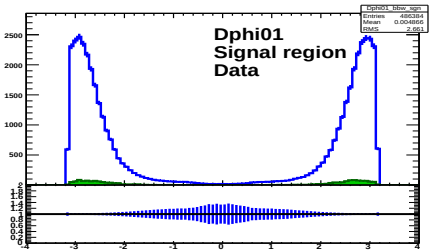
Control region
Data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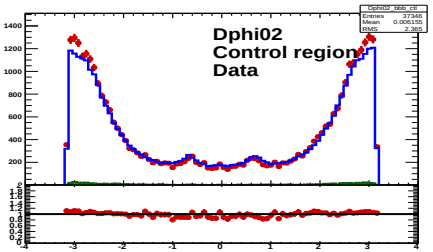
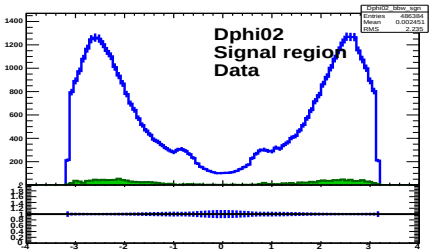
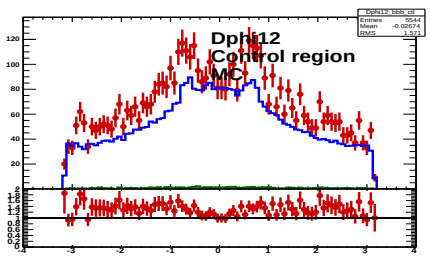
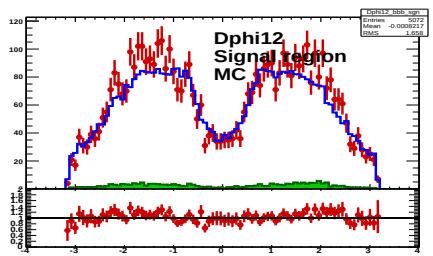
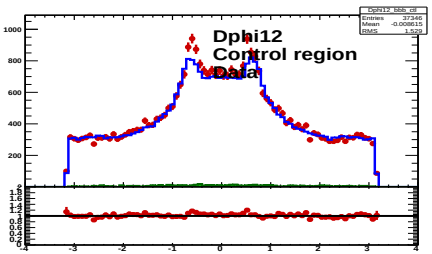
Signal region
Data

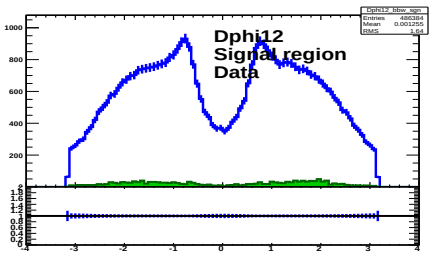

Dphi02
Control region
Data

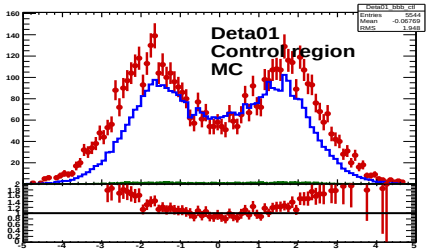

Dphi02
Signal region
Data

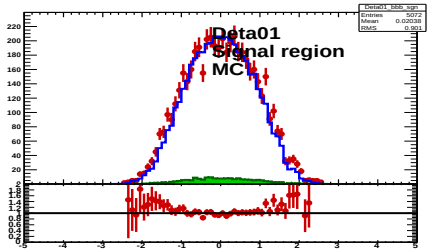

Dphi12
Control region
MC

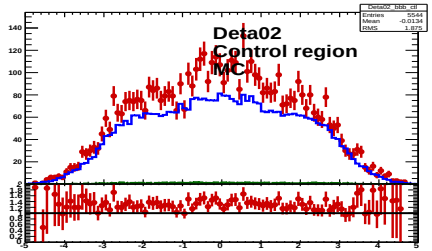

Dphi12
Signal region
MC

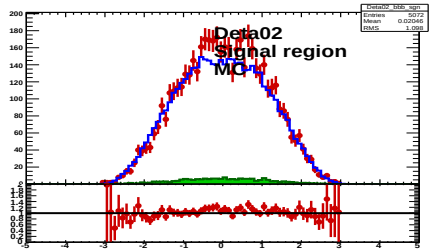

Dphi12
Control region
Data

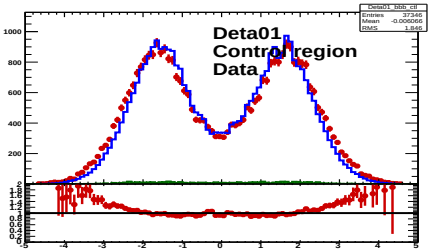

Dphi12
Signal region
Data

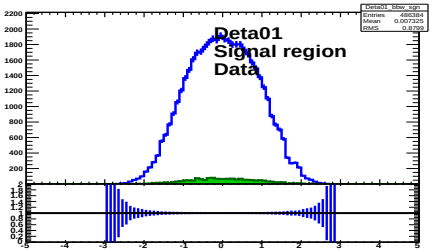

Deta01
Control region
MC

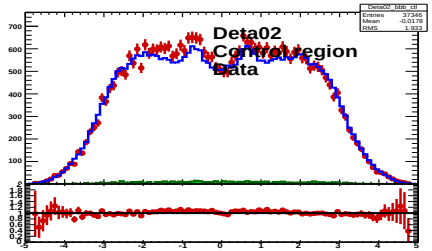

Deta01
Signal region
MC

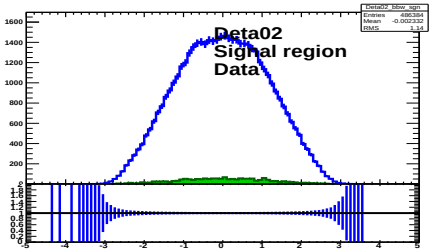

Deta02
Control region
MC

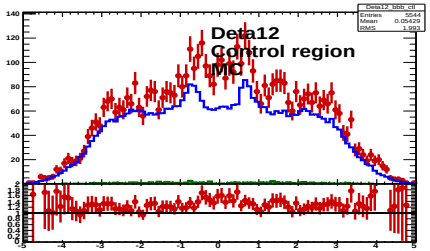

Deta02
Signal region
MC

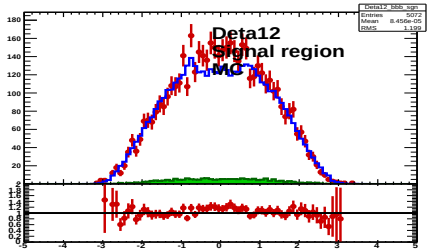

Deta01
Control region
Data

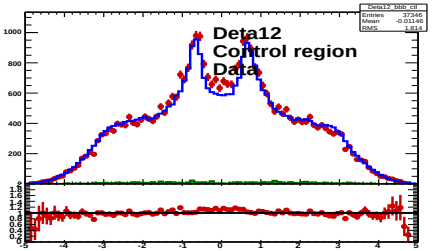

Deta01
Signal region
Data

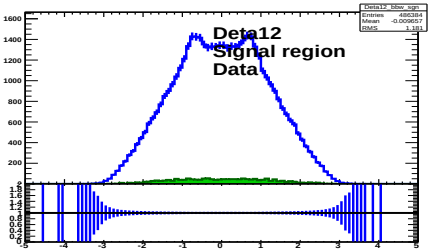

Deta02
Control region
Data

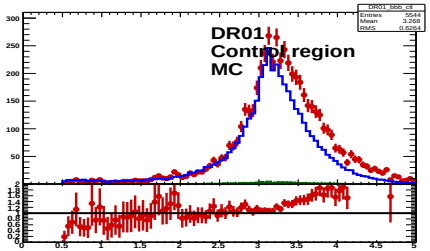

Deta02
Signal region
Data

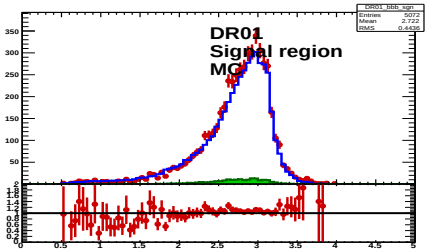

Deta12
Control region
MC

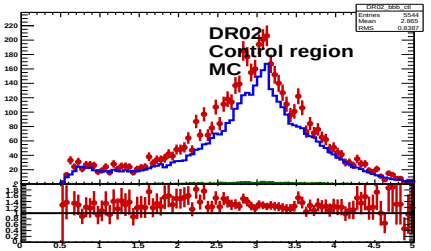

Deta12
Signal region
MC

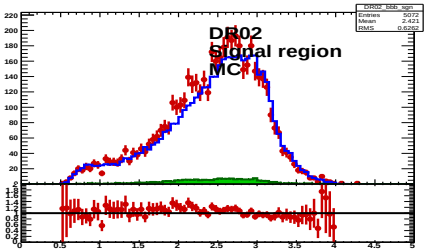

Deta12
Control region
Data

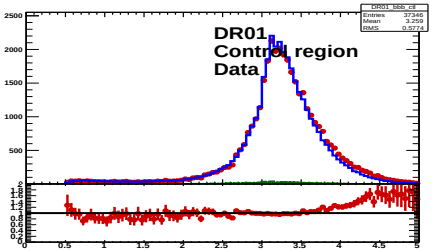

Deta12
Signal region
Data

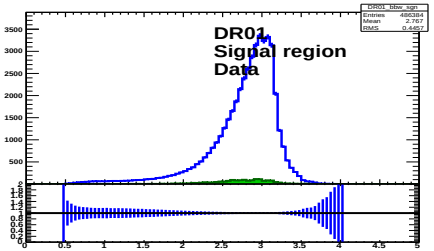

DR01
Control region
MC

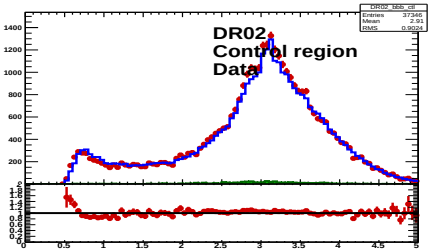

DR01
Signal region
MC

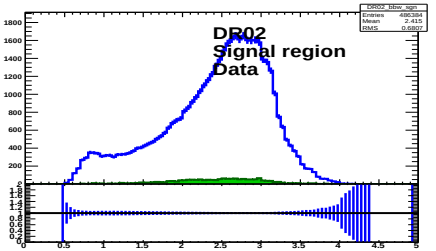

DR02
Control region
MC

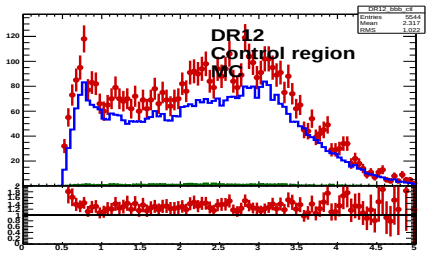

DR02
Signal region
MC

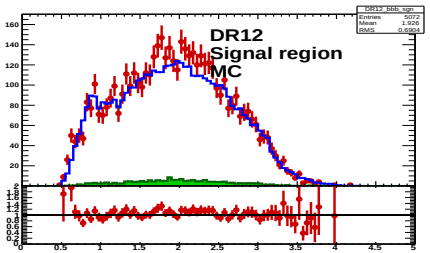

DR01
Control region
Data

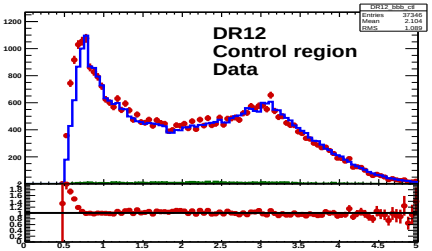

DR01
Signal region
Data

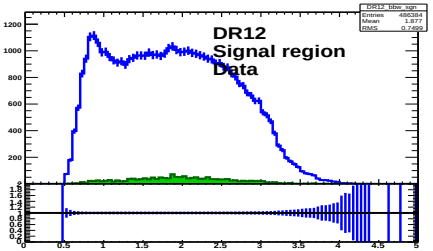

DR02
Control region
Data

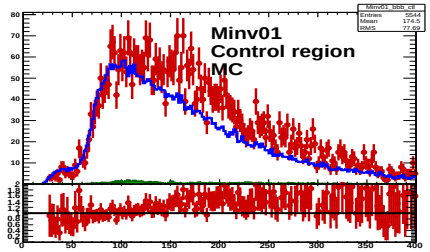

DR02
Signal region
Data

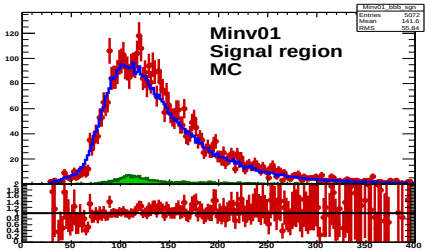

DR12
Control region
MC

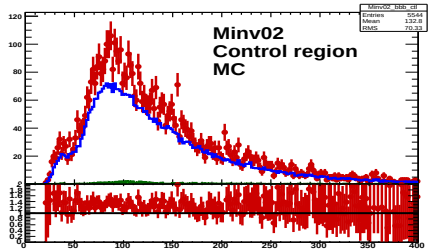

DR12
Signal region
MC

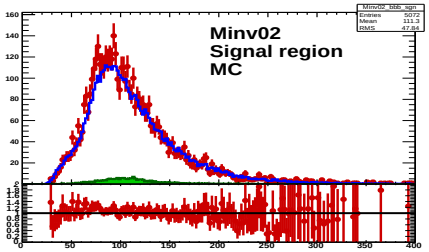

DR12
Control region
Data

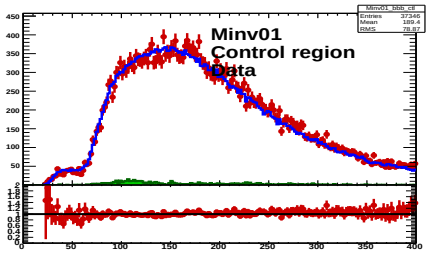

DR12
Signal region
Data

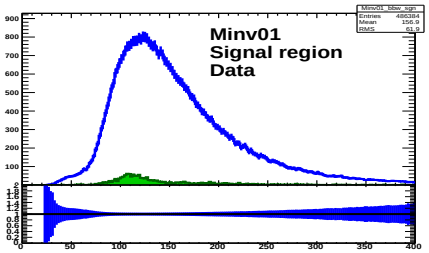

Minv01
Control region
MC

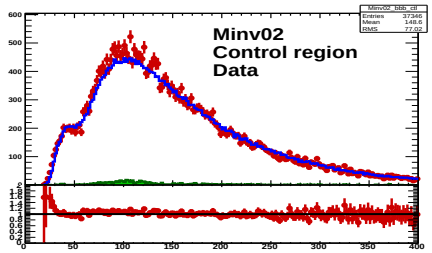

Minv01
Signal region
MC

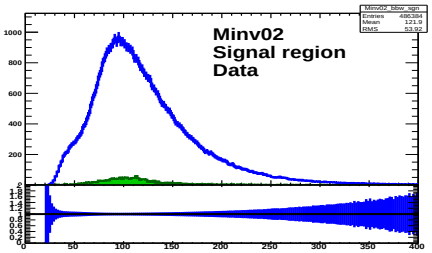

Minv02
Control region
MC

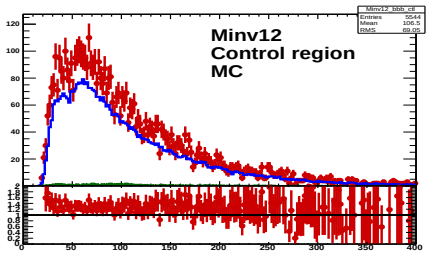

Minv02
Signal region
MC

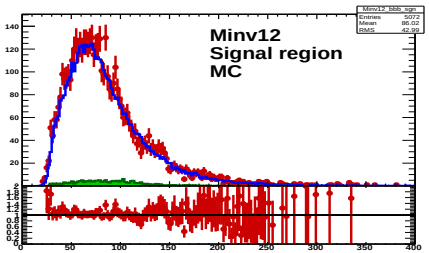

Minv01
Control region
Data

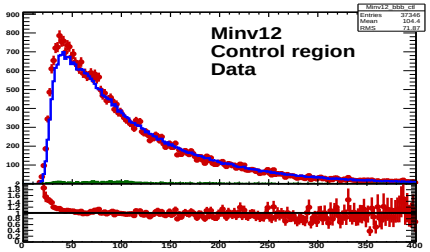

Minv01
Signal region
Data

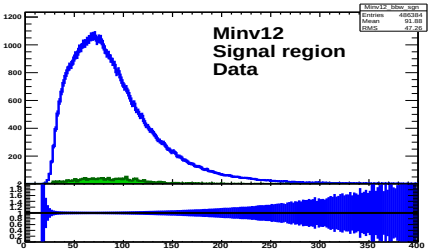

Minv02
Control region
Data

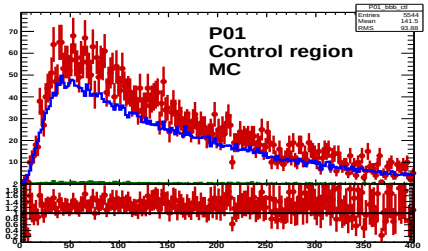

Minv02
Signal region
Data

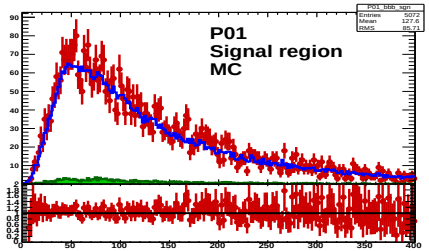

Minv12
Control region
MC

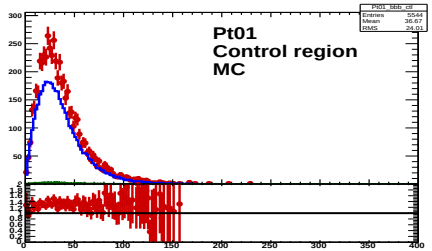

Minv12
Signal region
MC

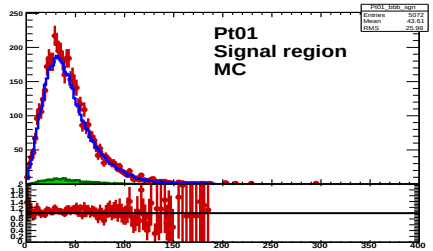

Minv12
Control region
Data

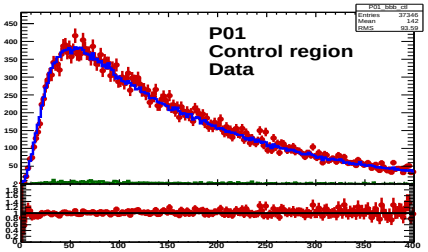

Minv12
Signal region
Data

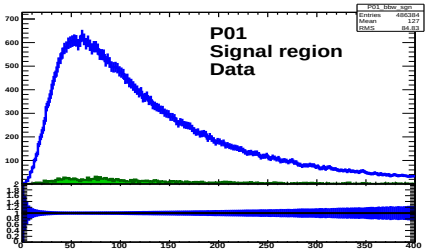

P01
Control region
MC

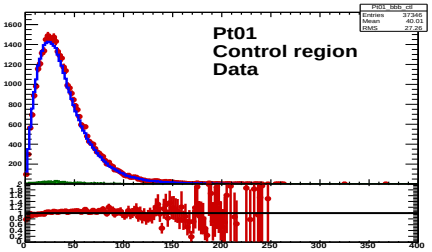

P01
Signal region
MC

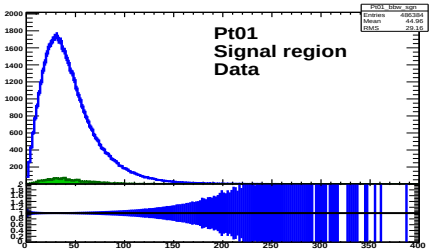

Pt01
Control region
MC

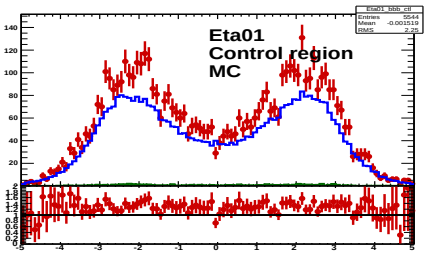

Pt01
Signal region
MC

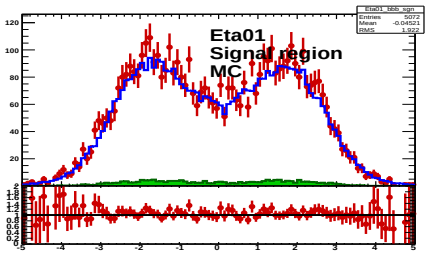

P01
Control region
Data

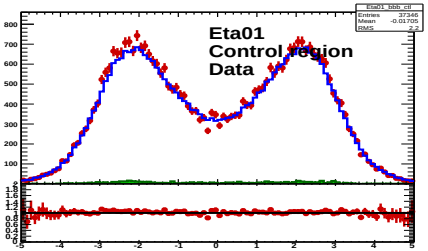

P01
Signal region
Data

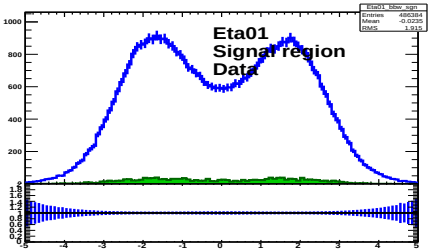

Pt01
Control region
Data


Pt01
Signal region
Data


Eta01
Control region
MC

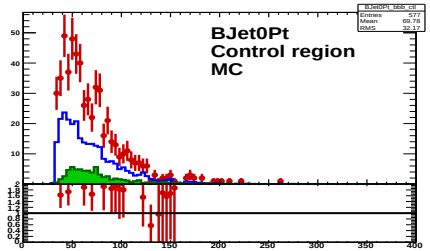

Eta01
Signal region
MC

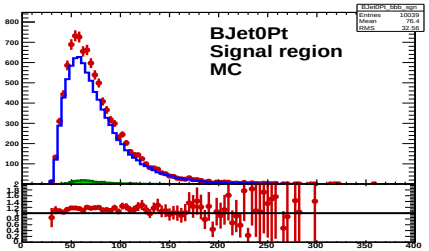

Eta01
Control region
Data

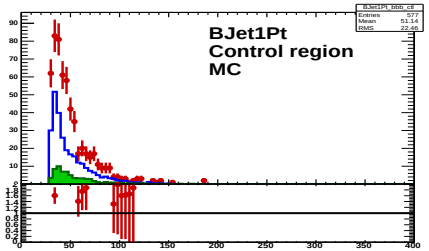

Eta01
Signal region
Data

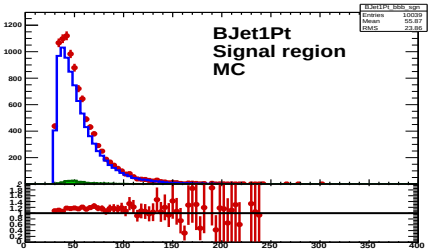
First try

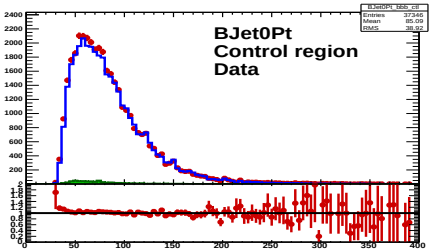
Ok, define (for MC only) control region as $D < 0.001$, so to see the distribution of all variables in the problematic region (control region) and everywhere else (signal region).

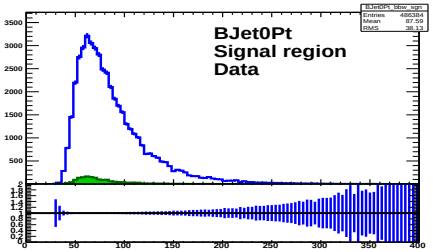

BJet0Pt
Control region
MC


BJet0Pt
Signal region
MC


BJet1Pt
Control region
MC


BJet1Pt
Signal region
MC


BJet0Pt
Control region
Data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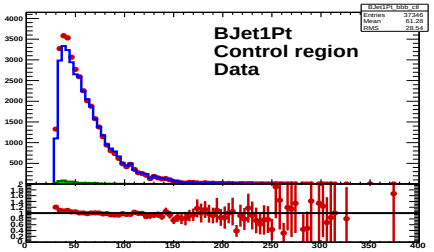
Signal region
Data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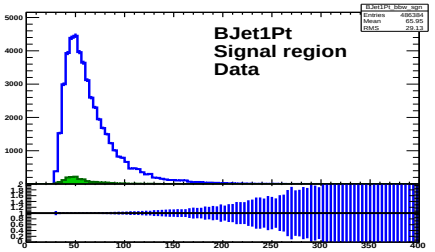
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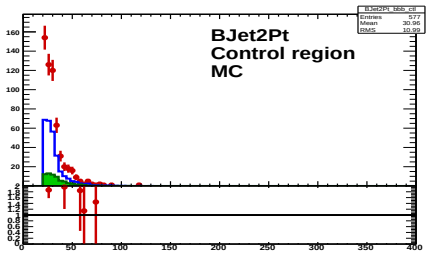
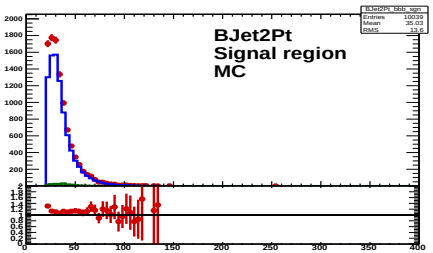
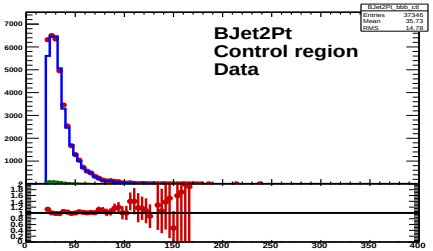
Signal region
Data


BJet2Pt
Control region
MC


BJet2Pt
Signal region
MC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Control region
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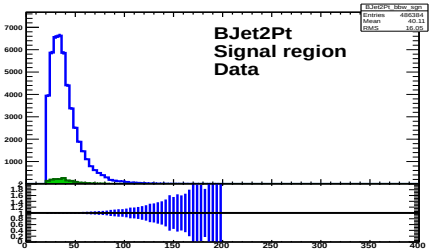
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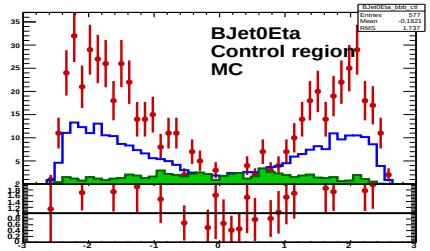
Signal region
Data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Control region
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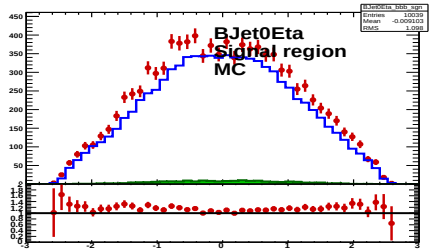
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Signal region
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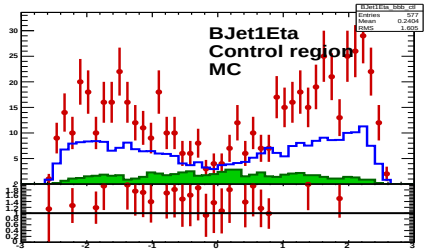
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Control region
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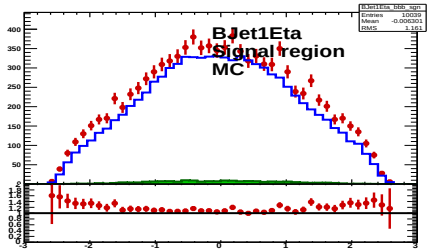
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Signal region
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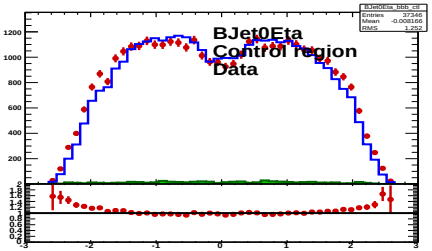
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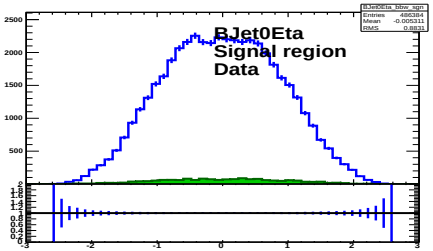
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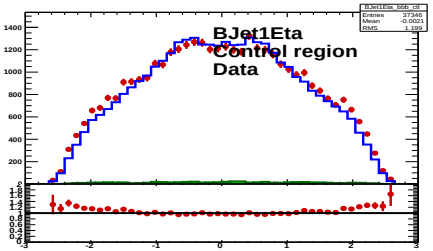
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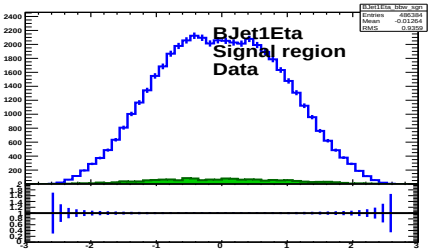
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Signal region
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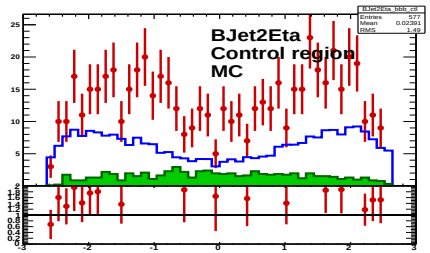
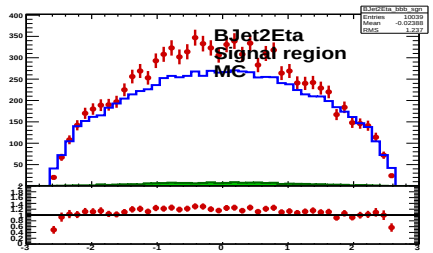

BJet2Eta
Control region
MC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Signal region
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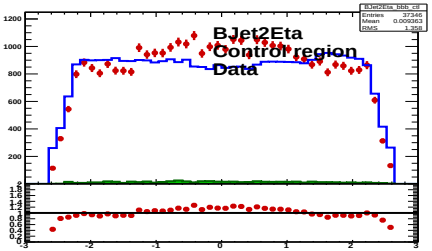
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Control region
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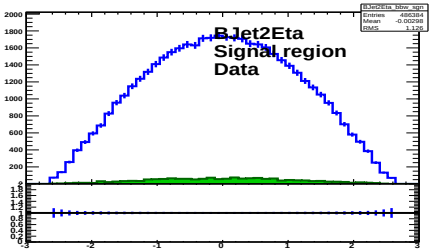
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Signal region
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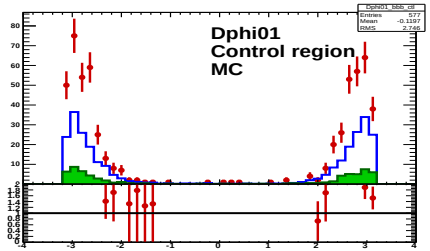
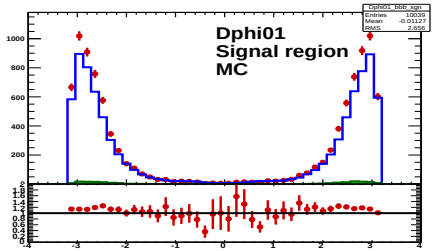

Dphi01
Control region
MC


Dphi01
Signal region
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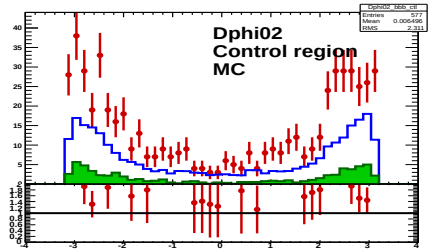
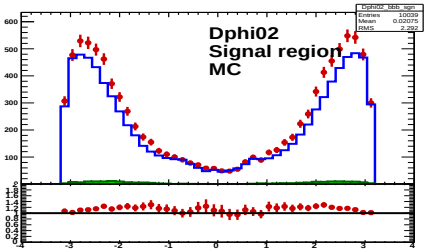

Dphi02
Control region
MC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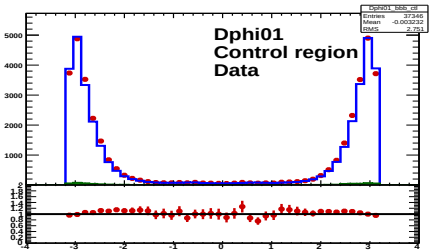
Signal region
MC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Control region
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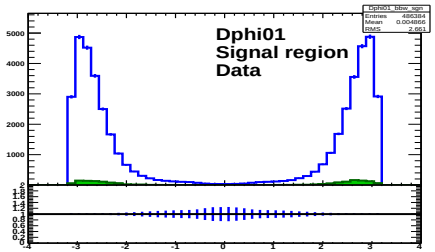
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Signal region
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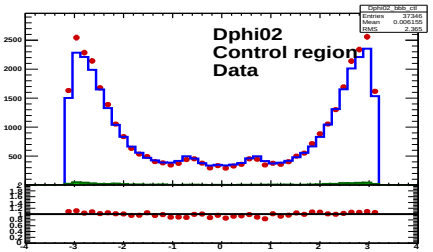
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Control region
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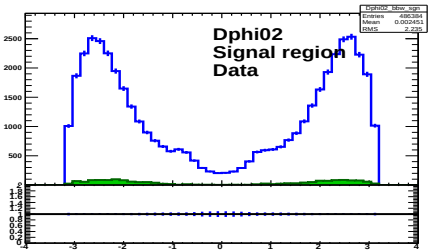
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Signal region
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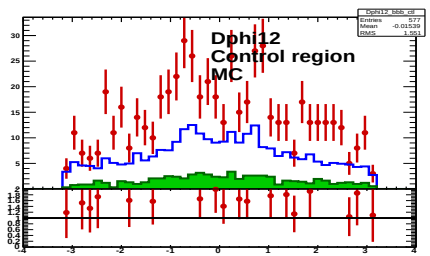
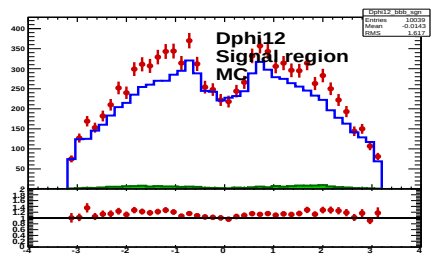

Dphi12
Control region
MC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Signal region
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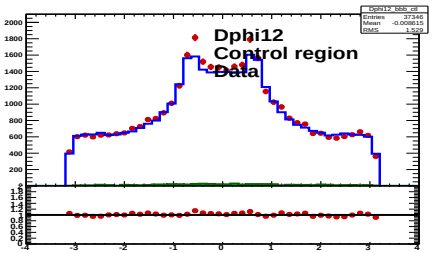
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Control region
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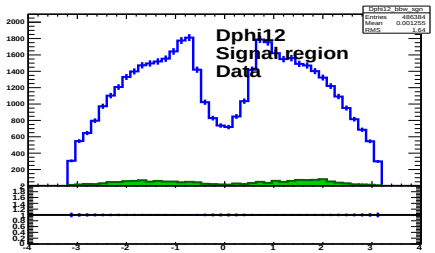
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Signal region
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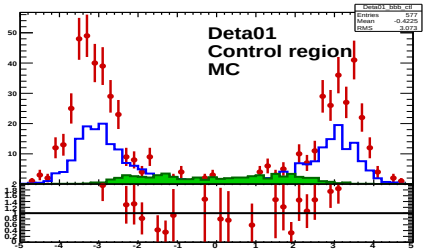
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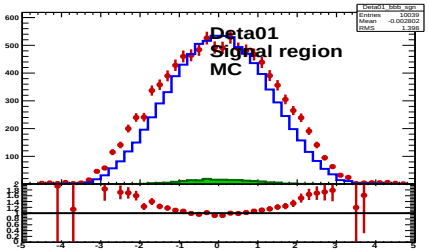
Control region
MC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Signal region
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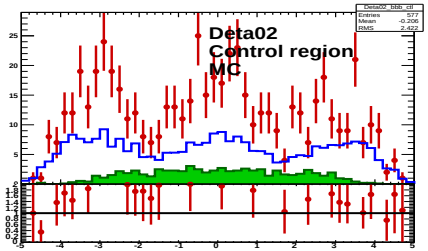
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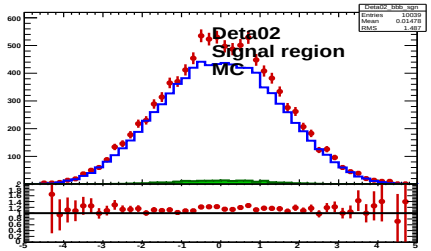
Control region
MC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Signal region
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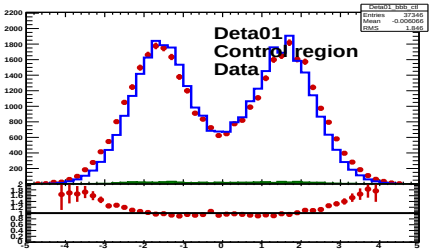
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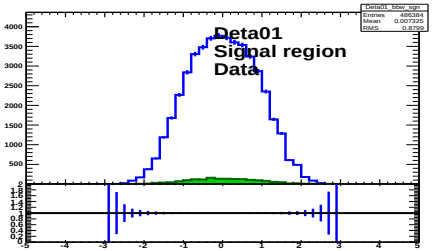
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Signal region
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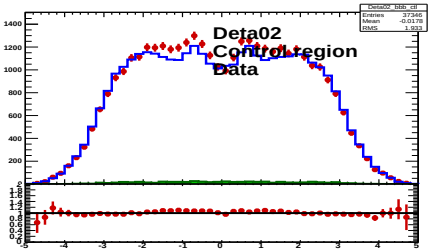
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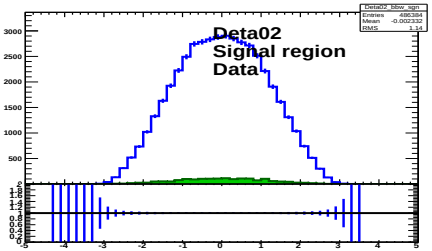
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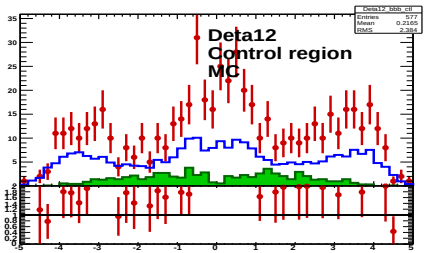
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Control region
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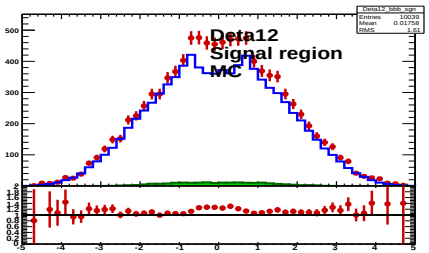
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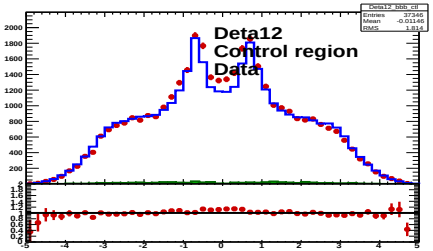
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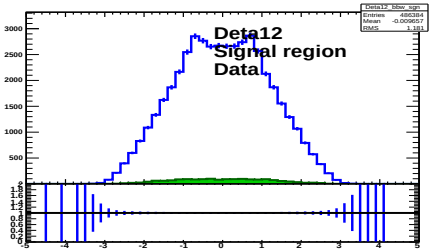
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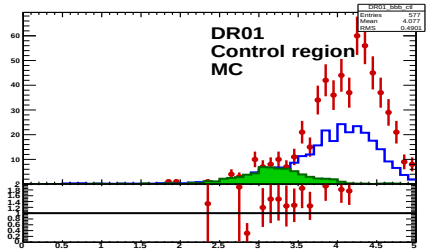
DR01
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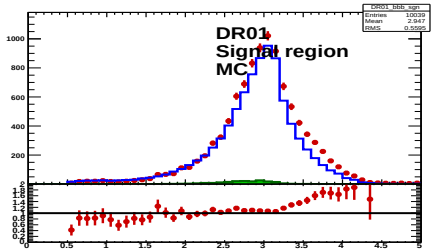
DR01
Signal region
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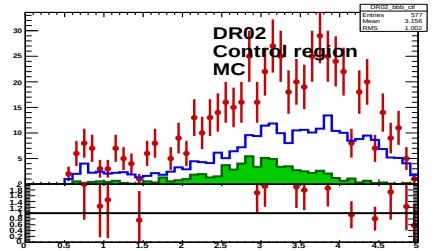
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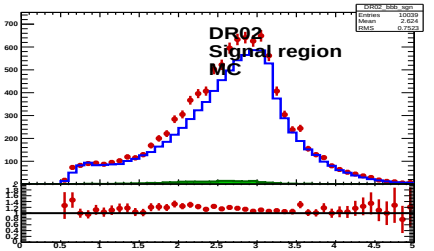
Control region
MC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Signal region
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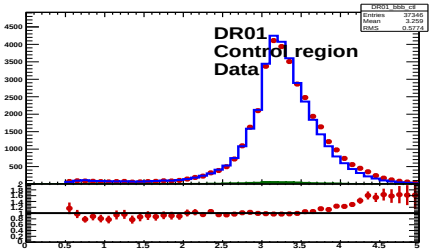
DR01
Control region
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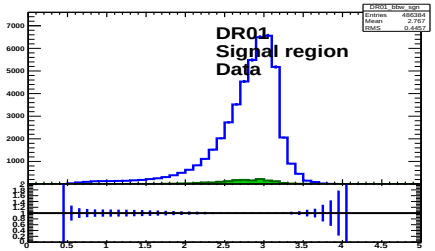
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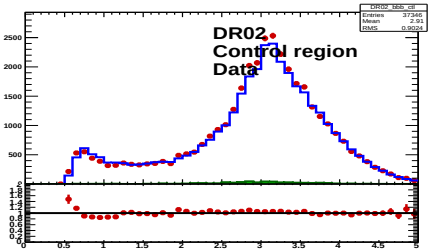
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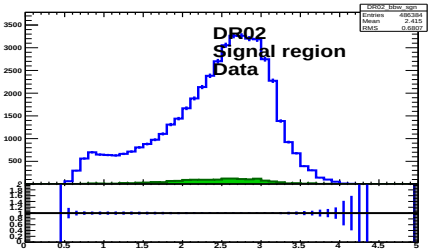
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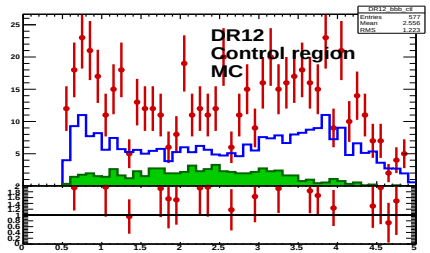
DR12
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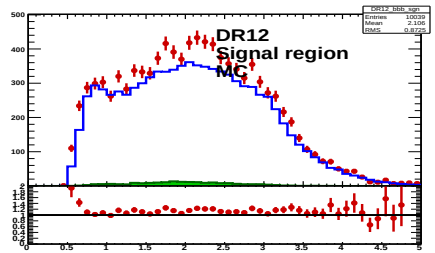
DR12
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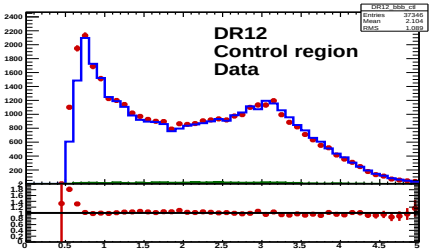
DR12
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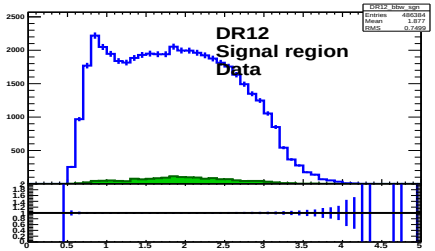
DR12
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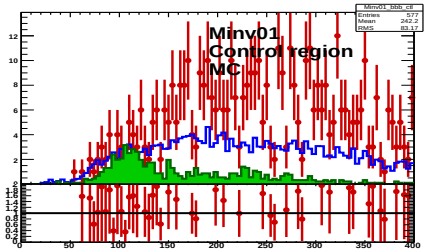
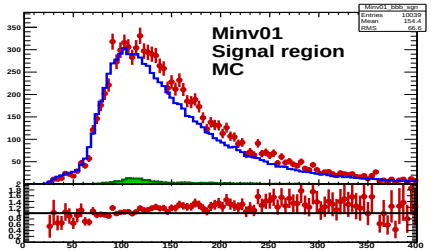
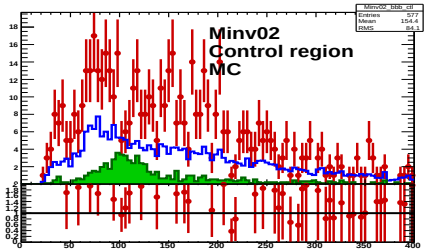
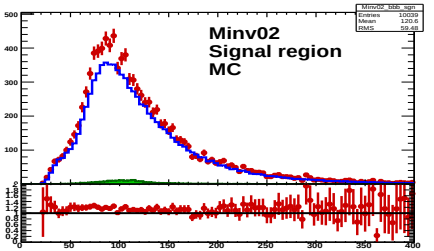
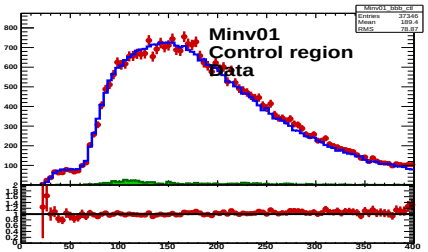
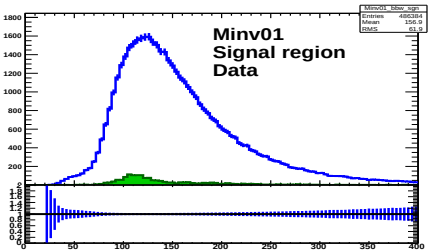

Minv01
Control region
MC

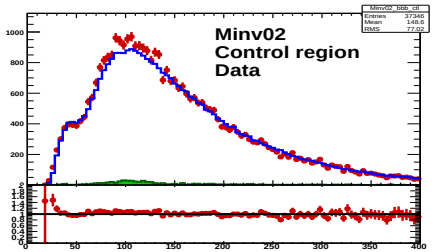

Minv01
Signal region
MC

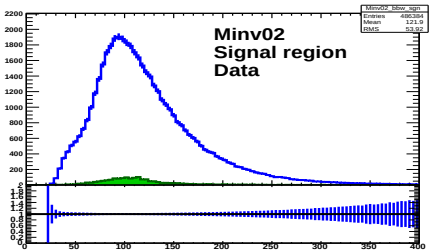

Minv02
Control region
MC

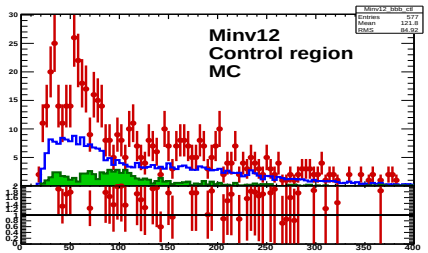

Minv02
Signal region
MC

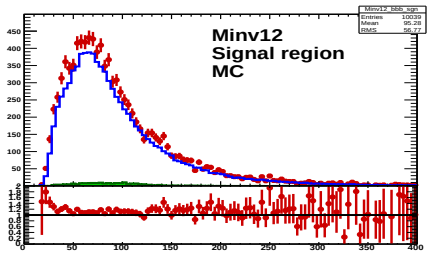

Minv01
Control region
Data

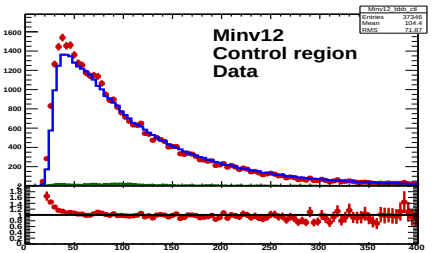

Minv01
Signal region
Data

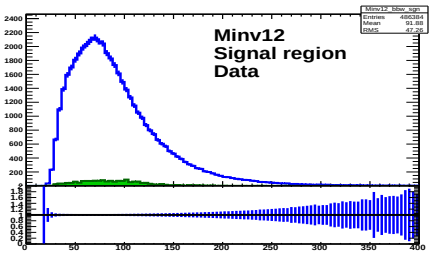

Minv02
Control region
Data

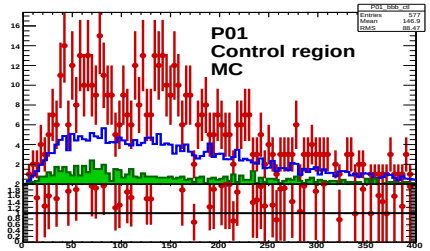

Minv02
Signal region
Data

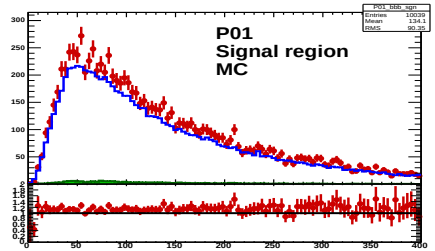

Minv12
Control region
MC

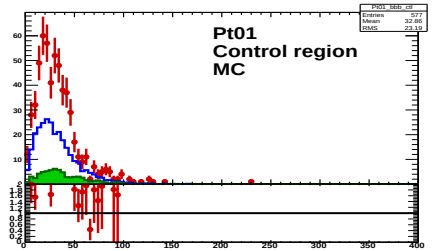

Minv12
Signal region
MC

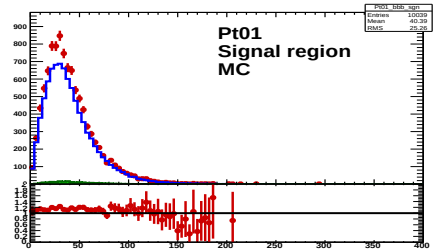

Minv12
Control region
Data

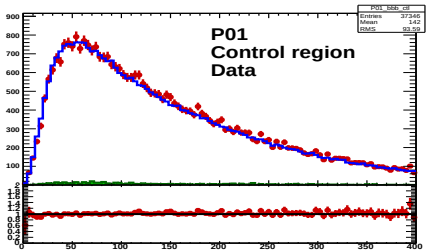

Minv12
Signal region
Data

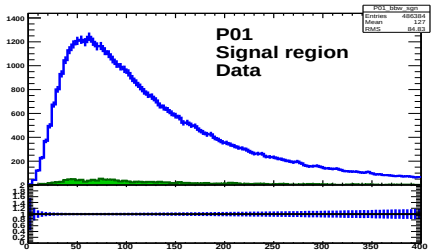

P01
Control region
MC

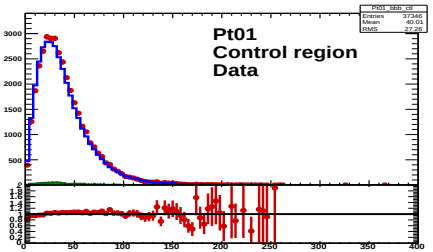

P01
Signal region
MC

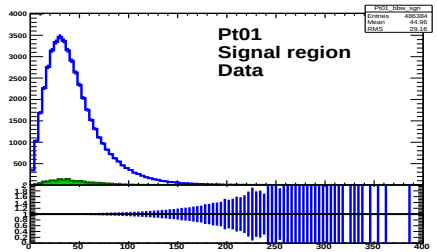

Pt01
Control region
MC

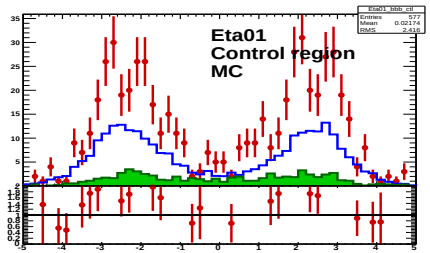

Pt01
Signal region
MC

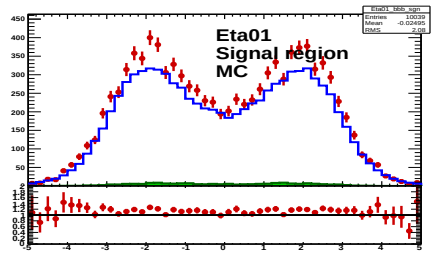

P01
Control region
Data

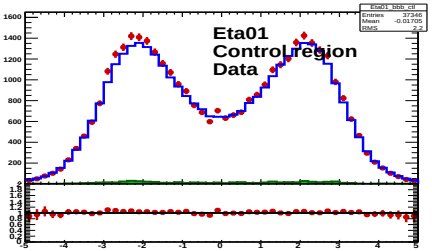

P01
Signal region
Data

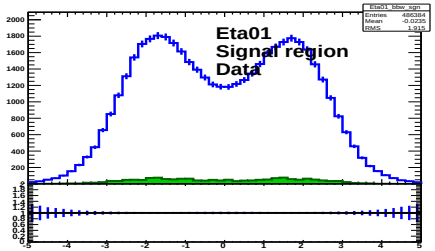

Pt01
Control region
Data


Pt01
Signal region
Data


Eta01
Control region
MC

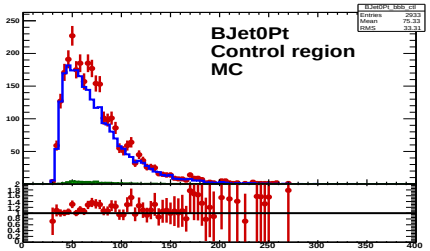

Eta01
Signal region
MC

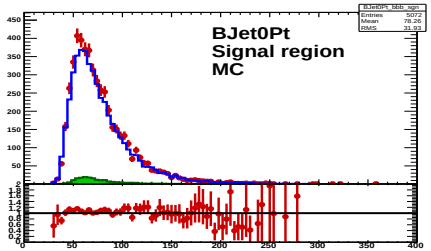

Eta01
Control region
Data

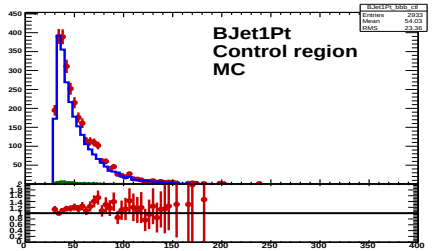

Eta01
Signal region
Data

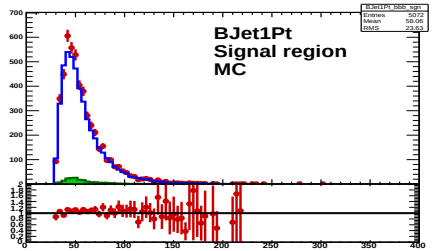
Third try

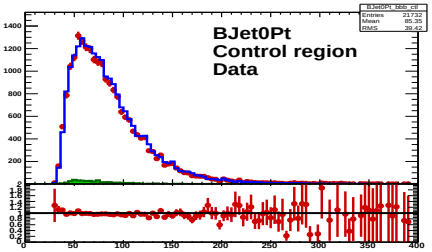
Ok, define (for MC only) control region as $0.05 < D < 0.04$ and signal region as $0.04 < D < 1.$ and see what happen

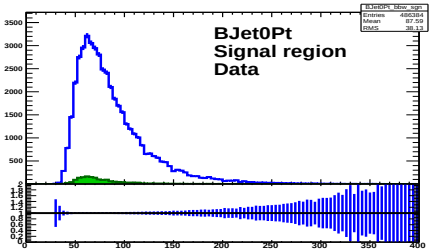

BJet0Pt
Control region
MC

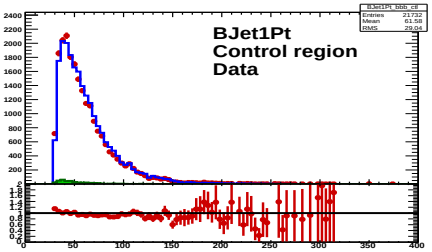

BJet0Pt
Signal region
MC

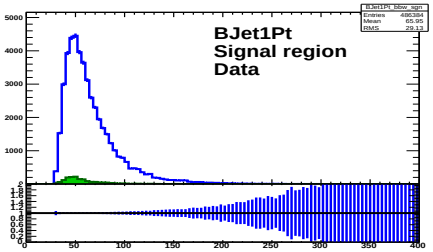

BJet1Pt
Control region
MC

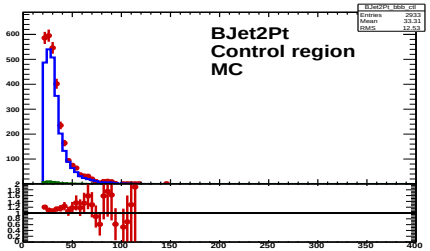

BJet1Pt
Signal region
MC

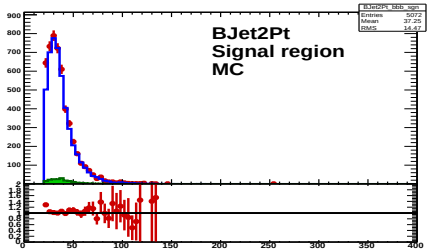

BJet0Pt
Control region
Data

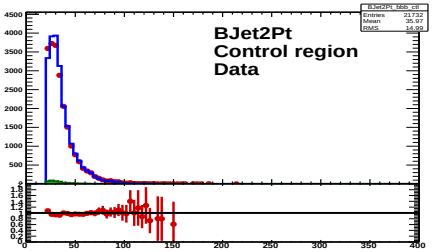

BJet0Pt
Signal region
Data

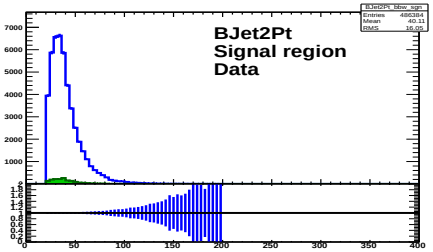

BJet1Pt
Control region
Data

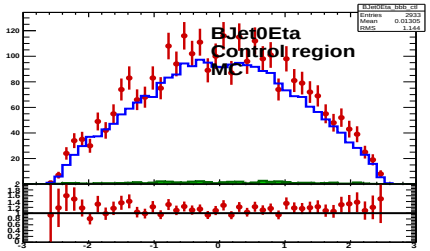

BJet1Pt
Signal region
Data

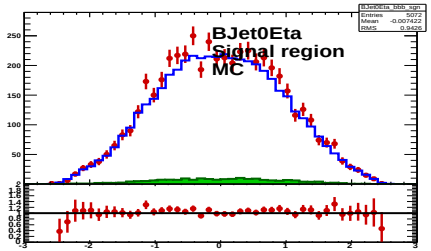

BJet2Pt
Control region
MC

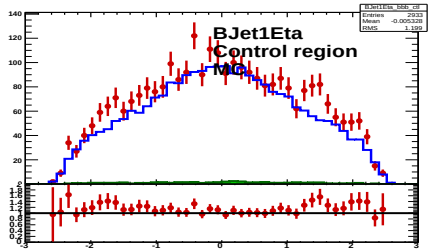

BJet2Pt
Signal region
MC

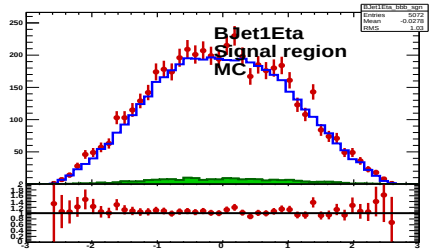

BJet2Pt
Control region
Data

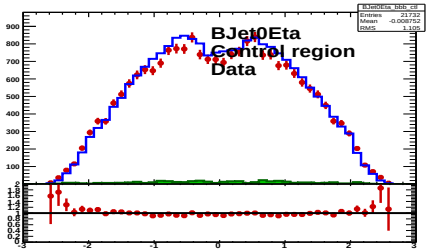

BJet2Pt
Signal region
Data

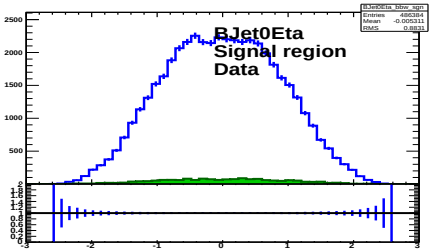

BJet0Eta
Control region
MC

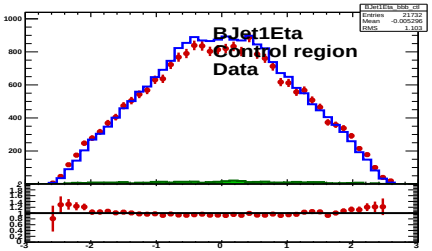

BJet0Eta
Signal region
MC

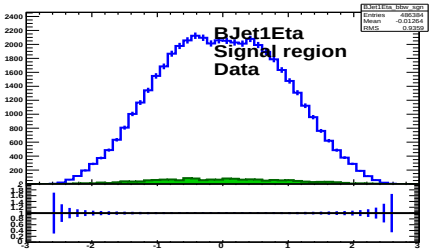

BJet1Eta
Control region
MC

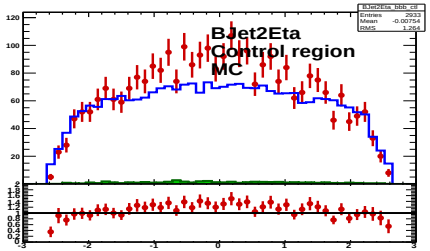

BJet1Eta
Signal region
MC

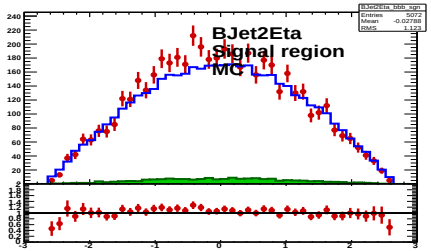

BJet0Eta
Control region
Data

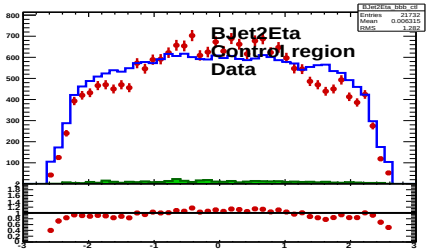

BJet0Eta
Signal region
Data

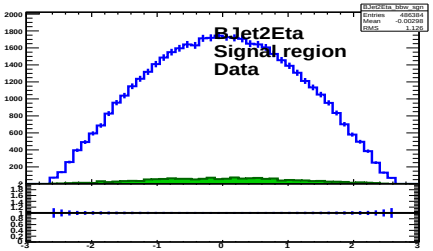

BJet1Eta
Control region
Data

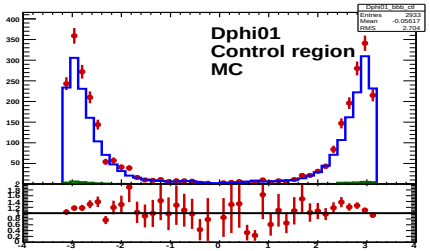

BJet1Eta
Signal region
Data

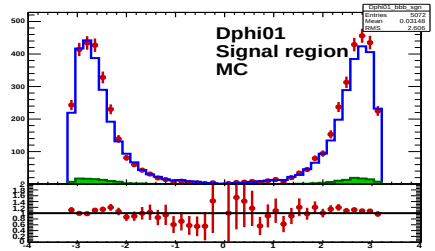

BJet2Eta
Control region
MC

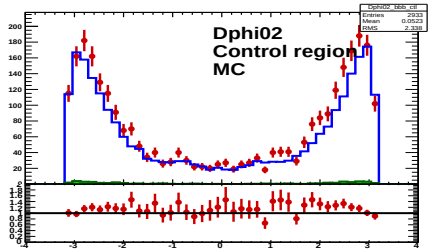

BJet2Eta
Signal region
MC

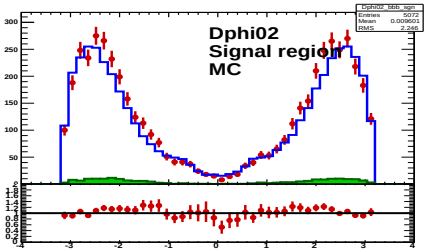

BJet2Eta
Control region
Data

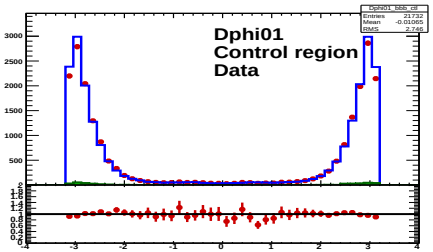

BJet2Eta
Signal region
Data

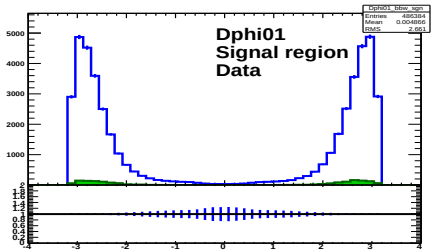

Dphi01
Control region
MC

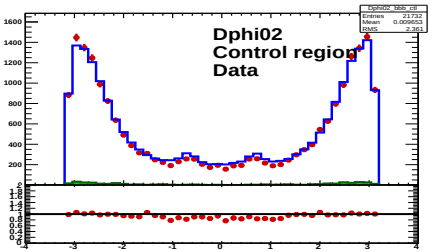

Dphi01
Signal region
MC

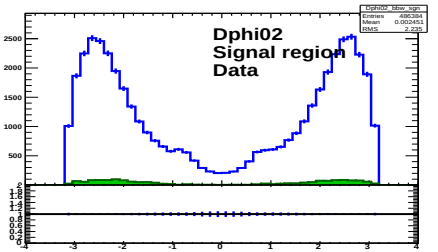

Dphi02
Control region
MC

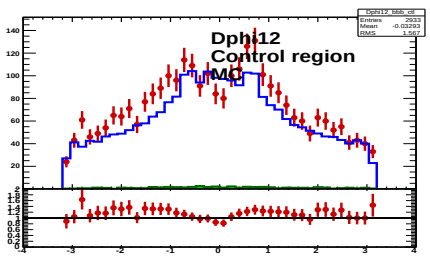

Dphi02
Signal region
MC

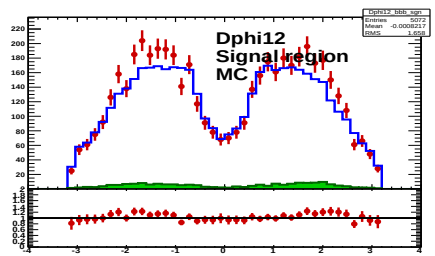

Dphi01
Control region
Data

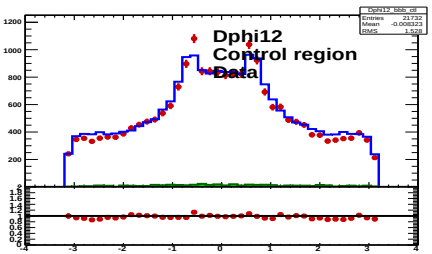

Dphi01
Signal region
Data

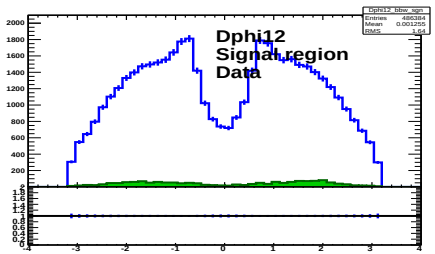

Dphi02
Control region
Data


Dphi02
Signal region
Data


Dphi12
Control region
MC


Dphi12
Signal region
MC


Dphi12
Control region
Data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Signal region
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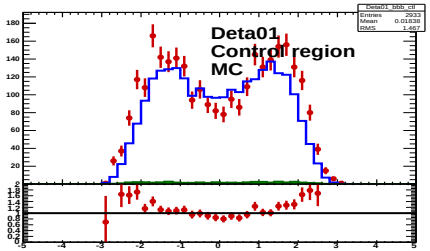
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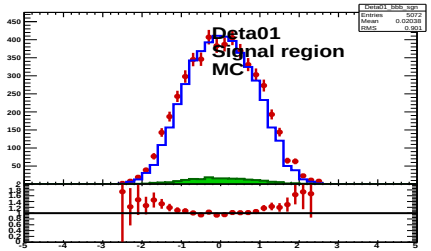
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Signal region
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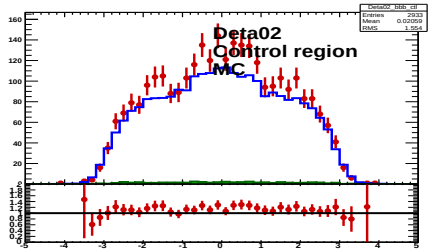
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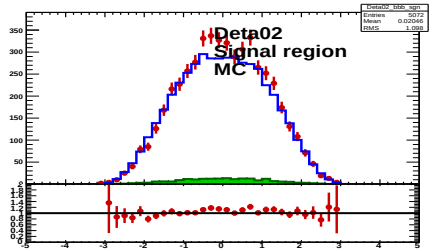
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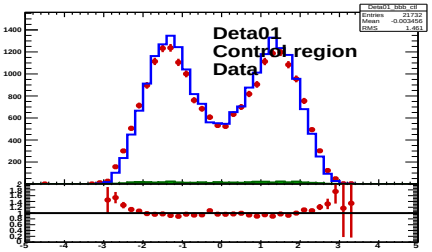
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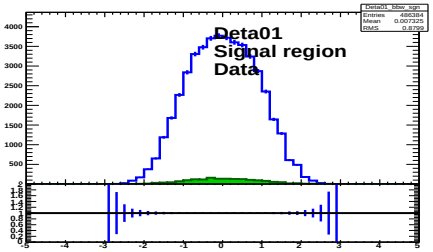
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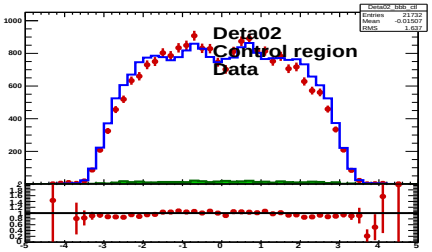
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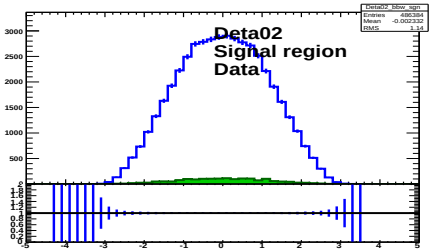
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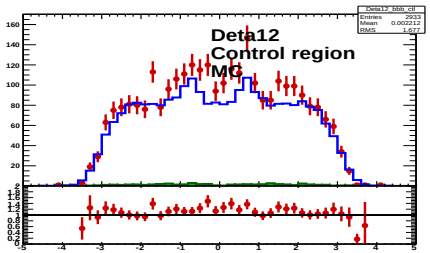
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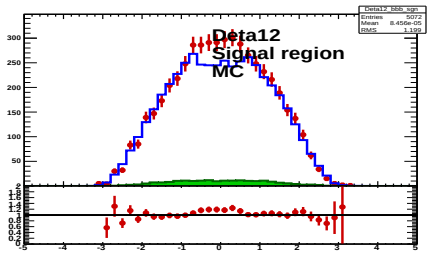
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Signal region
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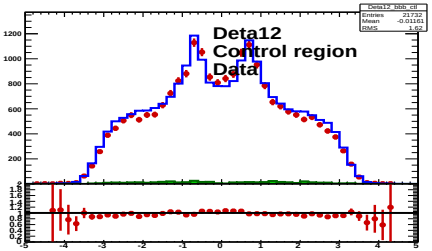
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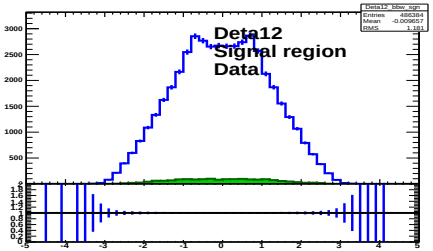
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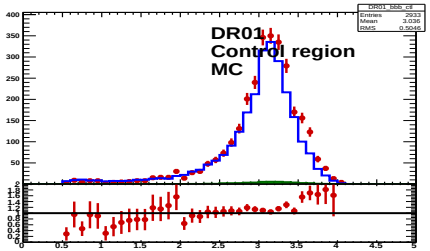
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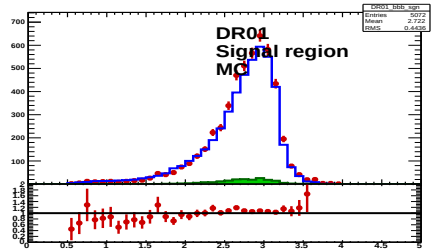
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Signal region
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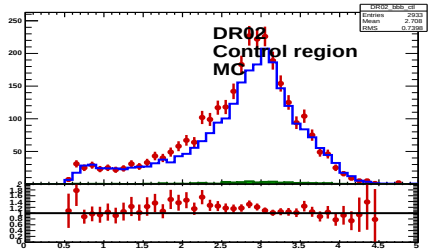
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Control region
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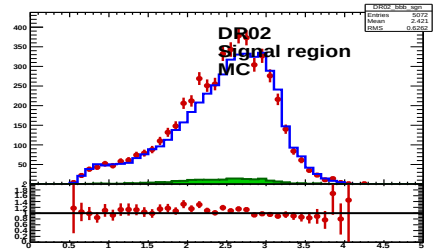
DR02
Signal region
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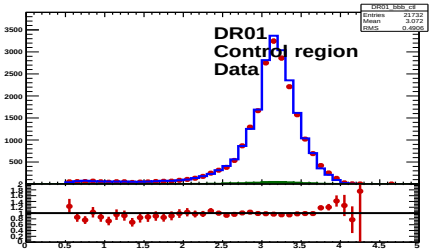
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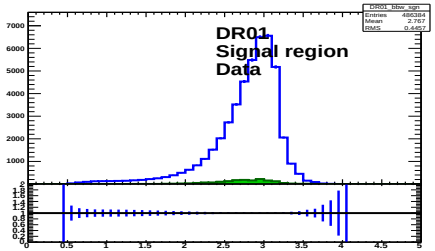
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Signal region
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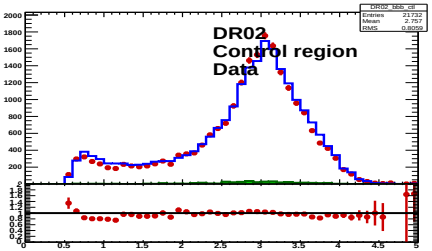
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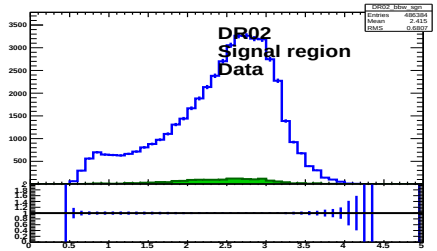
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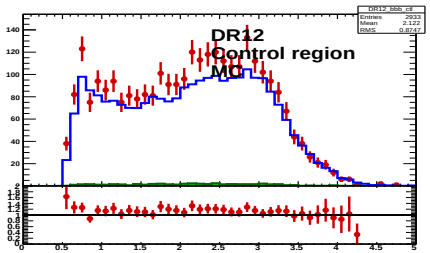
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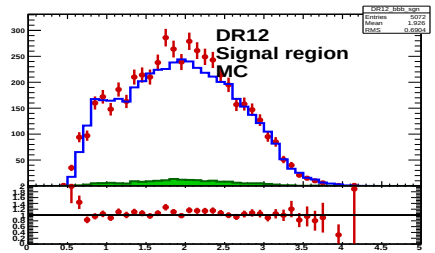
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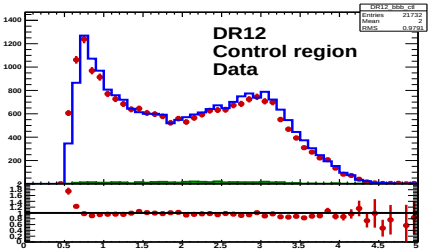
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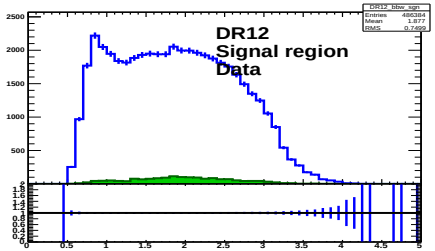
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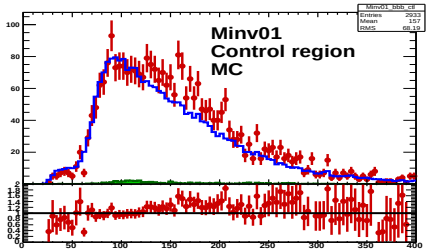
Minv01
Control region
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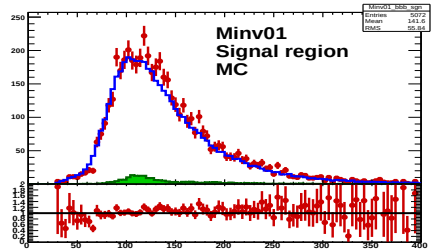
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Signal region
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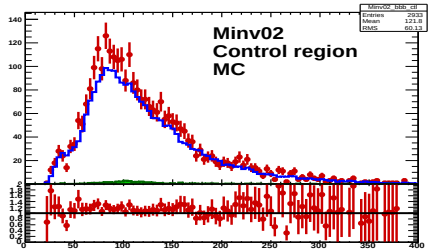
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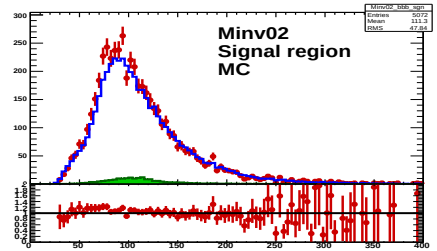
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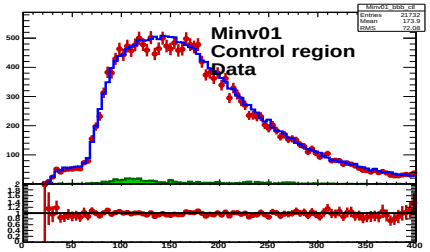
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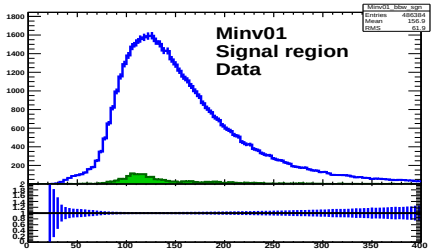
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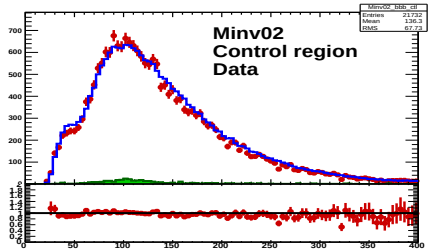
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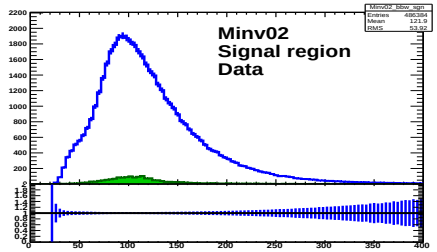
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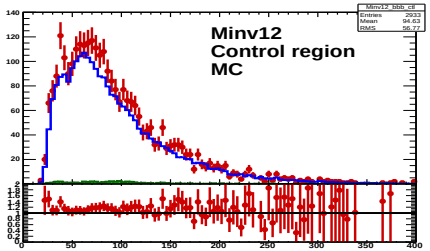
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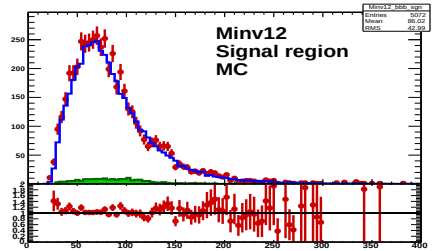
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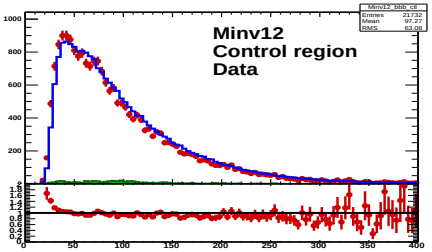
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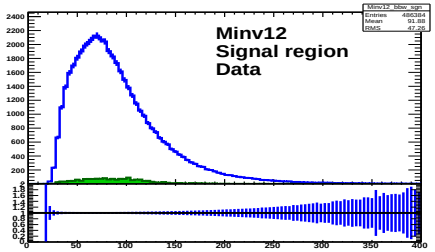
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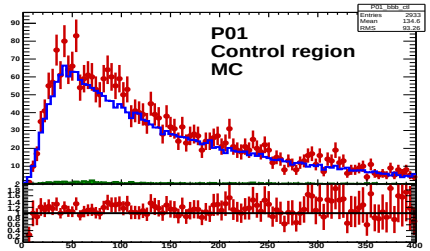
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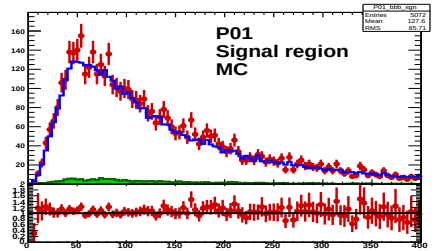
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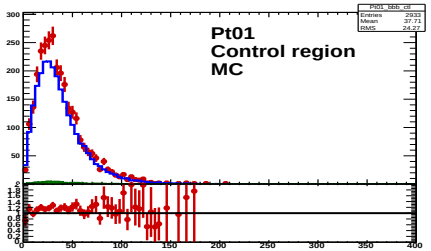
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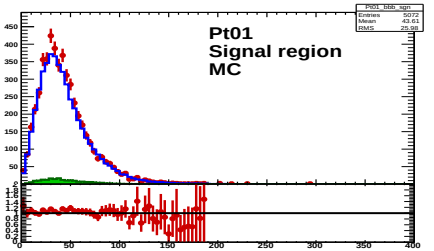
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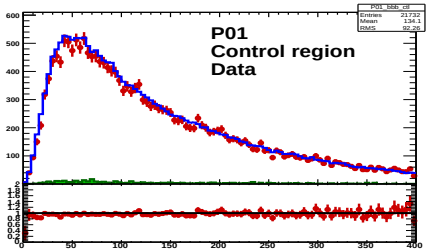
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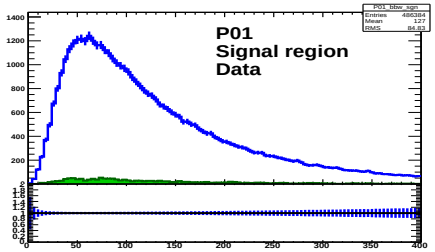
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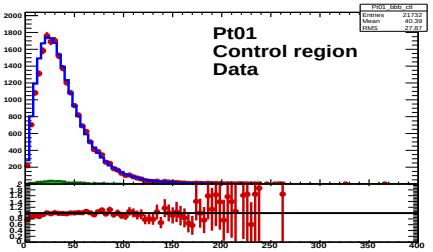
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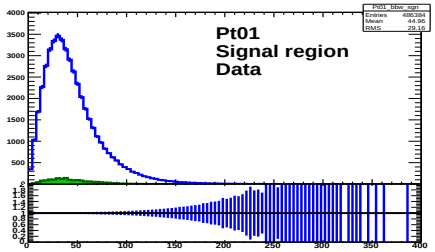
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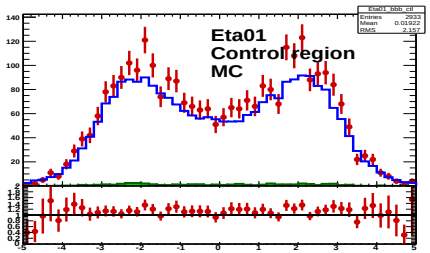
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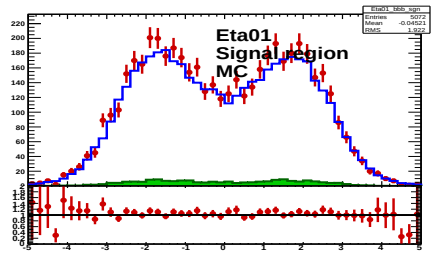
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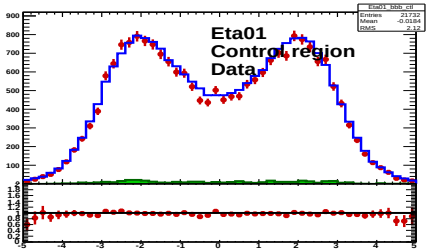
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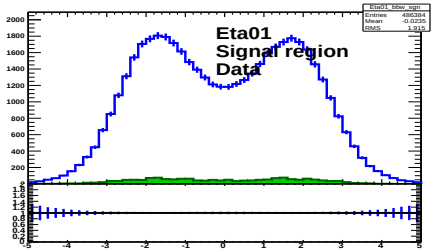
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