Studies on interference effects of flavor changing neutral currents in the top sector ($tu\gamma$,$tc\gamma$ couplings)

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Productions:

- Production mode sample: $\sigma = (22.66 \pm 0.03)$ pb
- generate p p > t a $$ t~, add p p > t u~ a $$ t~ + anti-particle processes
- Decay mode sample: $\sigma = (48.18 \pm 0.06)$ pb
- generate p p > t t~ > w+ b a u~ + anti-particle process
- Interference Sample: $\sigma = (70.35 \pm 0.08)$ pb
- generate p p > t a, add p p > t j~ a + anti-particle processes
- Parameters $C_{tB} = 12$

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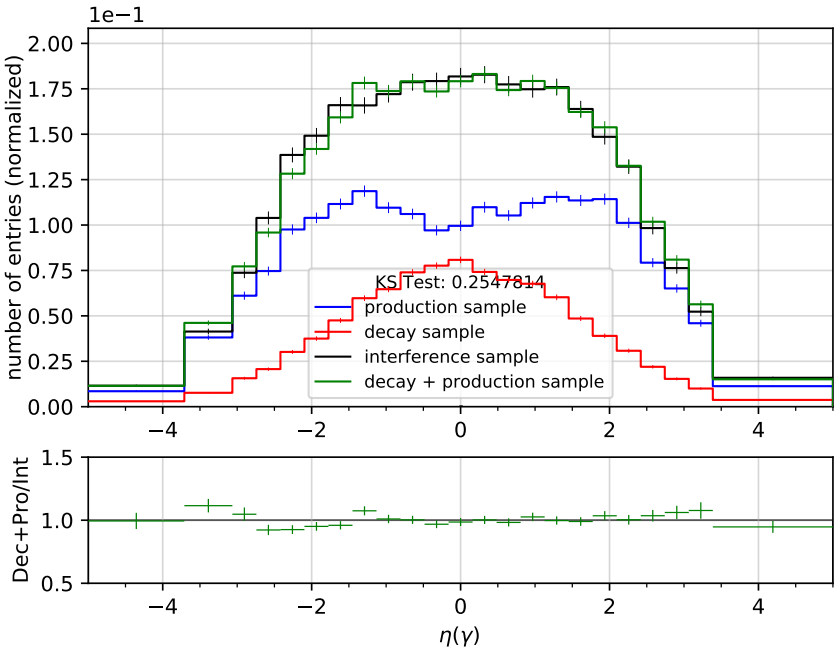
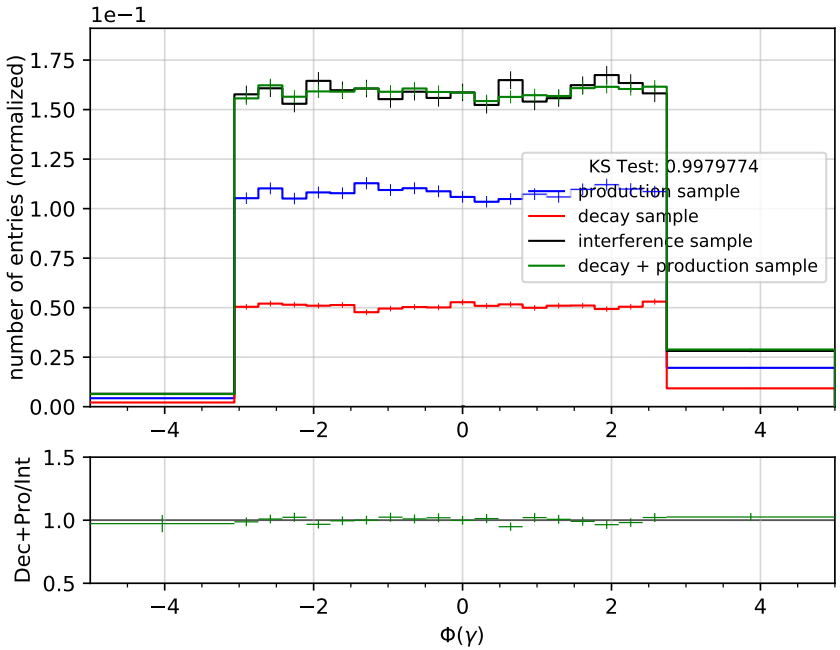
- Variables Truth:
- Photon, TopQuark ($t \rightarrow Wb$), WBoson, BQuark, Highest p_T Up Quark
  - p_T,η,Φ,m
- ΔR and invariant mass from γ,t to:
  - γ,t,u,W

- Variables Reco:
- Photon, TopQuark, WBoson, highest p_T bJet and Jet
  - p_T,η,Φ,m,b
- ΔR and invariant mass from γ,t to:
  - γ,t,Leading Jet,b Jet,W
- Cuts:
  - nPhoton > 0, nLepton > 0, $p_{T,\text{all}} > 20$ GeV, $\eta_{\text{all}} < 2.5$, $E_T^{\text{miss}} > 20\,\text{GeV}$, and no complex solutions for neutrino reco

$\rightarrow$ too many weights are zero!


1e−1
number of entries (normalized)
KS Test: 0.2547814
production sample
decay sample
interference sample
decay + production sample
Dec+Pro/Int
η(γ)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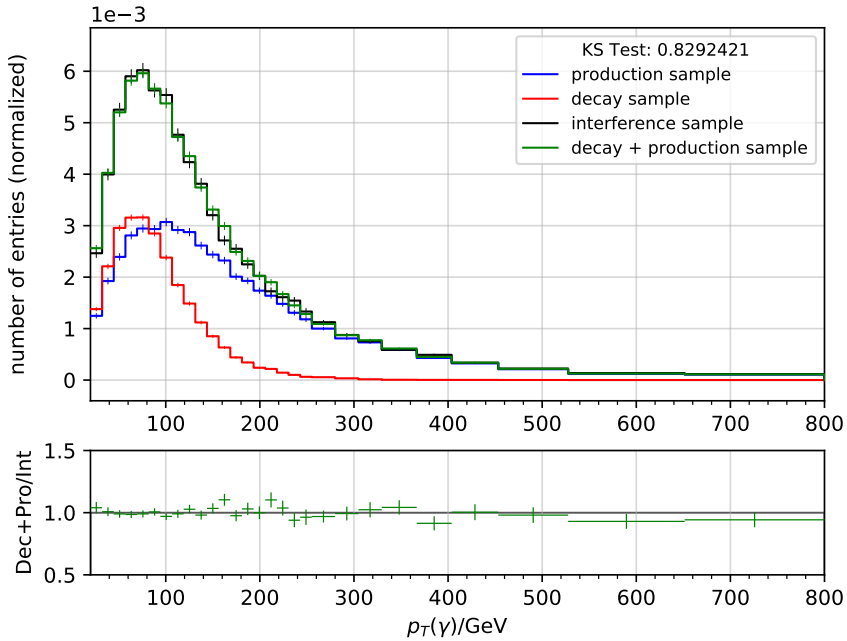
interference sample
decay + production sample
Dec+Pro/Int
Φ(γ)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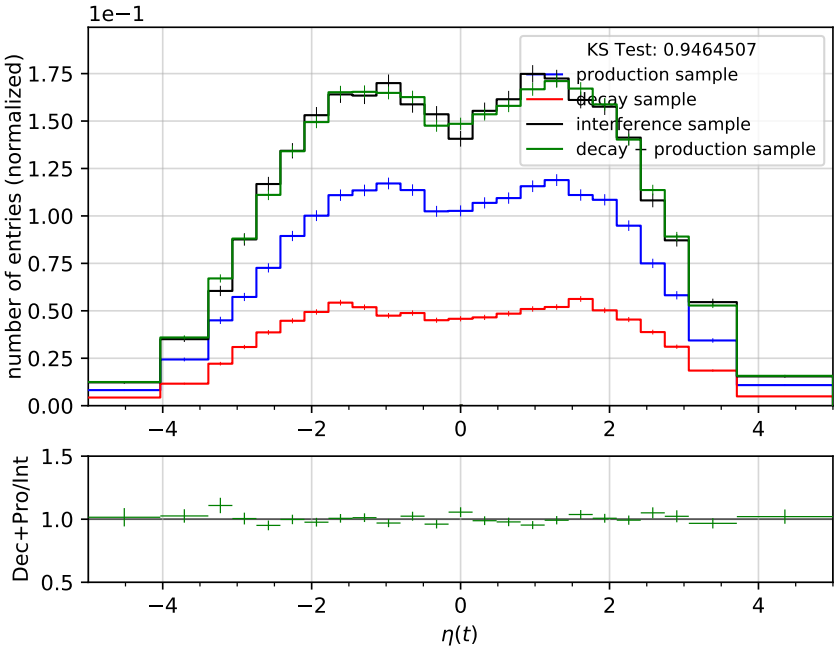
decay sample
interference sample
decay + production sample
Dec+Pro/Int
$p_T(\gamma)$/GeV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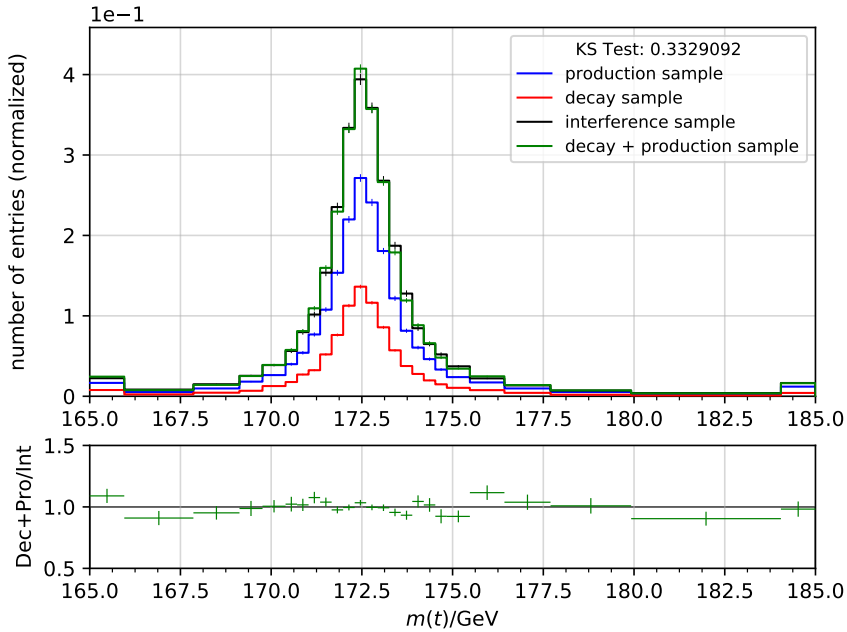
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
η(t)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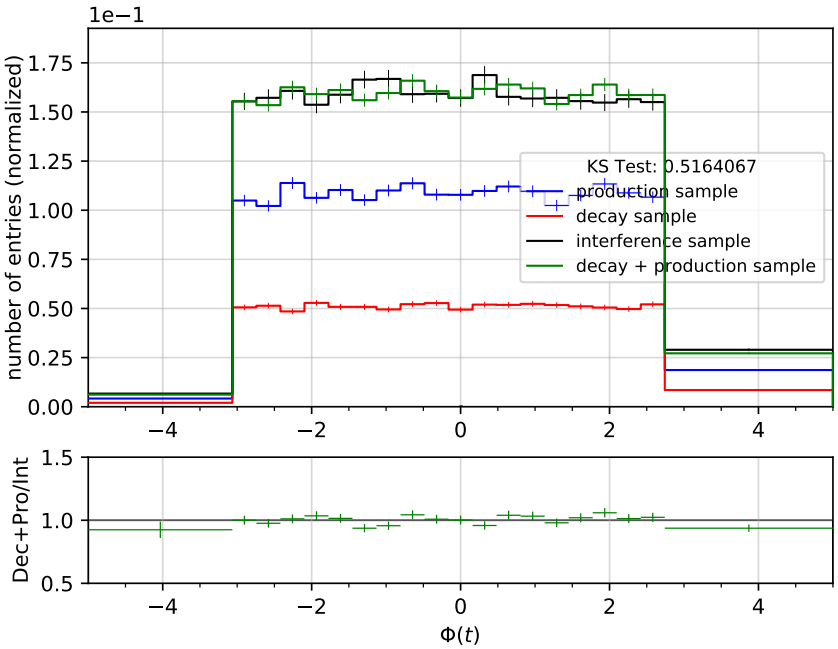
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
m(t)/GeV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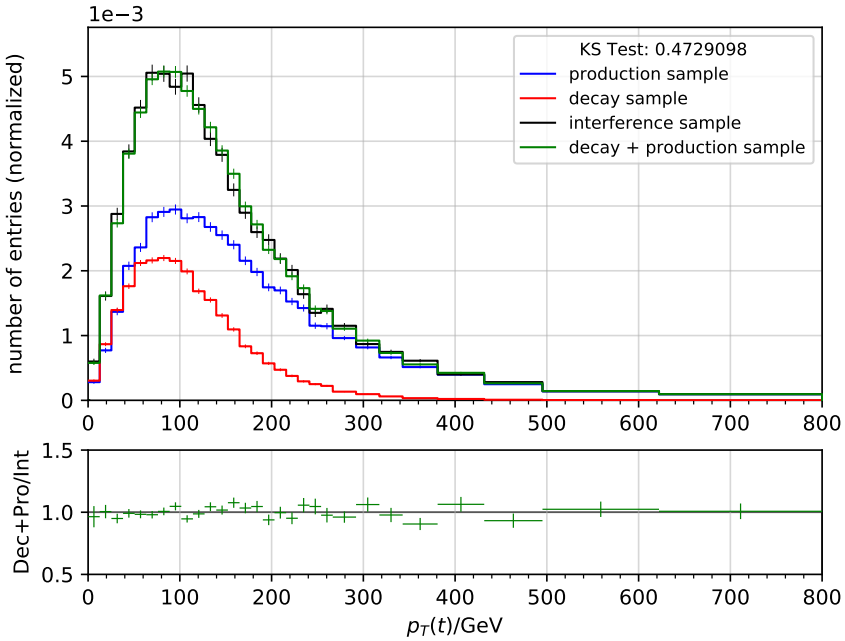
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
Φ(t)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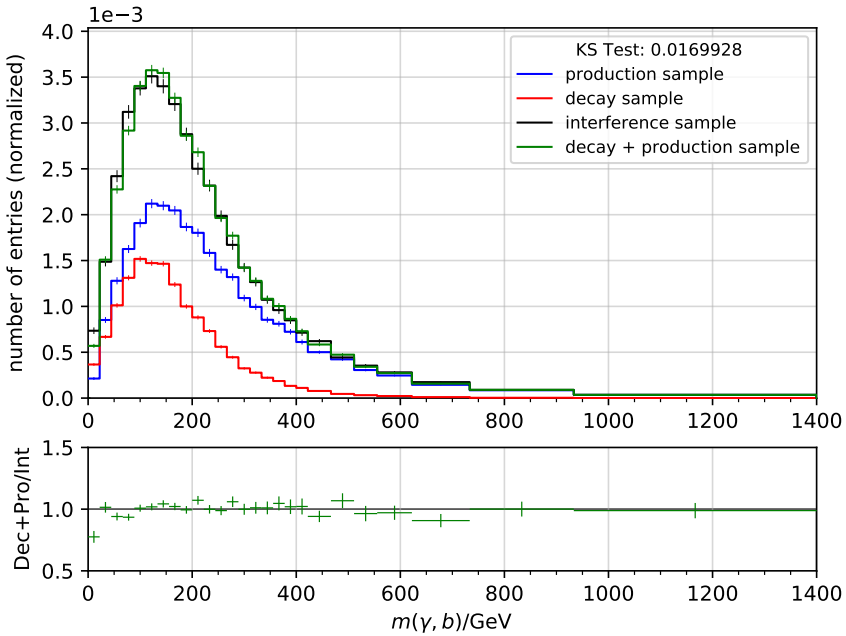
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
$p_T(t)$/GeV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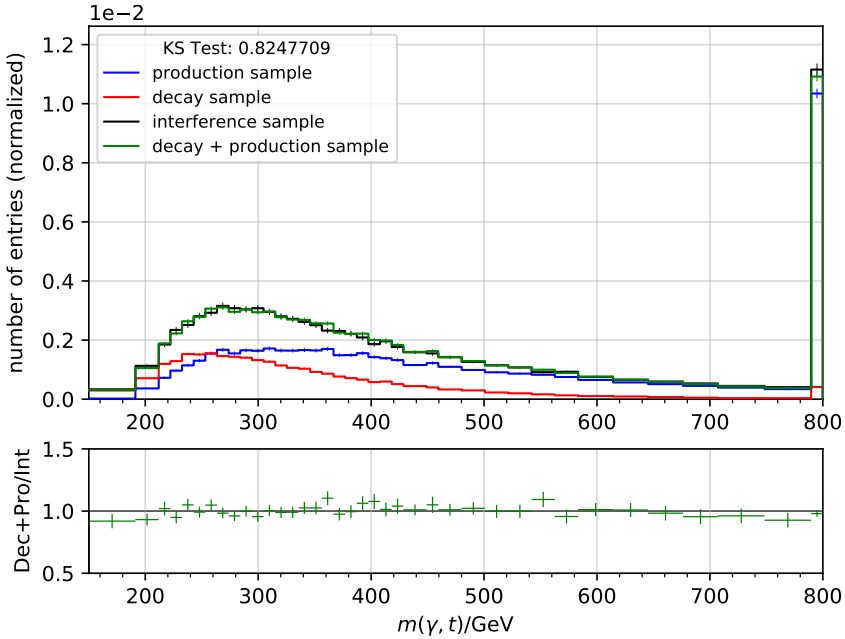
decay + production sample
number of entries (normalized)
Dec+Pro/Int
m(γ, b)/GeV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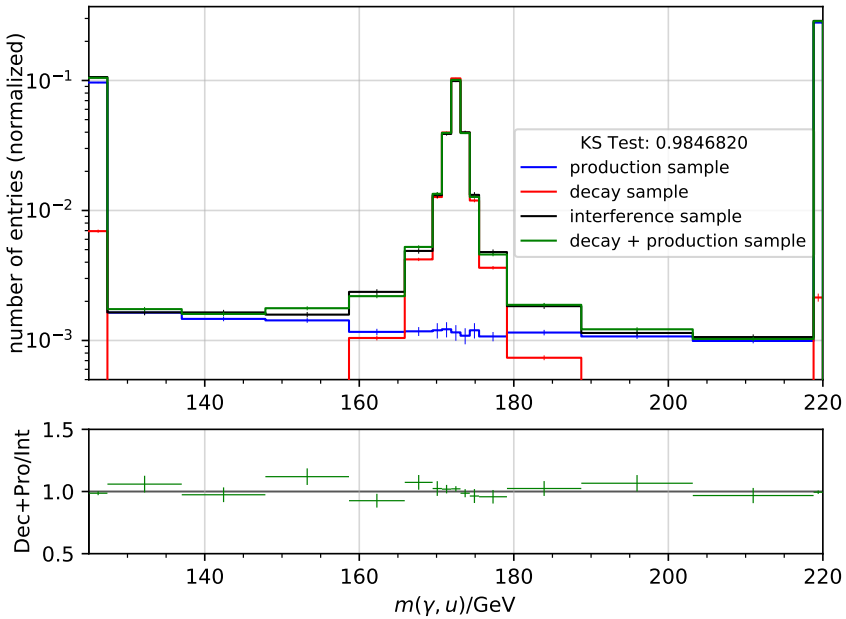
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
m(γ, t)/GeV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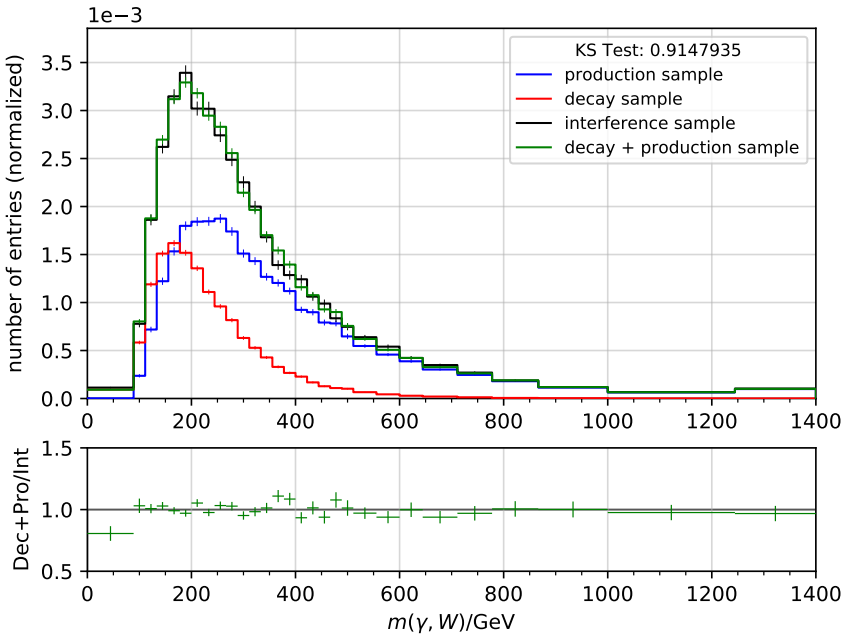
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
m(γ, u)/GeV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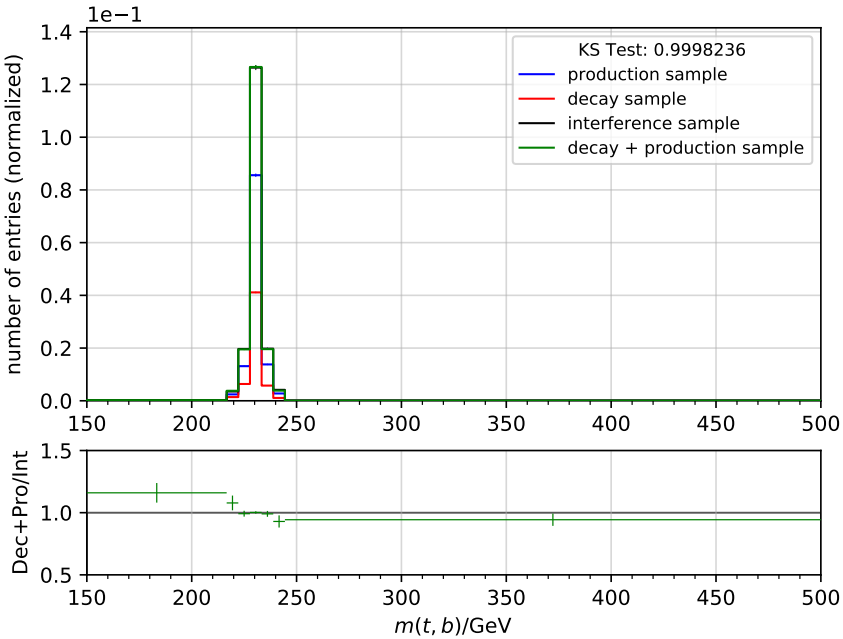
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
m(γ, W)/GeV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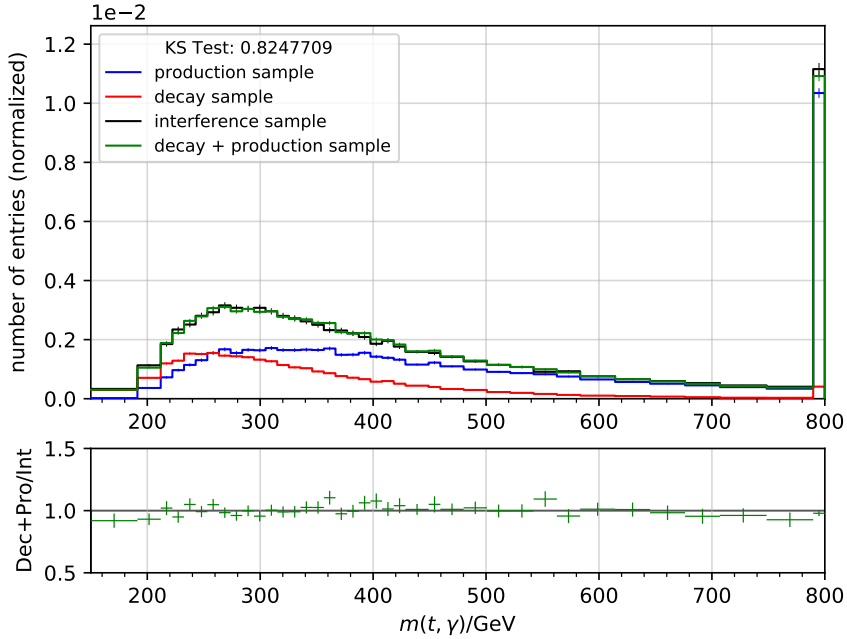
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
m(t, b)/GeV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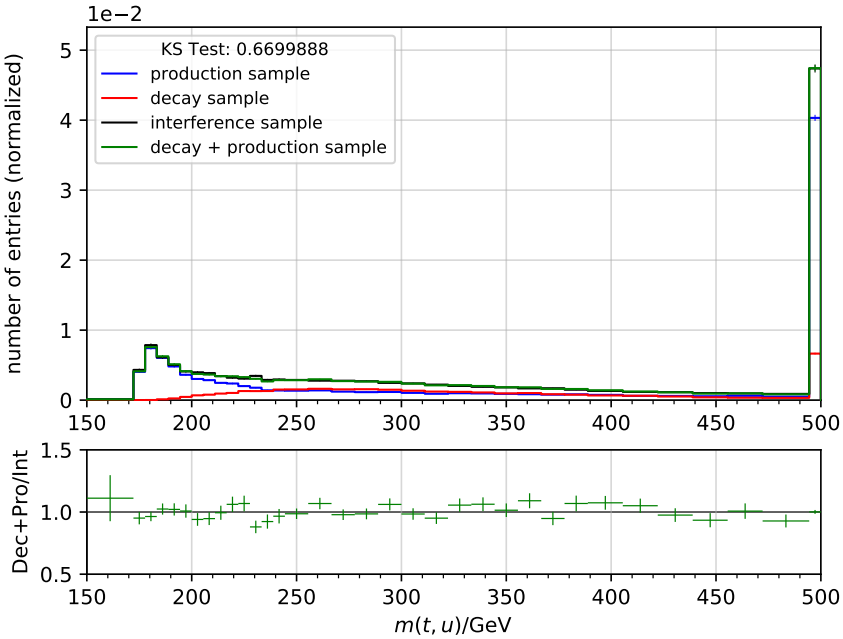
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
m(t, γ)/GeV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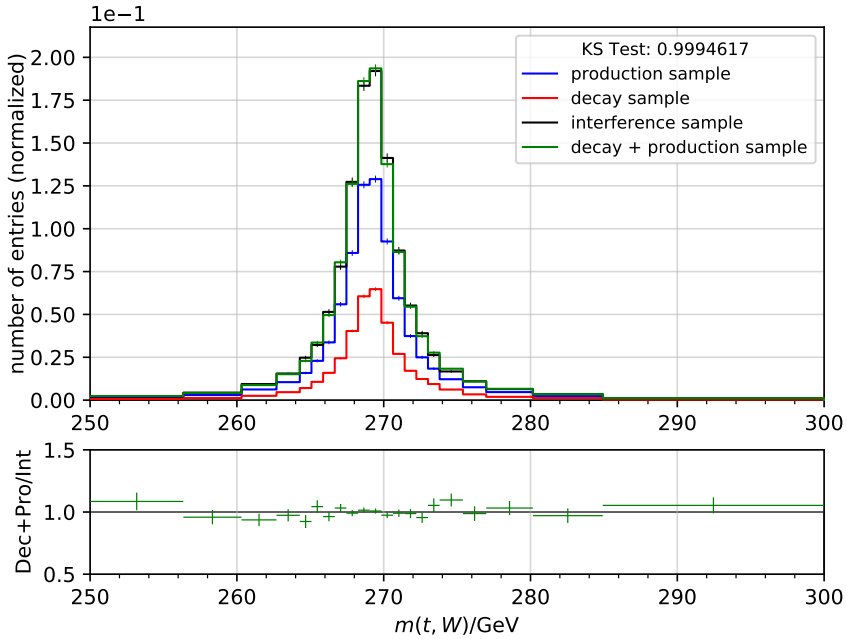
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
m(t, u)/GeV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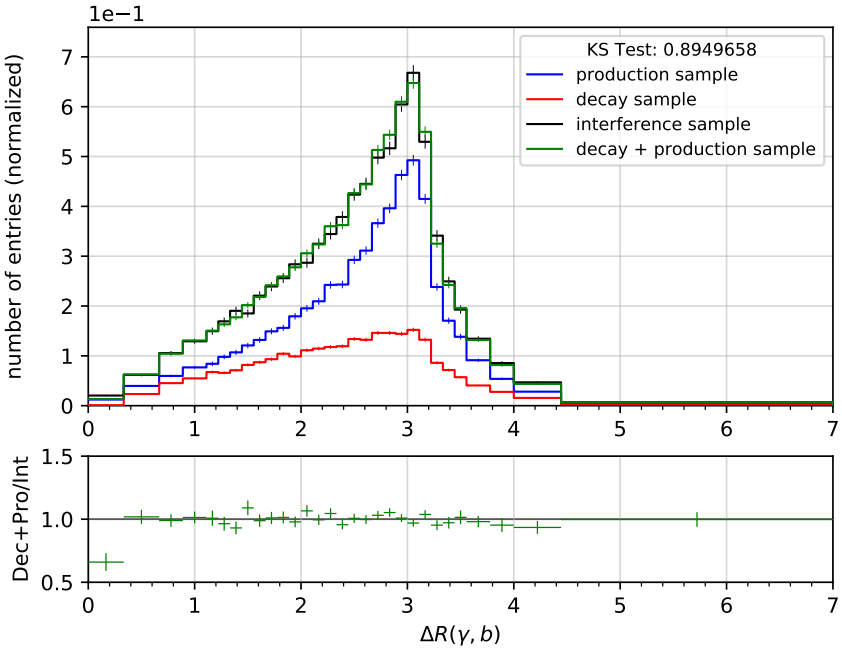
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
m(t, W)/GeV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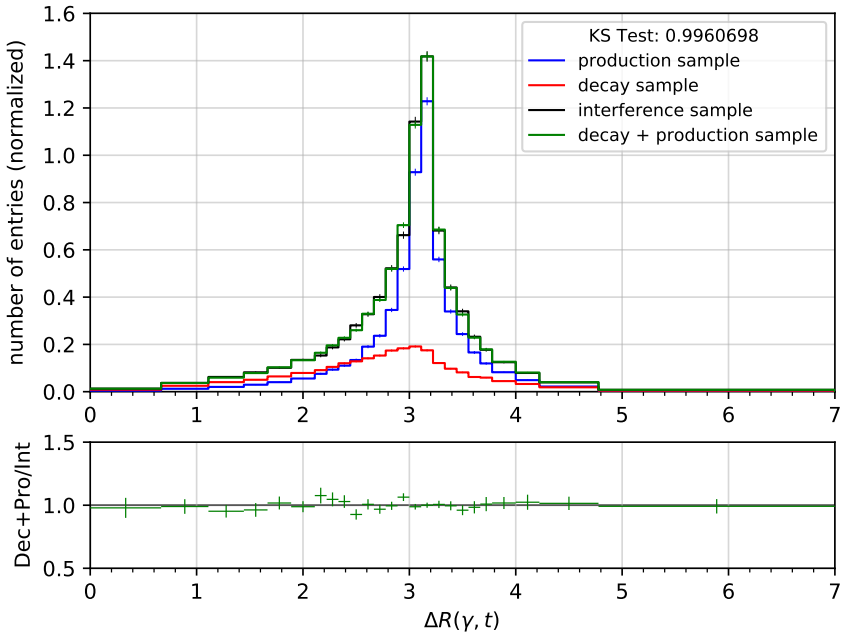
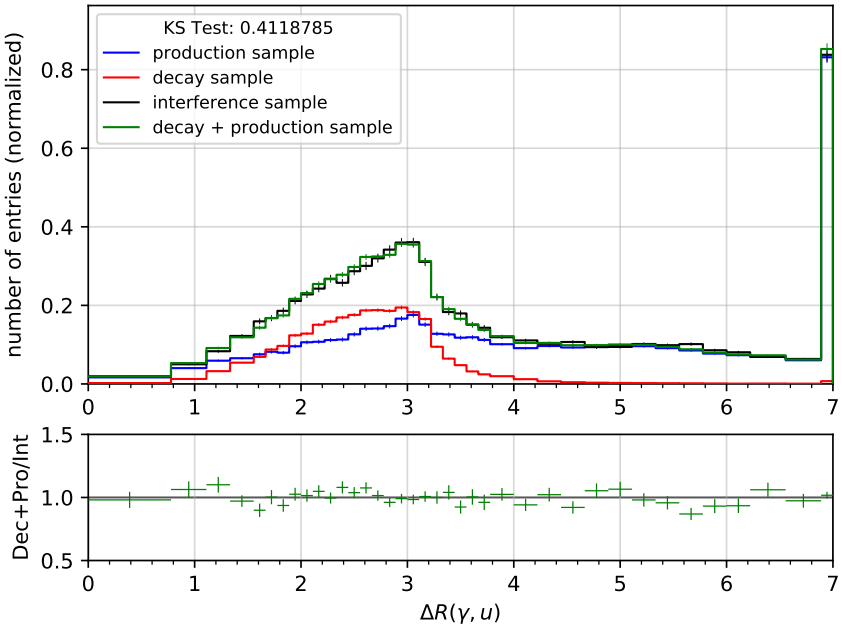
KS Test: 0.8949658
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
ΔR(γ, b)


KS Test: 0.9960698
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
ΔR(γ, t)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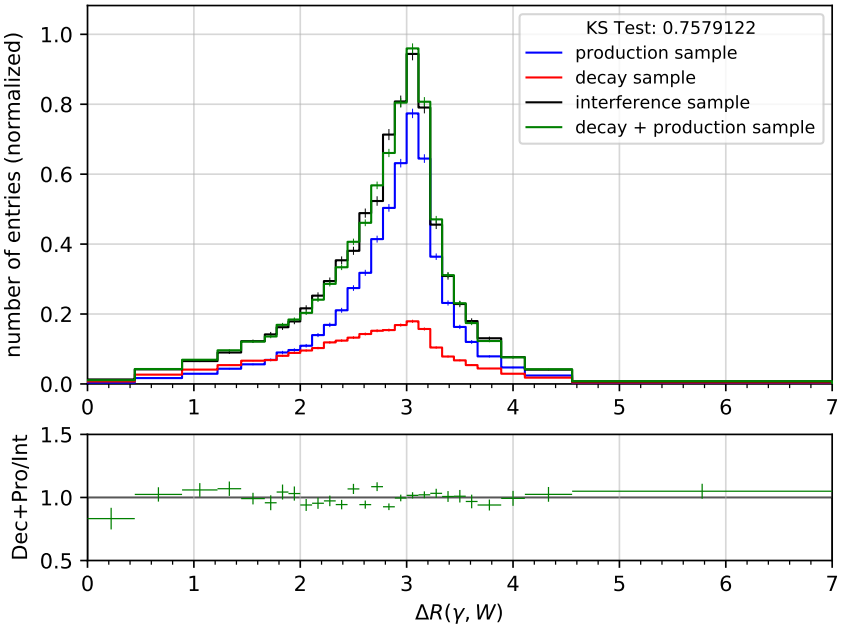
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
ΔR(γ, u)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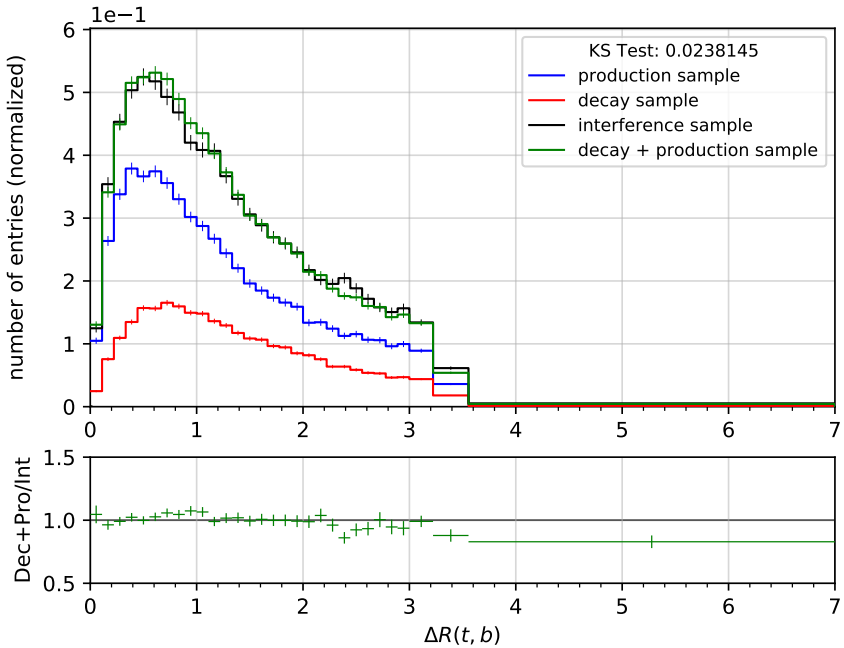
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
ΔR(γ, W)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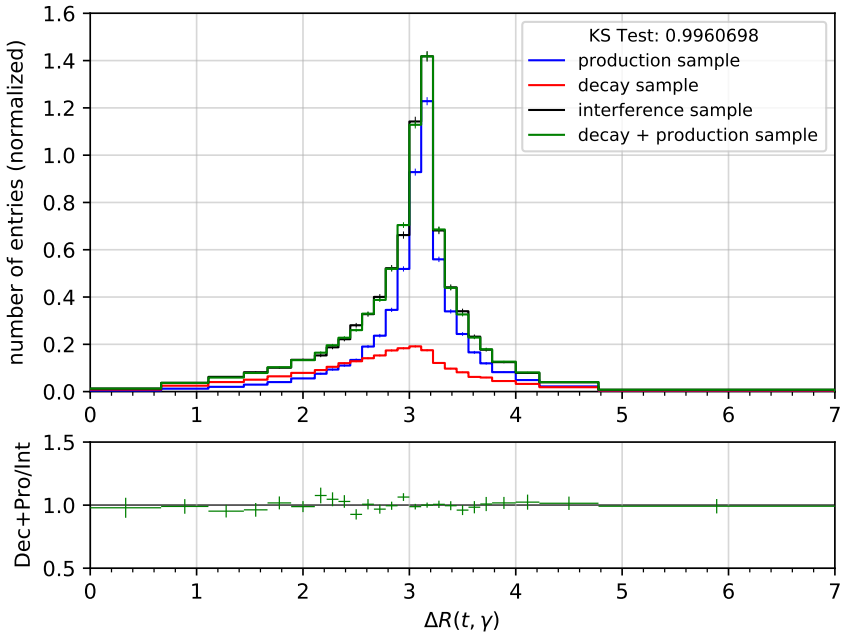
KS Test: 0.0238145
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
ΔR(t, b)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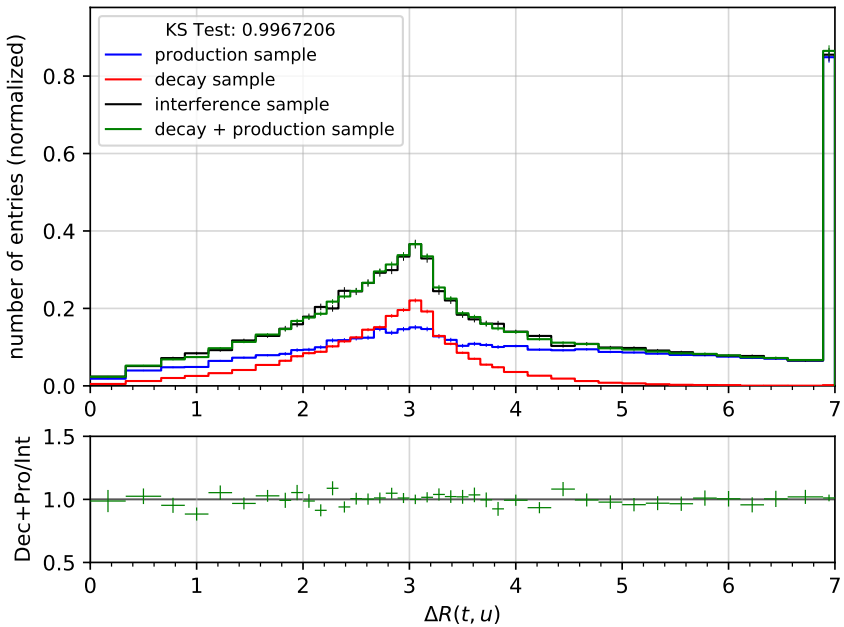
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
ΔR(t, γ)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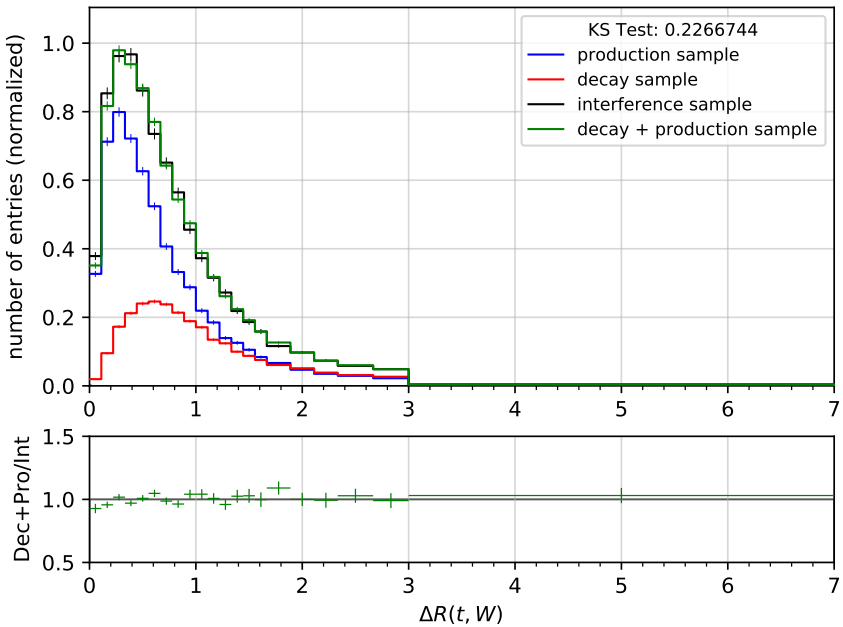
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
ΔR(t, u)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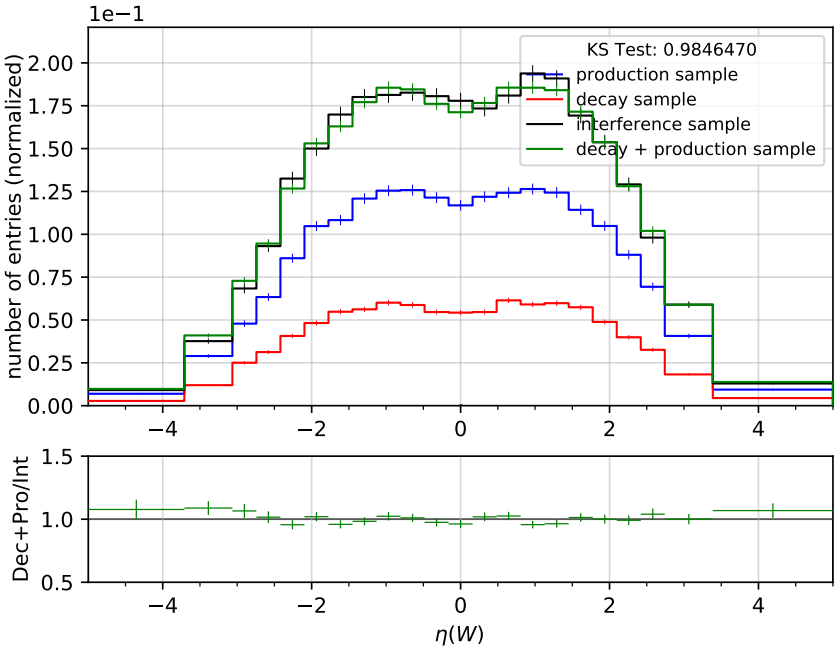
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
ΔR(t, W)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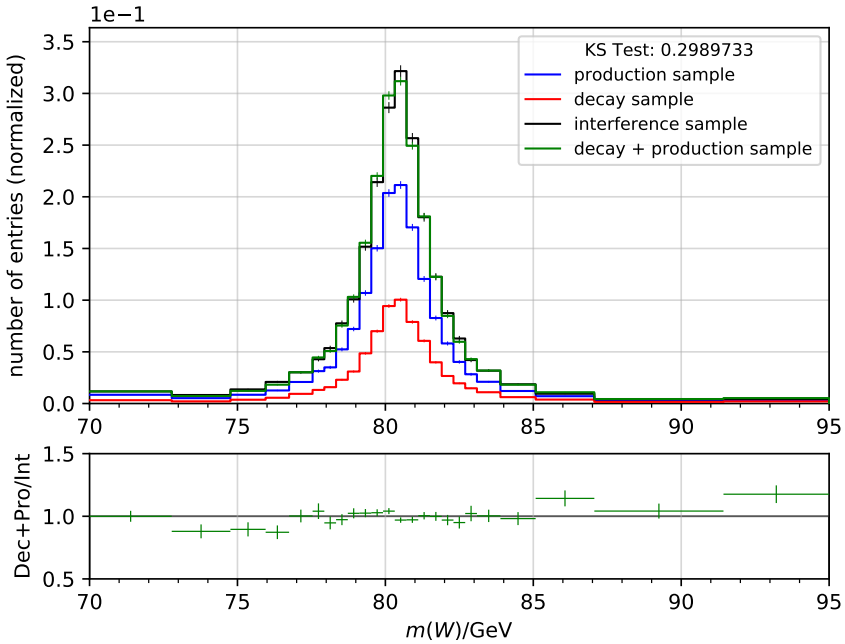
KS Test: 0.9846470
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
η(W)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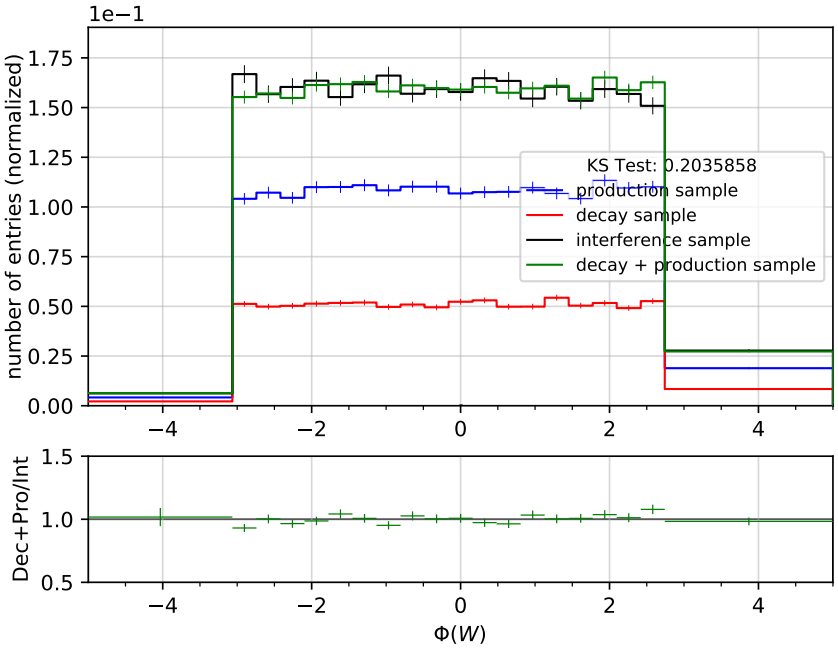
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
m(W)/GeV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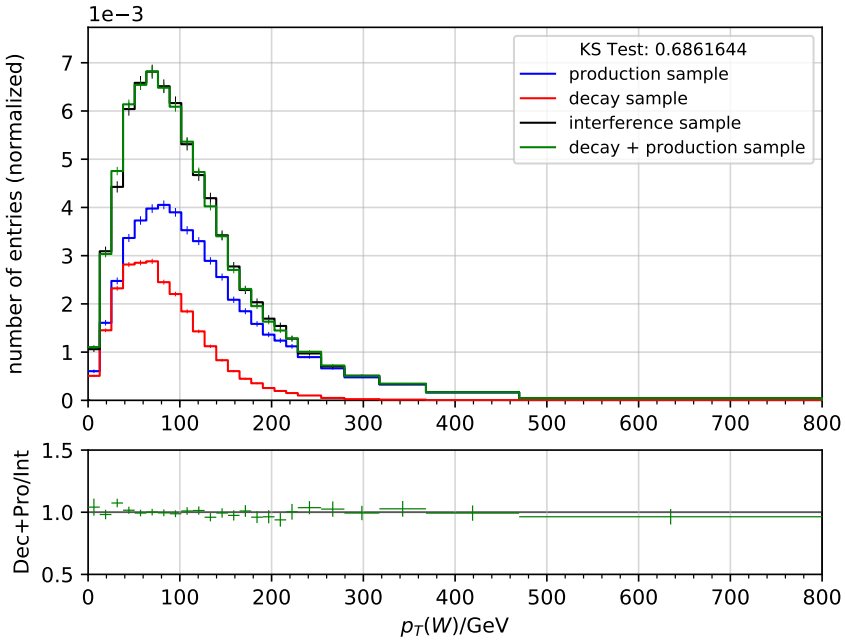
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
Φ(W)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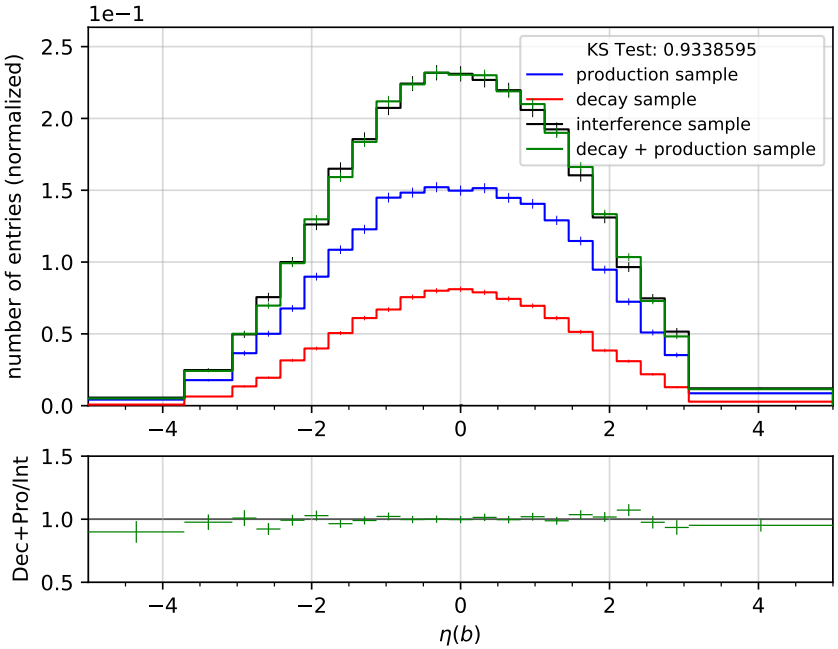
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
$p_T(W)$/GeV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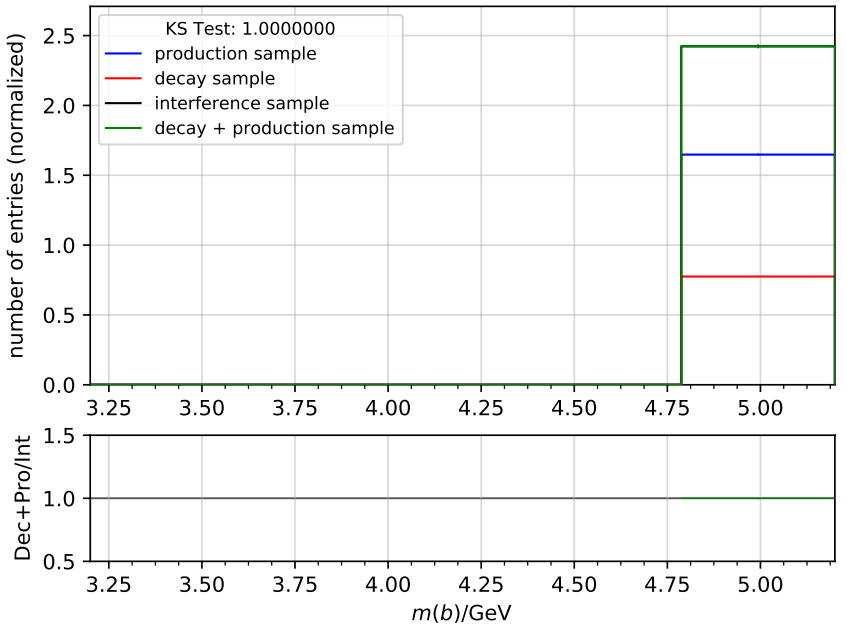
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
η(b)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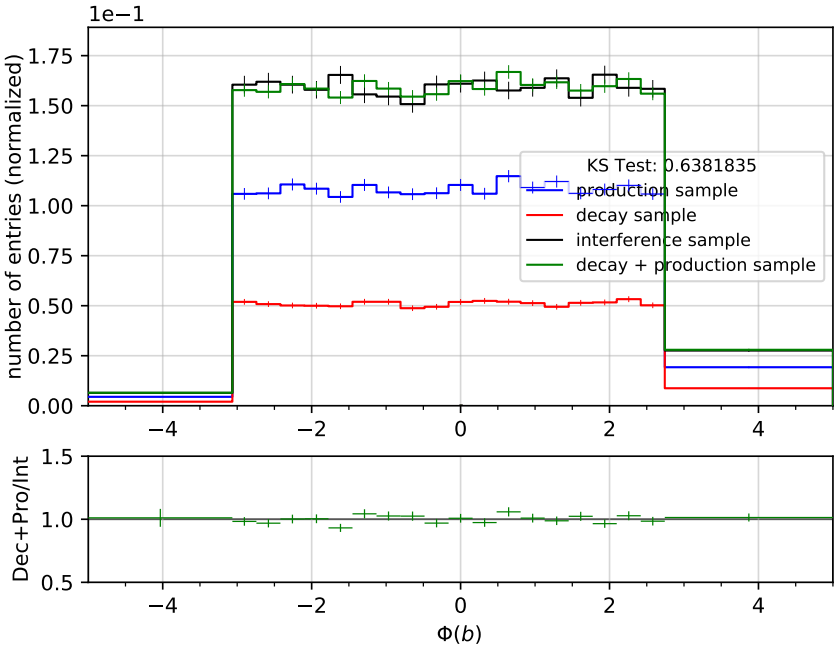
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
m(b)/GeV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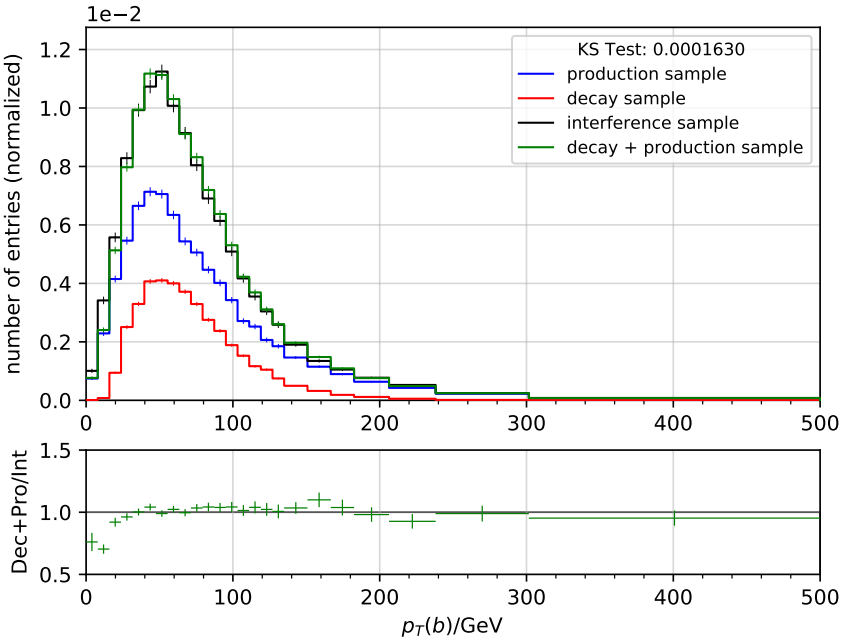
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
Φ(b)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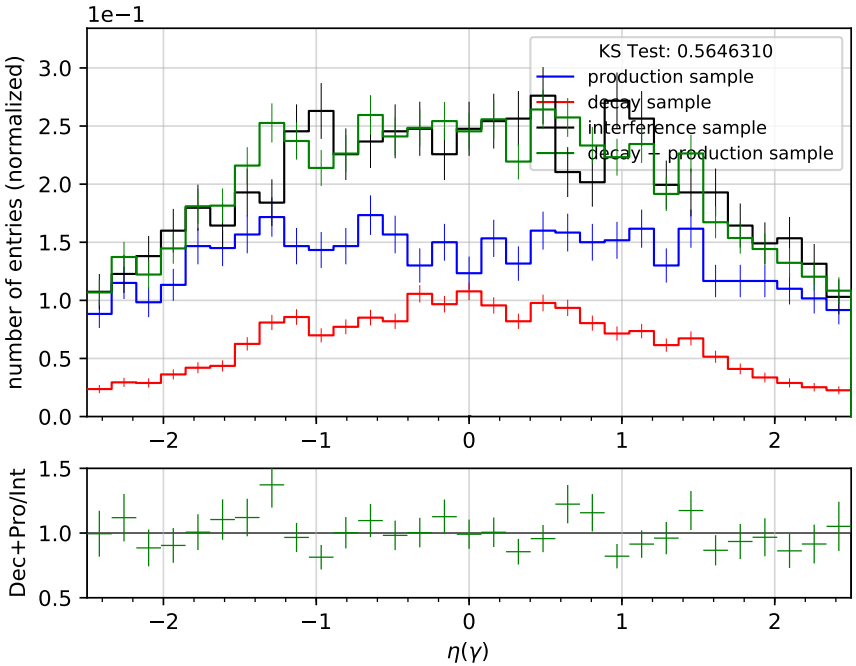
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
$p_T(b)$/GeV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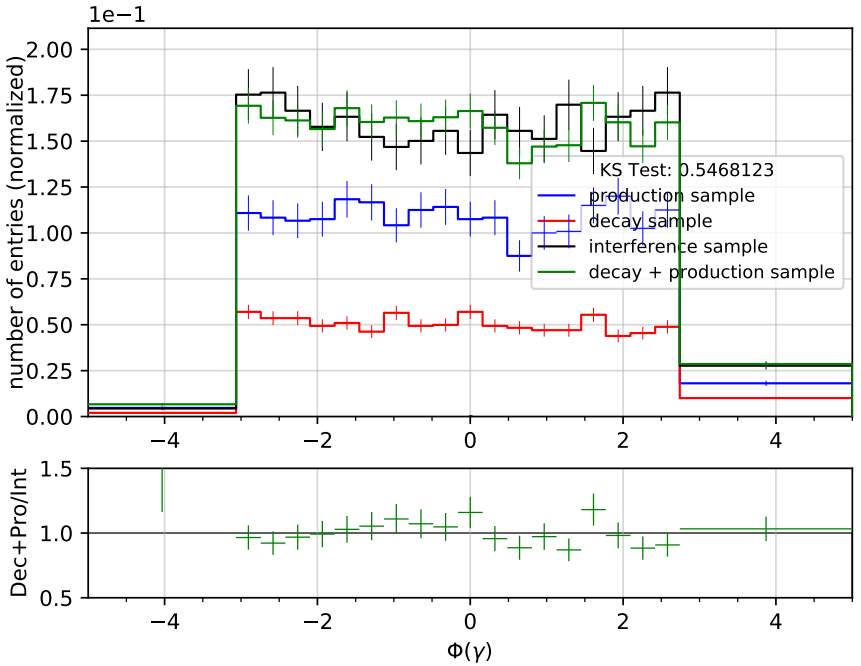
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
η(γ)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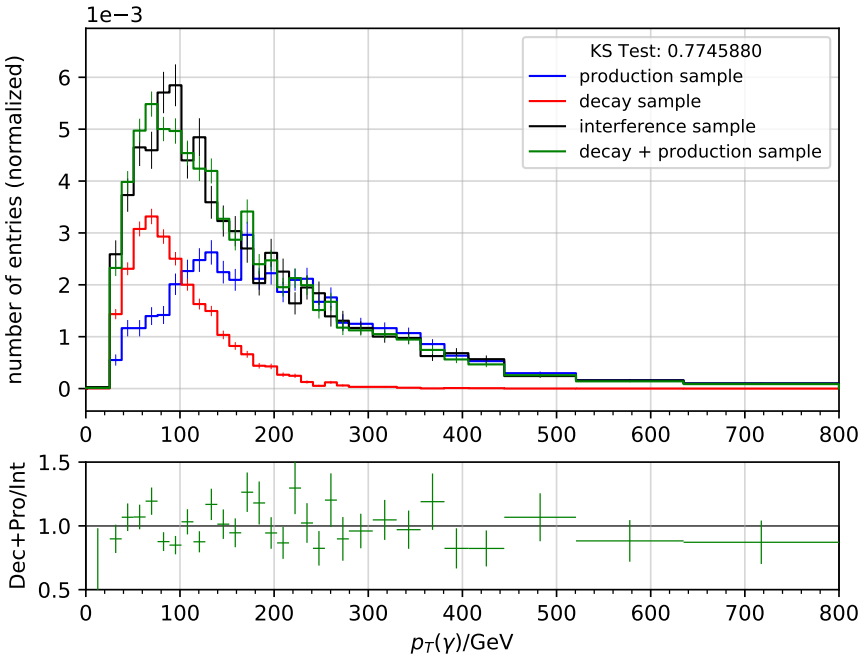
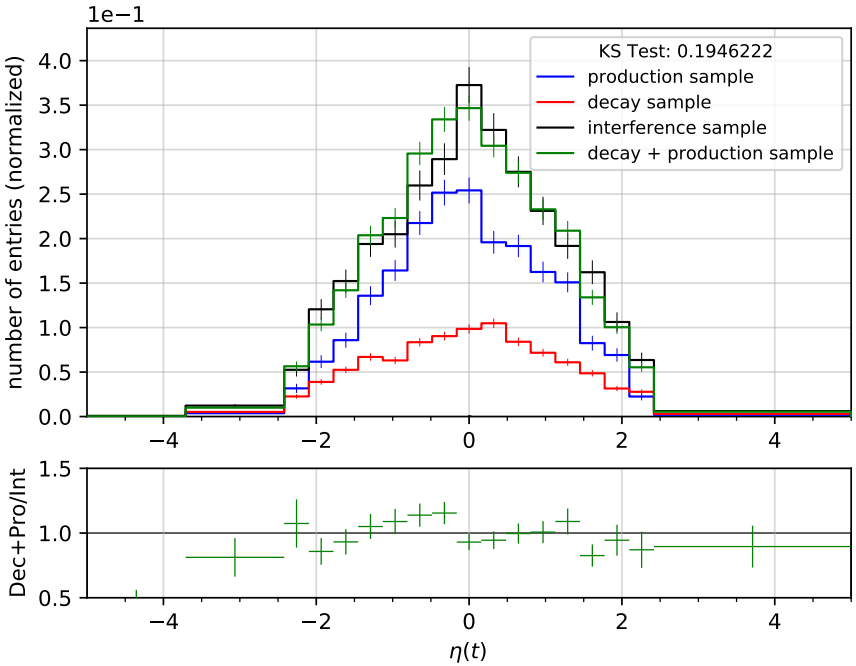
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
Φ(γ)


1e−3
KS Test: 0.7745880
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
$p_T(\gamma)$/GeV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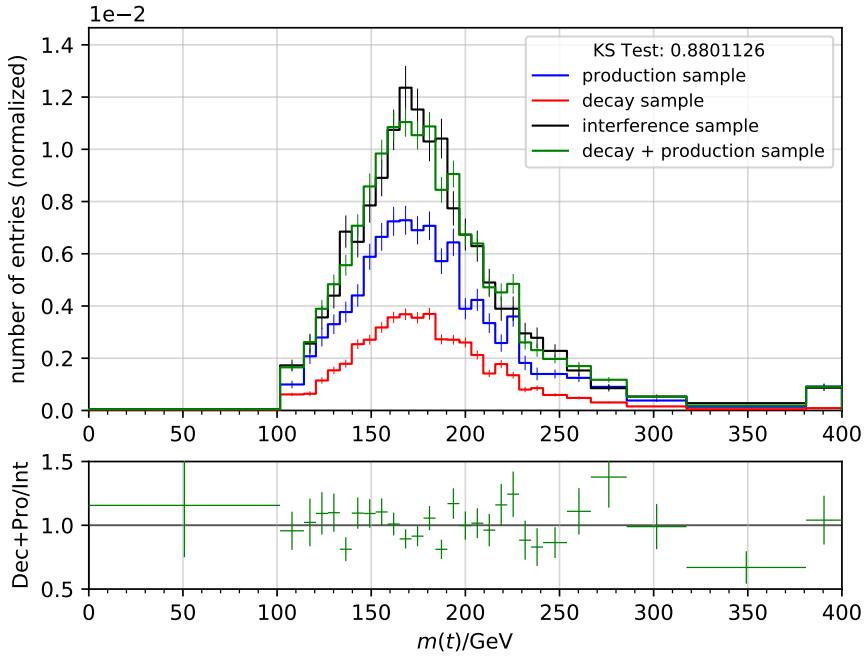
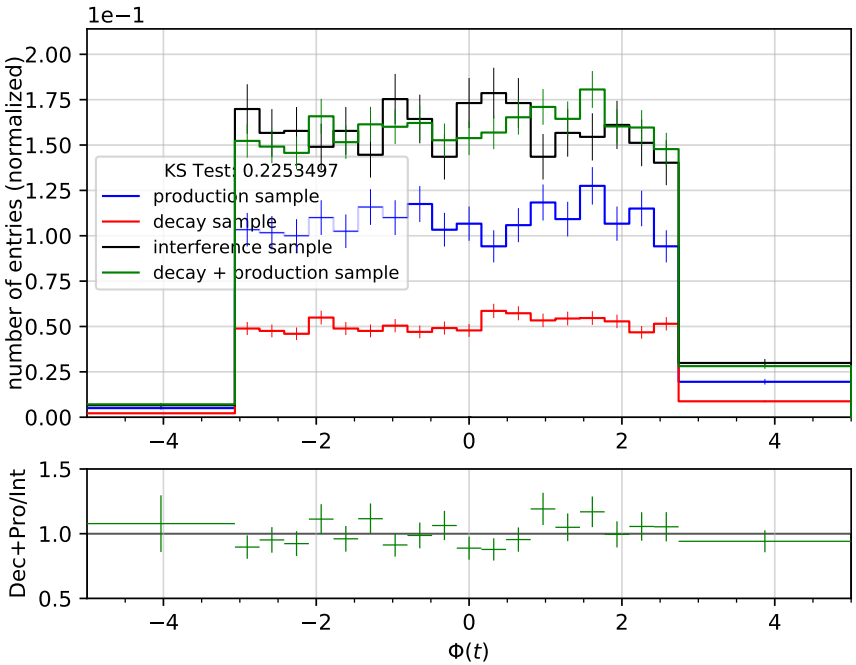
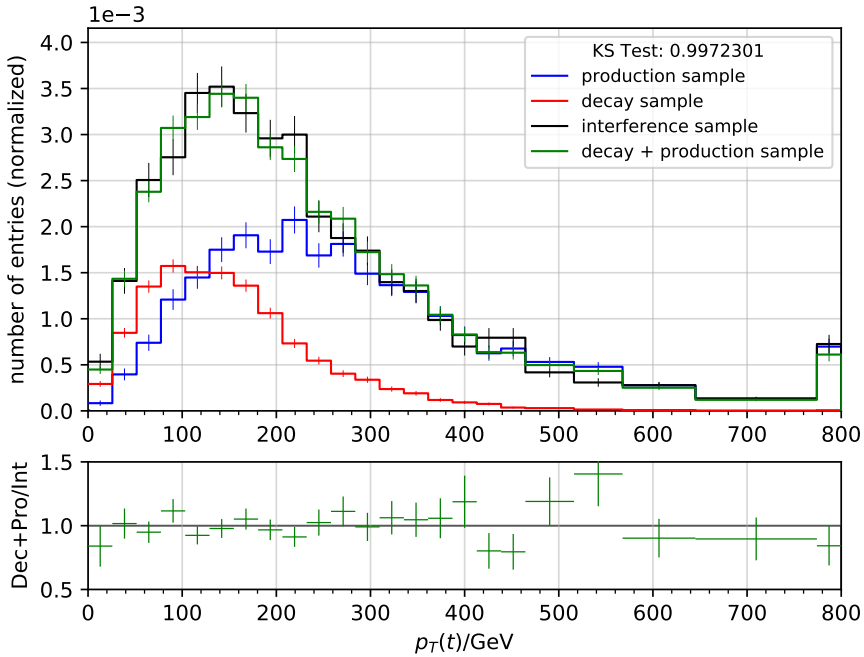
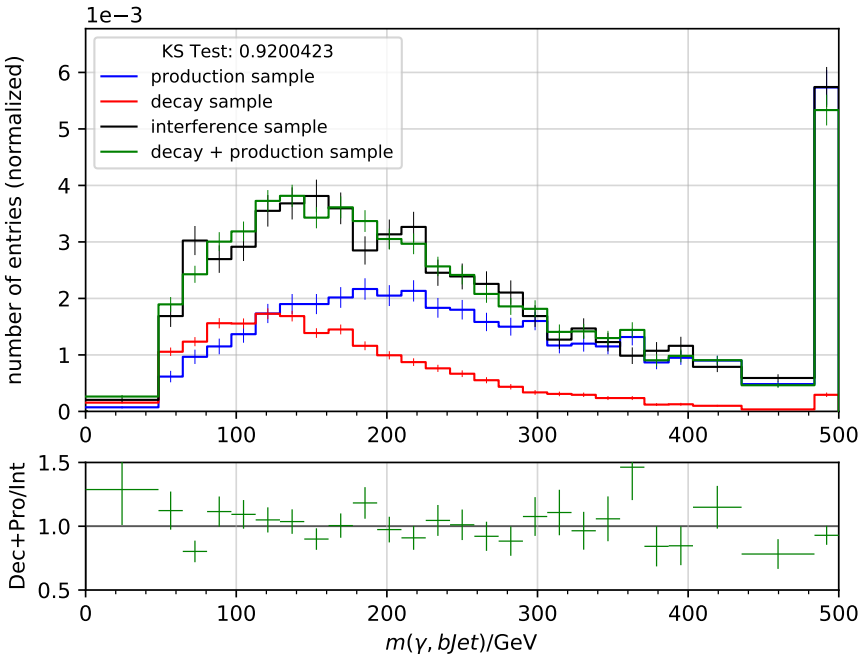
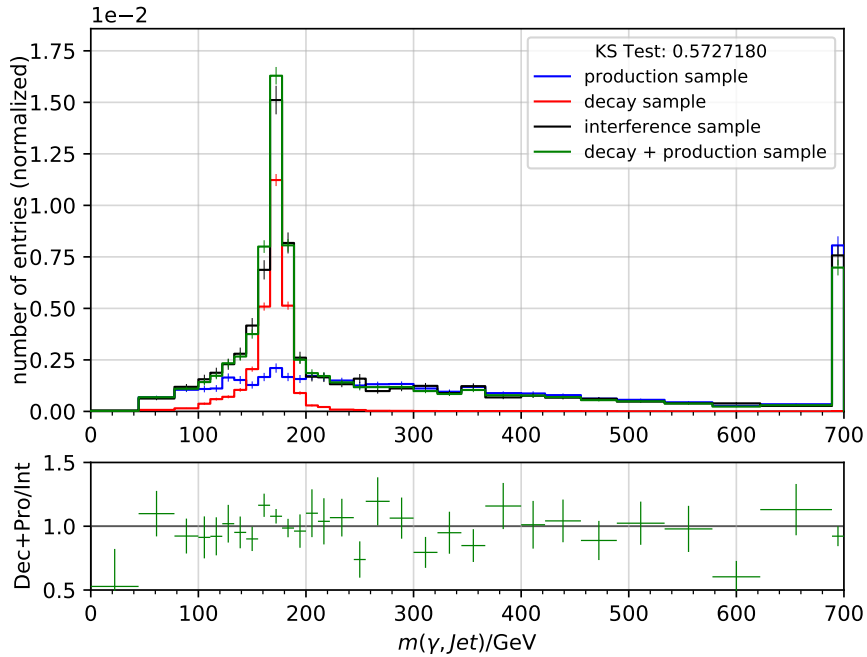
KS Test: 0.1946222
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
η(t)

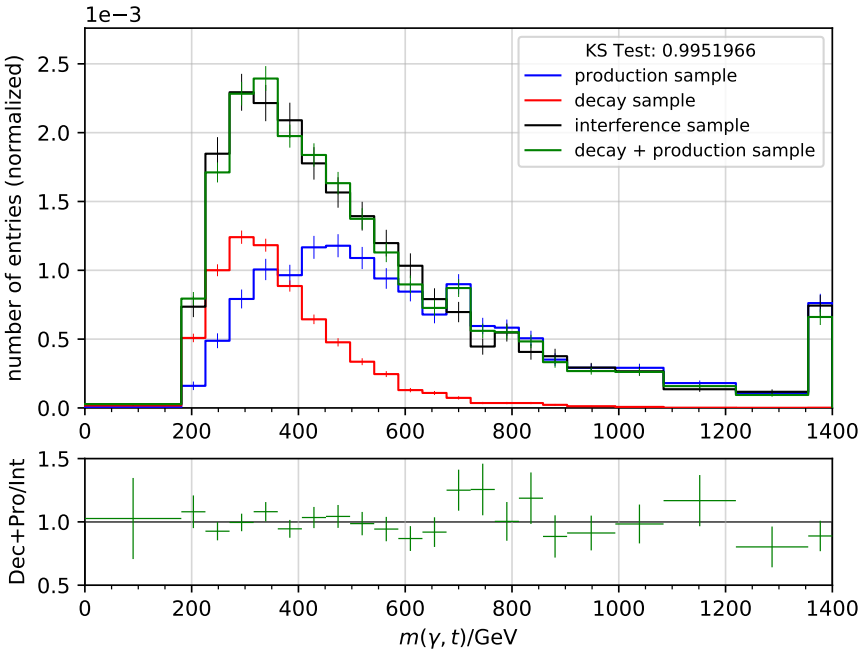

1e−2
KS Test: 0.8801126
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
m(t)/GeV

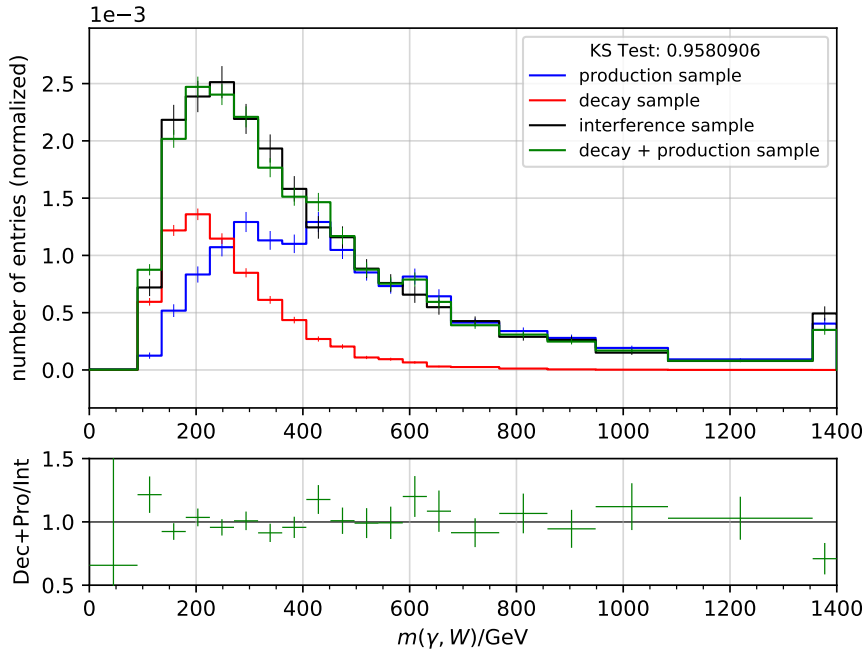

1e−1
KS Test: 0.2253497
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
Φ(t)

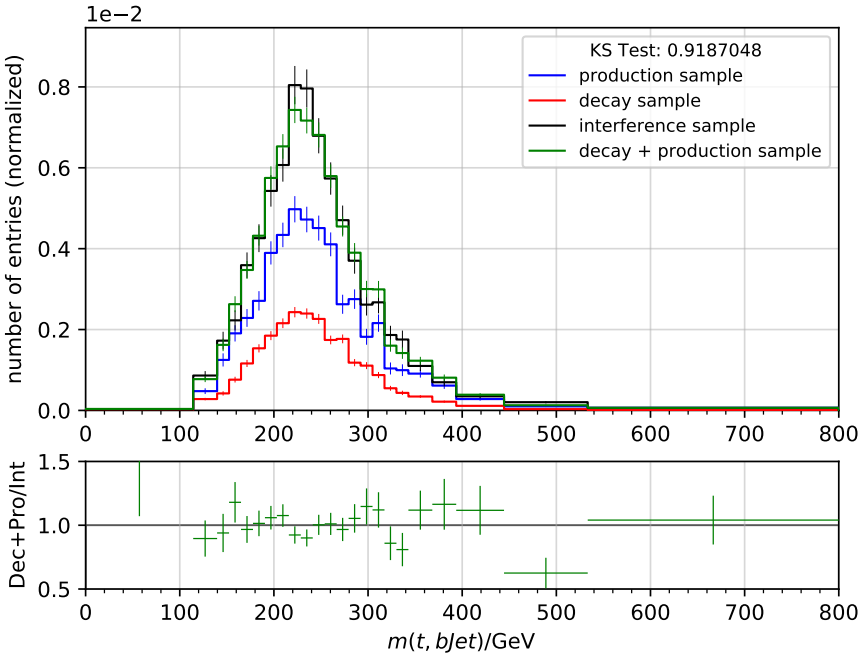

1e−3
KS Test: 0.9972301
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
$p_T(t)$/GeV

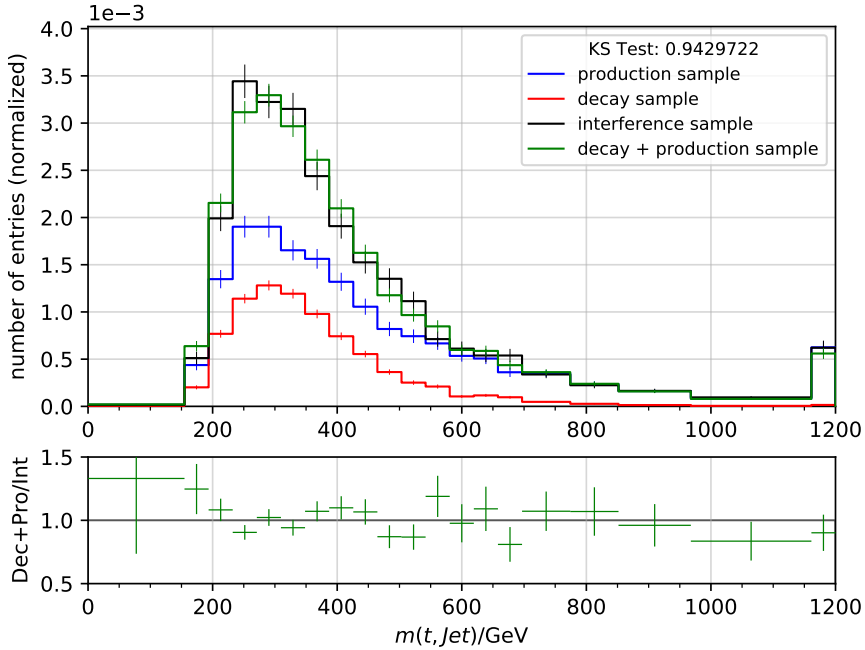

1e−3
KS Test: 0.9200423
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
m(γ, bJet)/GeV

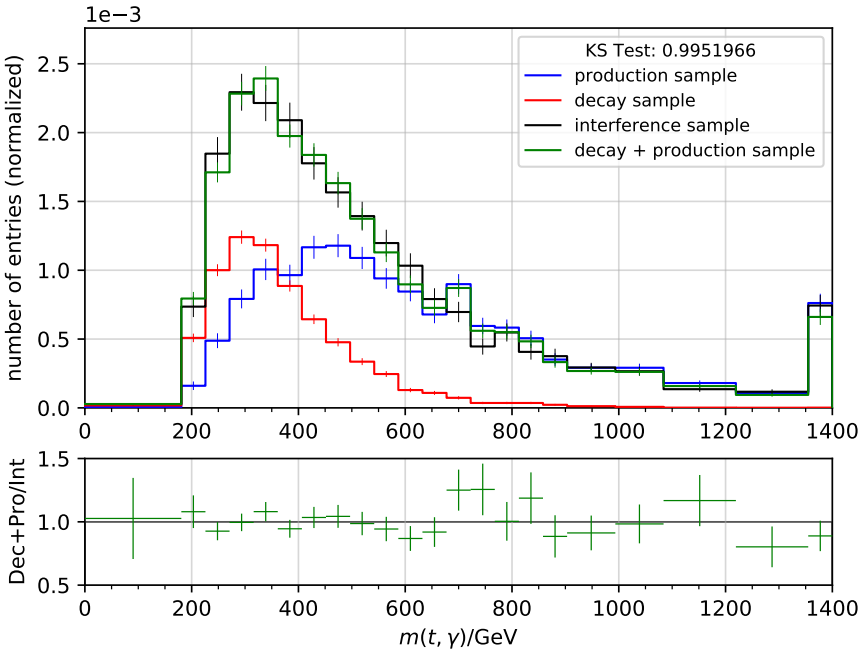

1e−2
KS Test: 0.5727180
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
m(γ, Jet)/GeV

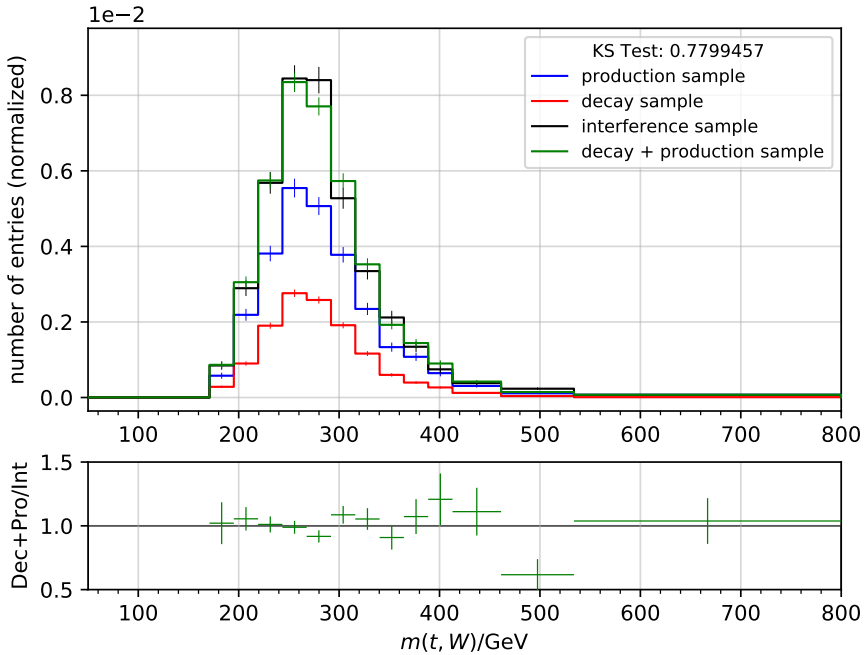

1e−3
KS Test: 0.9951966
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
m(γ, t)/GeV

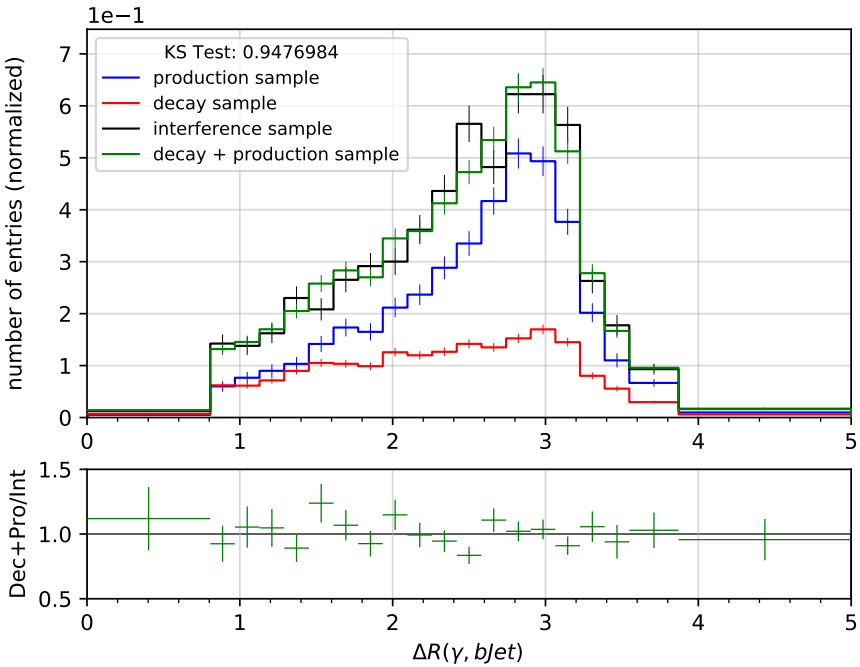

1e−3
KS Test: 0.9580906
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
m(γ, W)/GeV

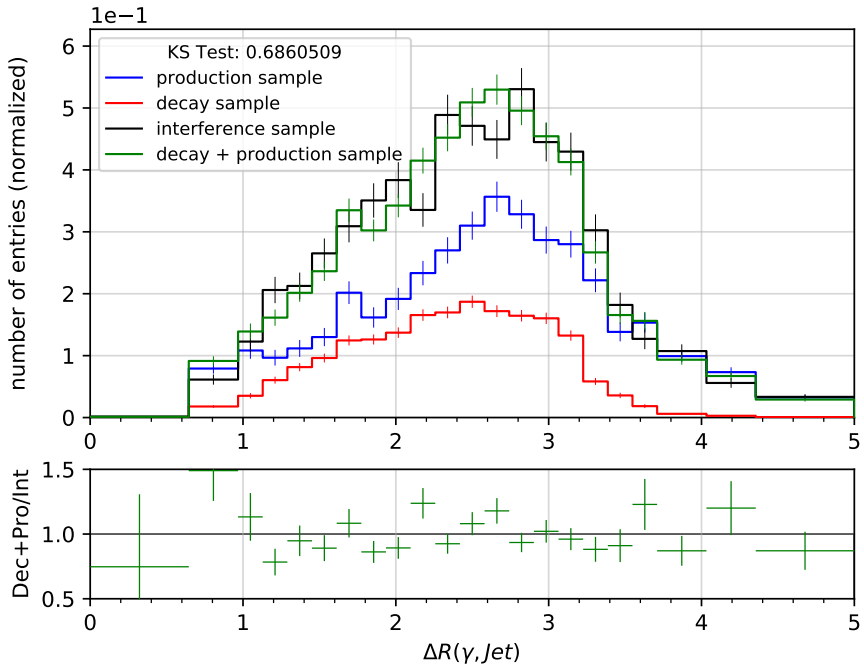

1e−2
KS Test: 0.9187048
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
m(t, bJet)/GeV

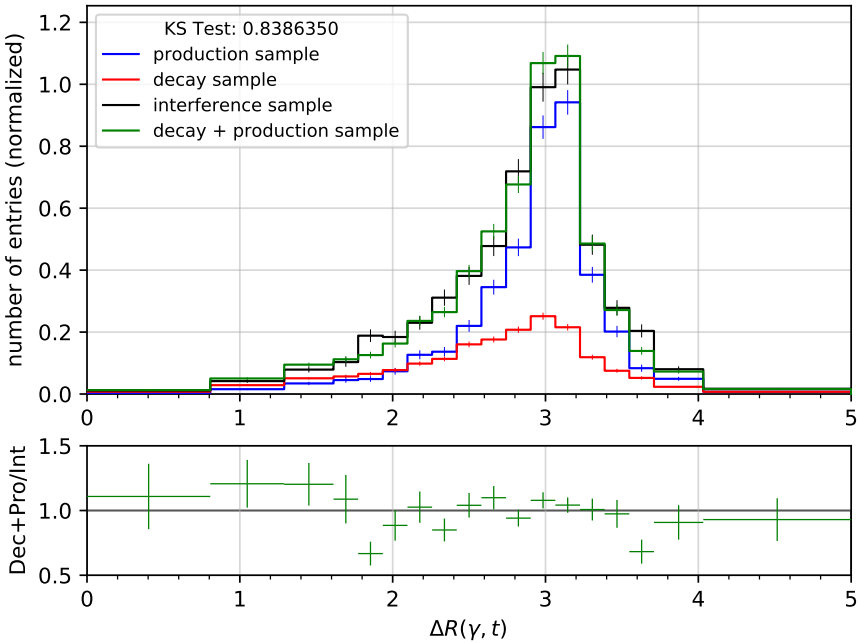

1e−3
KS Test: 0.9429722
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
m(t, Jet)/GeV

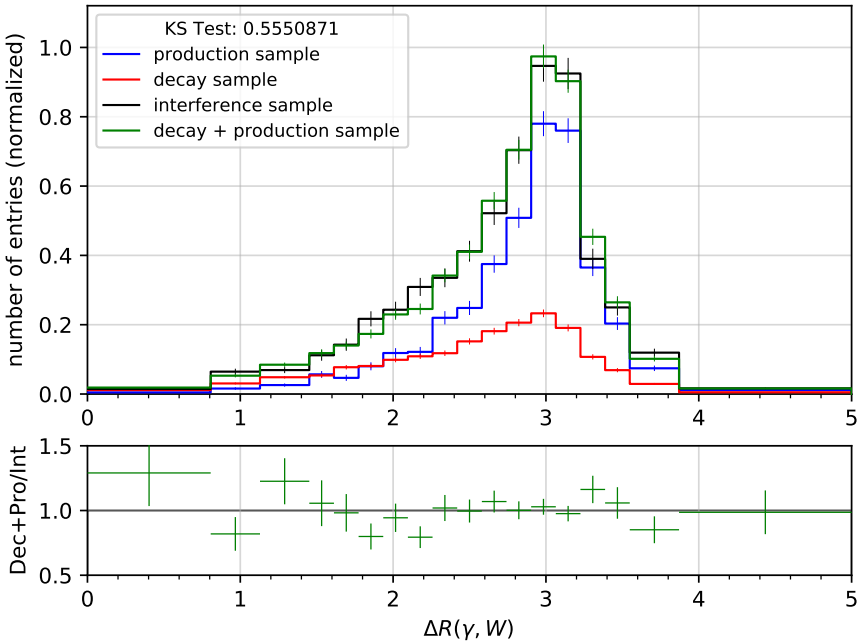

1e−3
KS Test: 0.9951966
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
m(t, γ)/GeV

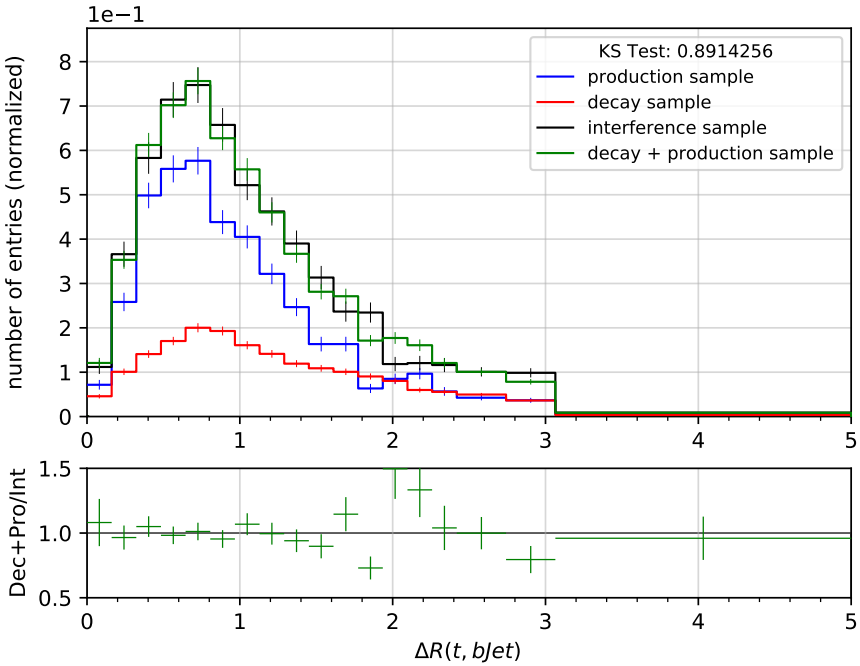

1e−2
KS Test: 0.7799457
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
m(t, W)/GeV

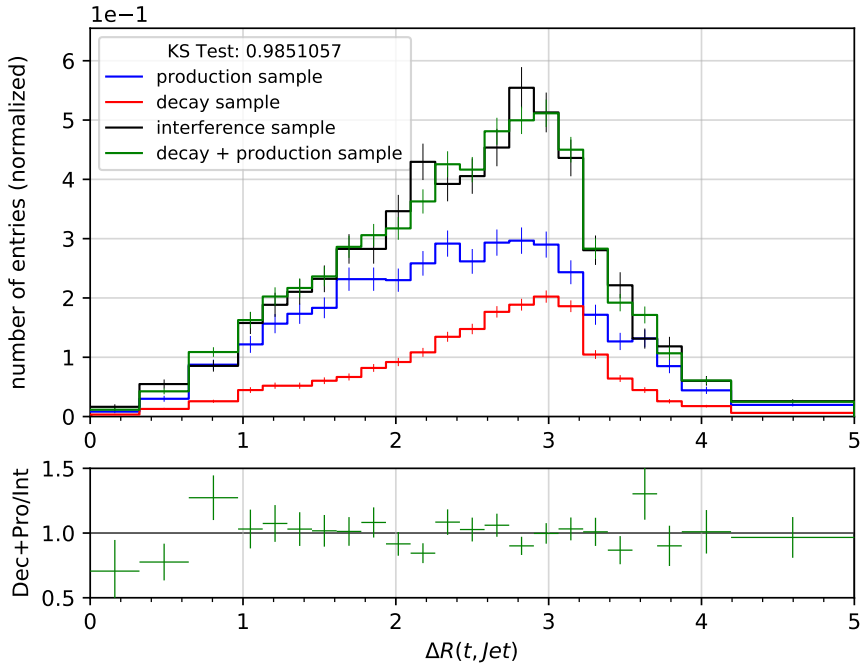

1e−1
KS Test: 0.9476984
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
ΔR(γ, bJet)

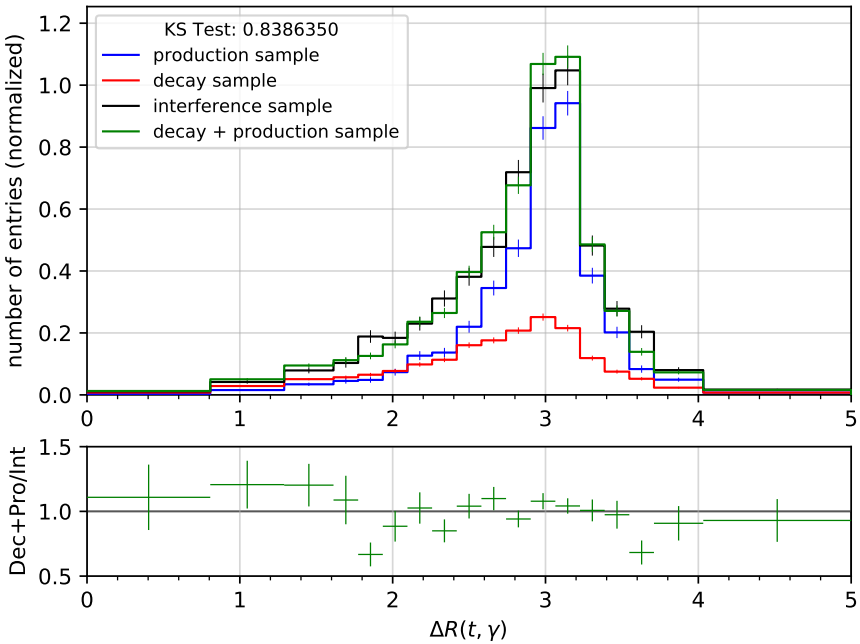

1e−1
KS Test: 0.6860509
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
ΔR(γ, Jet)

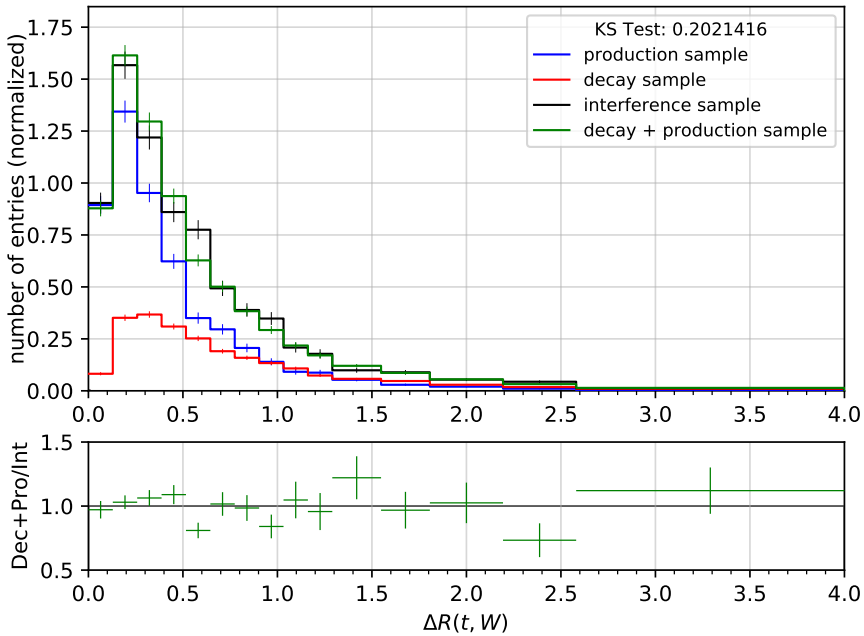

KS Test: 0.8386350
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
ΔR(γ, t)

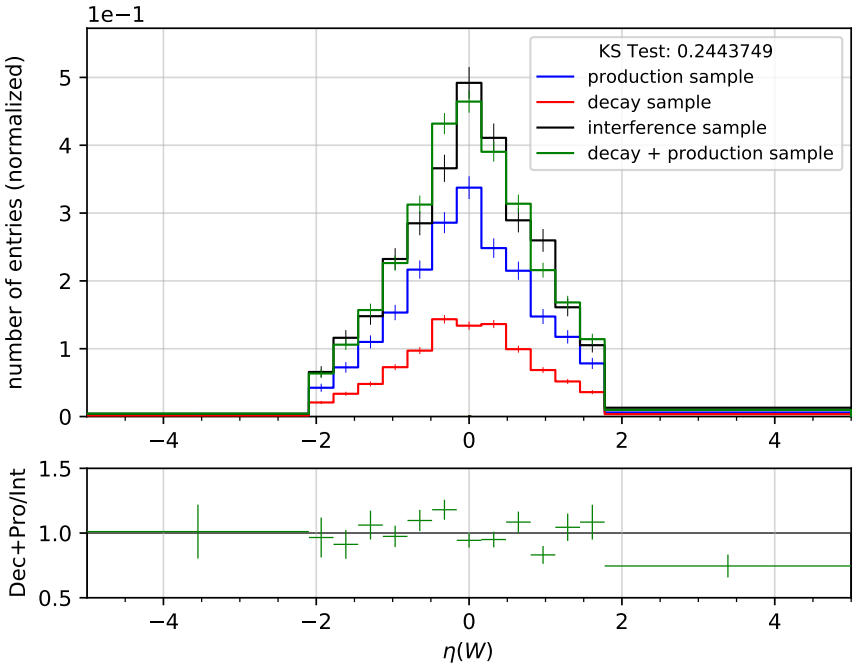

KS Test: 0.5550871
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
ΔR(γ, W)

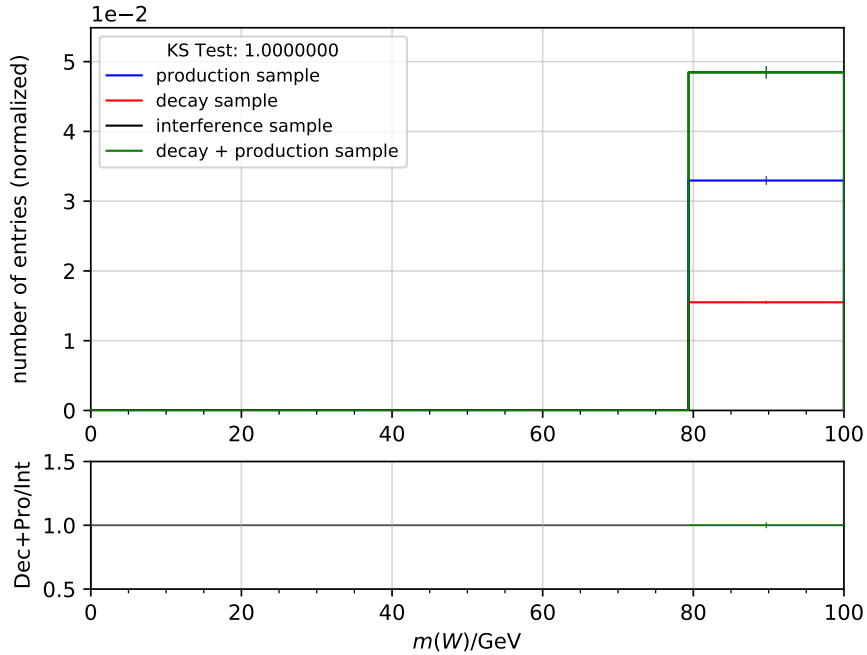

1e−1
KS Test: 0.8914256
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
ΔR(t, bJet)

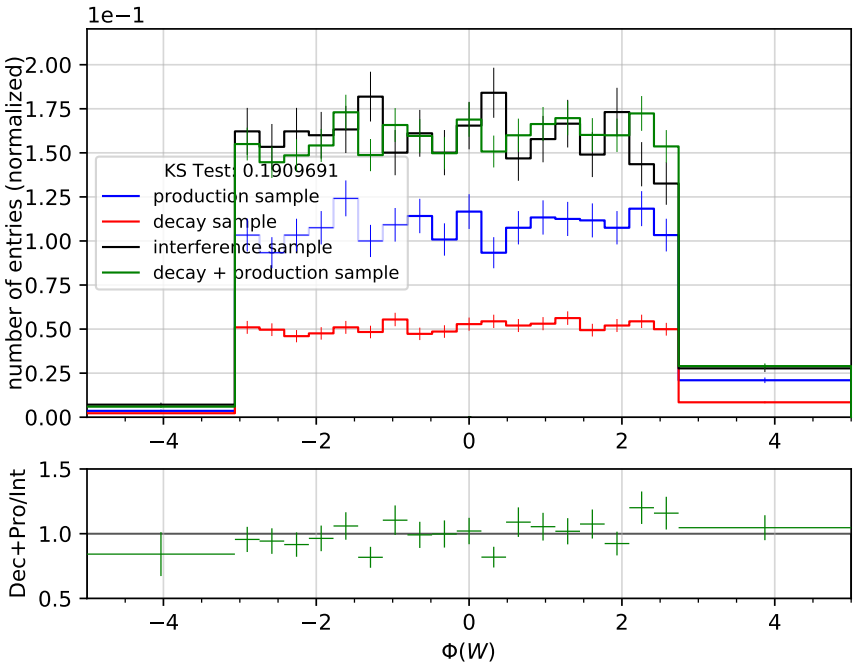

1e−1
KS Test: 0.9851057
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
ΔR(t, Jet)

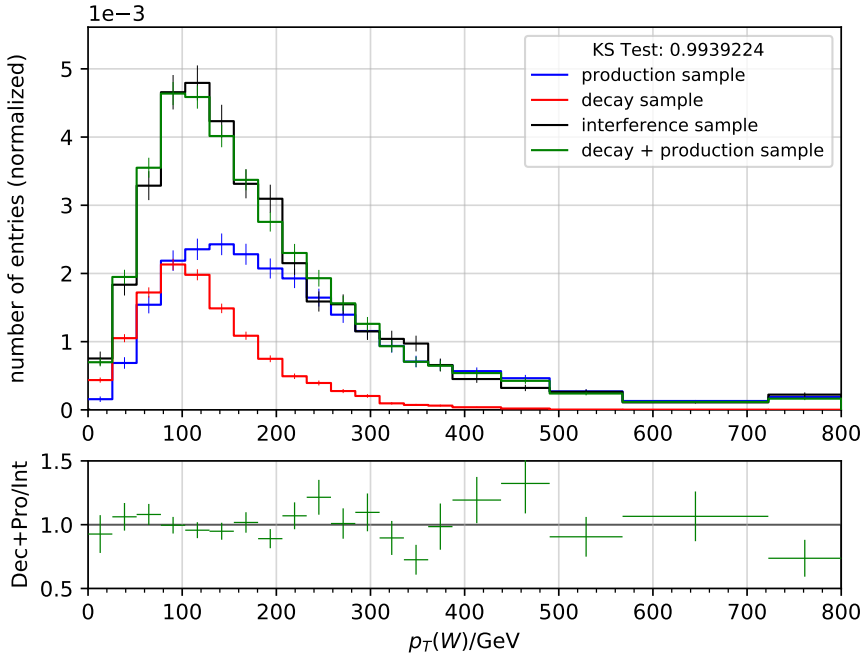

KS Test: 0.8386350
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
ΔR(t, γ)

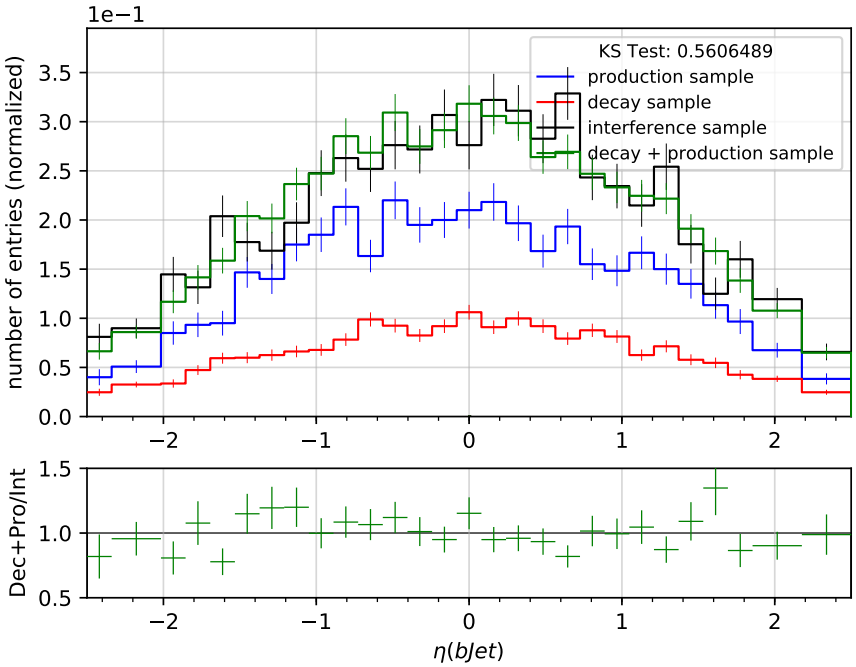

KS Test: 0.2021416
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
ΔR(t, W)

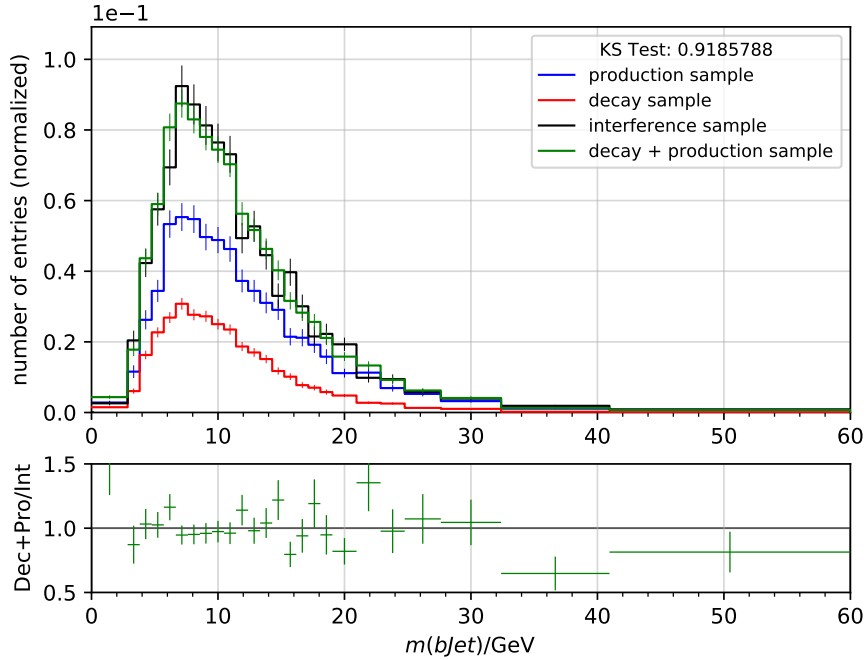

1e−1
KS Test: 0.2443749
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
η(W)

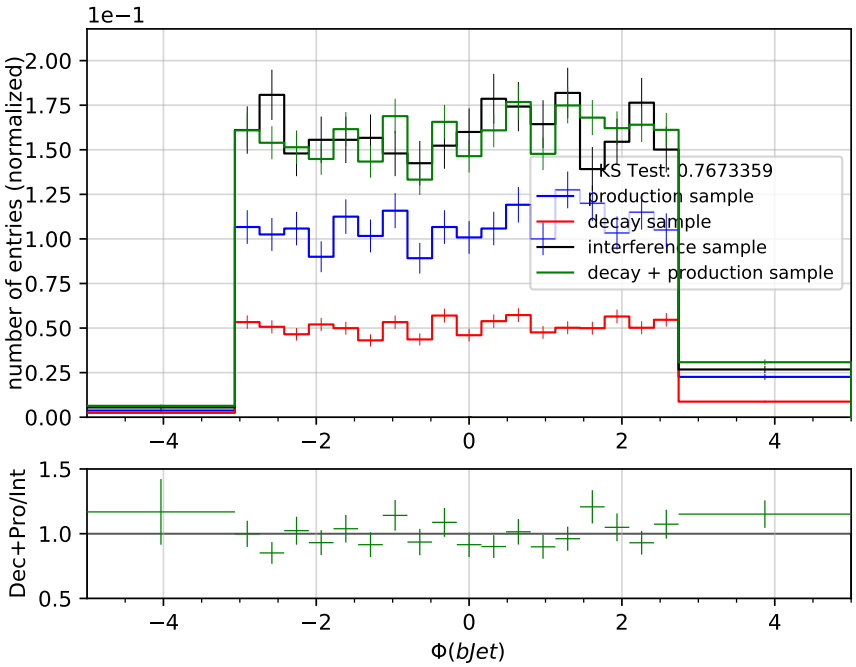

1e−2
KS Test: 1.0000000
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
m(W)/GeV

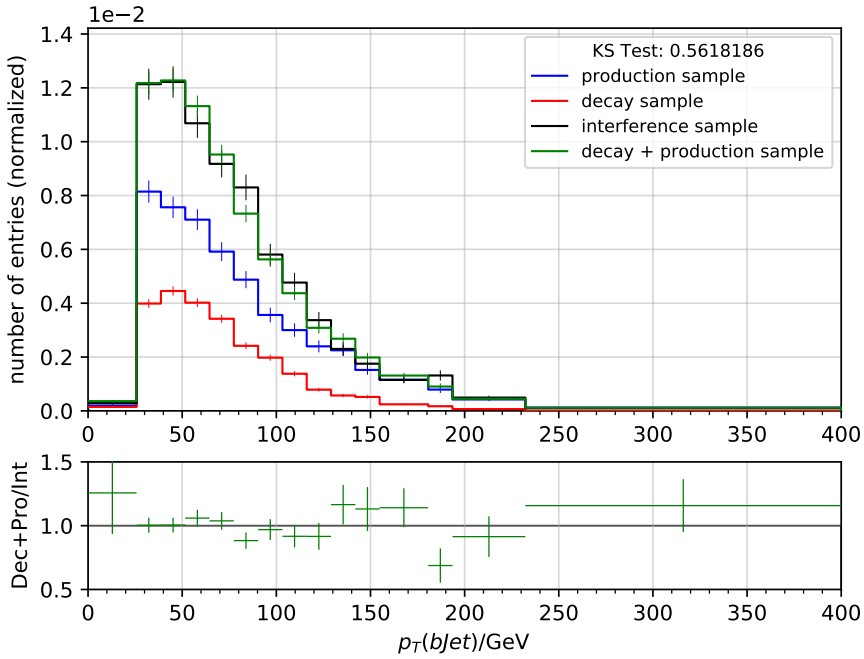

1e−1
KS Test: 0.1909691
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
Φ(W)

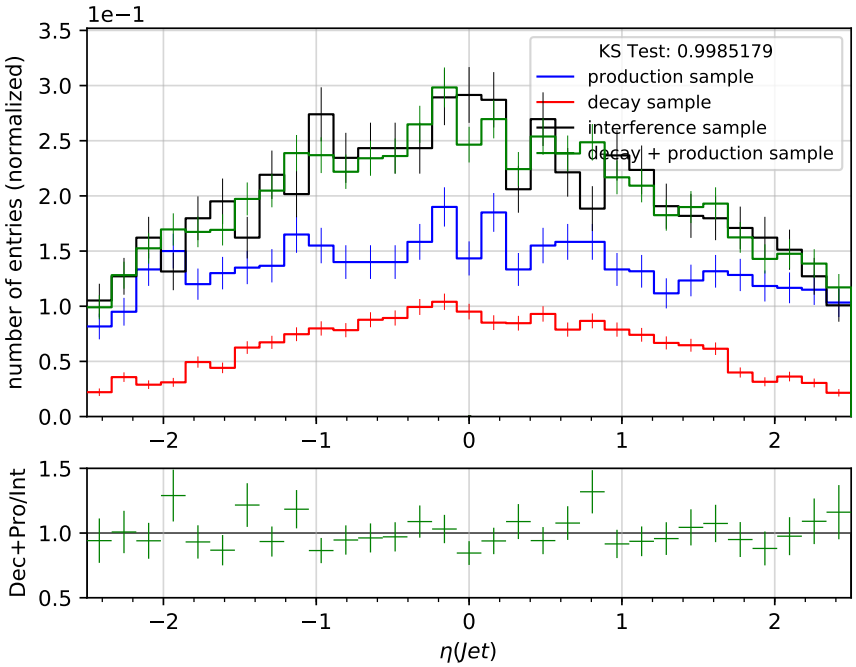

1e−3
KS Test: 0.9939224
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
$p_T(W)$/GeV

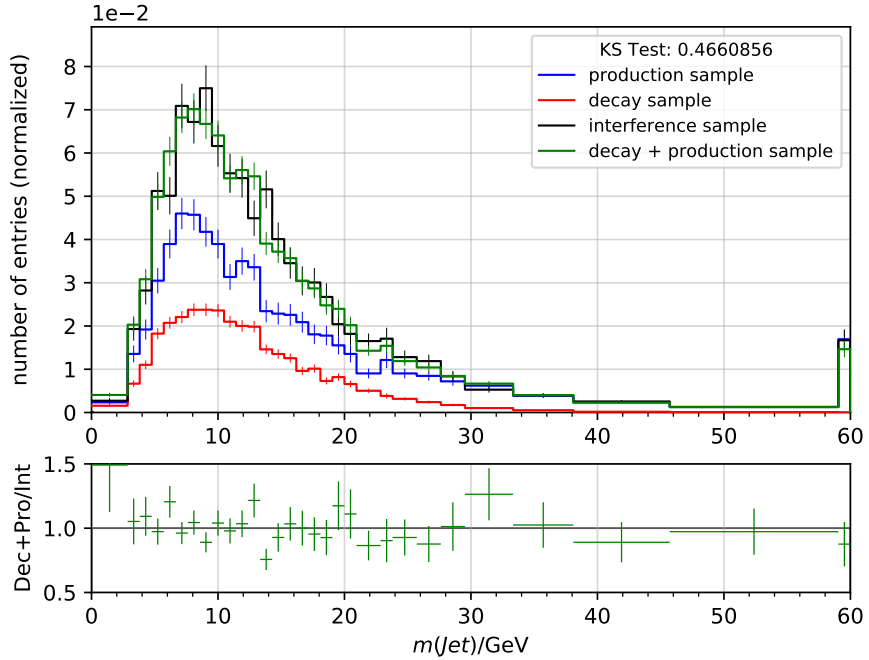

1e−1
KS Test: 0.5606489
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
η(bJet)

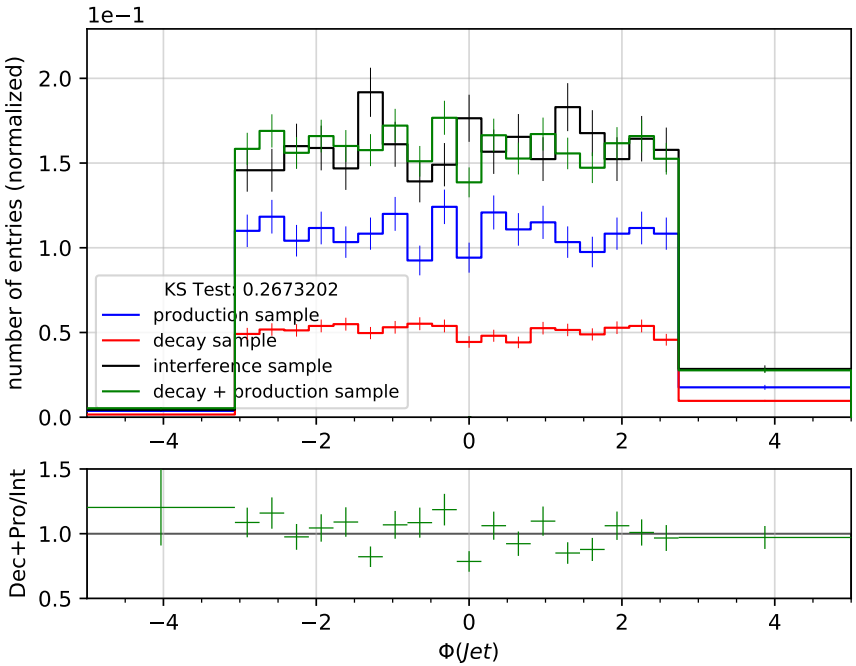

1e−1
KS Test: 0.9185788
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
m(bJet)/GeV

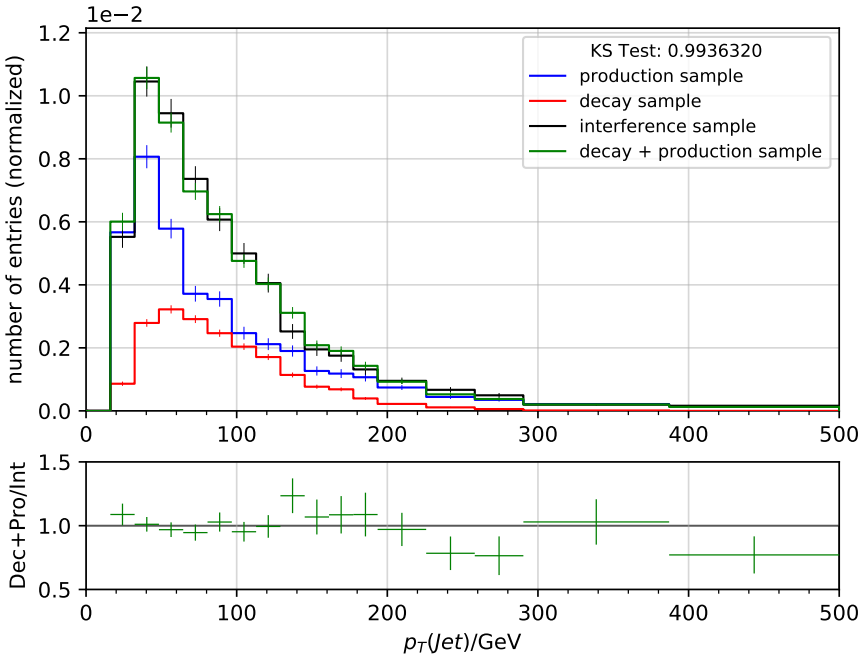

1e−1
KS Test: 0.7673359
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
Φ(bJet)


1e−2
KS Test: 0.5618186
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
p_T(bJet)/GeV


1e−1
KS Test: 0.9985179
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
η(Jet)


1e−2
KS Test: 0.4660856
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
m(Jet)/GeV


1e−1
KS Test: 0.2673202
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
Φ(Jet)


1e−2
KS Test: 0.9936320
production sample
decay sample
interference sample
decay + production sample
number of entries (normalized)
Dec+Pro/Int
p_T(Jet)/GeV