

Target-definition study: ttbar_hadronic

files: 3; nonzero-weight events: 5353; hadronic tops: 10706

hadronic tops per event: {2: 5353}

AK4 re-clustering closure: {'provided_kept_jets': 25798, 'reclustered_pt30_matched': 25837, 'mean_pt_ratio': np.float64(1.0011461197855522), 'frac_within_1pct': np.float64(0.9998538802144478)}

Variants: V0 current | V1 A (no mass windows) | V2 A+B (exclusive containment) | V3 A+B+E (+acceptance, global matching)

V4 C (ghost association of last-copy partons) | V5 C+D (shower-parton ghosts, energy share >= 40/50/60%)

Exclusive category = first available of FB > SRqq > SRbq > FR (for every variant), else lost.

Category fractions (all hadronic tops):

variant	FB	SRqq	SRbq	FR	lost
V0_current	0.006	0.019	0.029	0.137	0.809
V1_A	0.007	0.025	0.030	0.159	0.779
V2_AB	0.010	0.021	0.030	0.160	0.779
V3_ABE	0.009	0.016	0.023	0.120	0.831
V4_C	0.010	0.020	0.027	0.128	0.815
V5_CD40	0.015	0.026	0.028	0.139	0.791
V5_CD50	0.013	0.025	0.027	0.136	0.799
V5_CD60	0.012	0.023	0.025	0.126	0.814

Lost reasons:

V3_ABE: {'threshold_slots': 1925, 'acceptance': 6046, 'merged': 241, 'no_jet': 680}

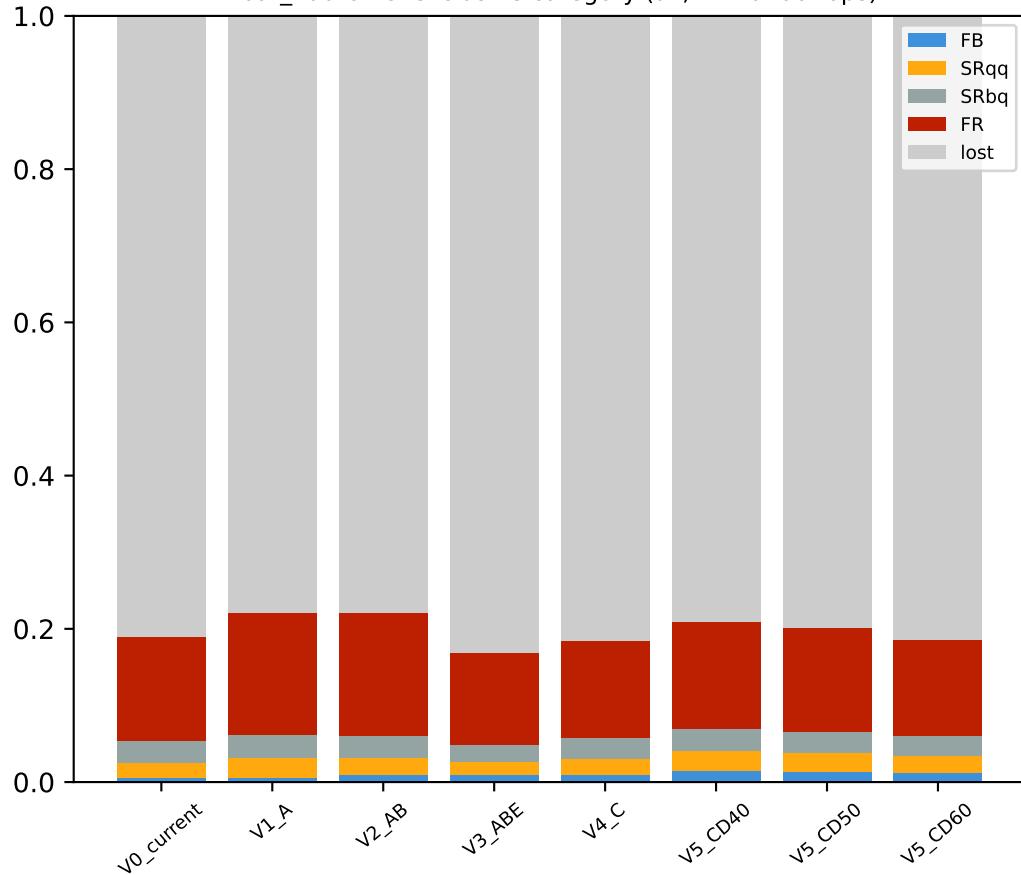
V4_C: {'threshold_slots': 3714, 'merged': 1536, 'no_jet': 3474}

V5_CD40: {'threshold_slots': 3233, 'merged': 1443, 'diffuse': 1963, 'no_jet': 1830}

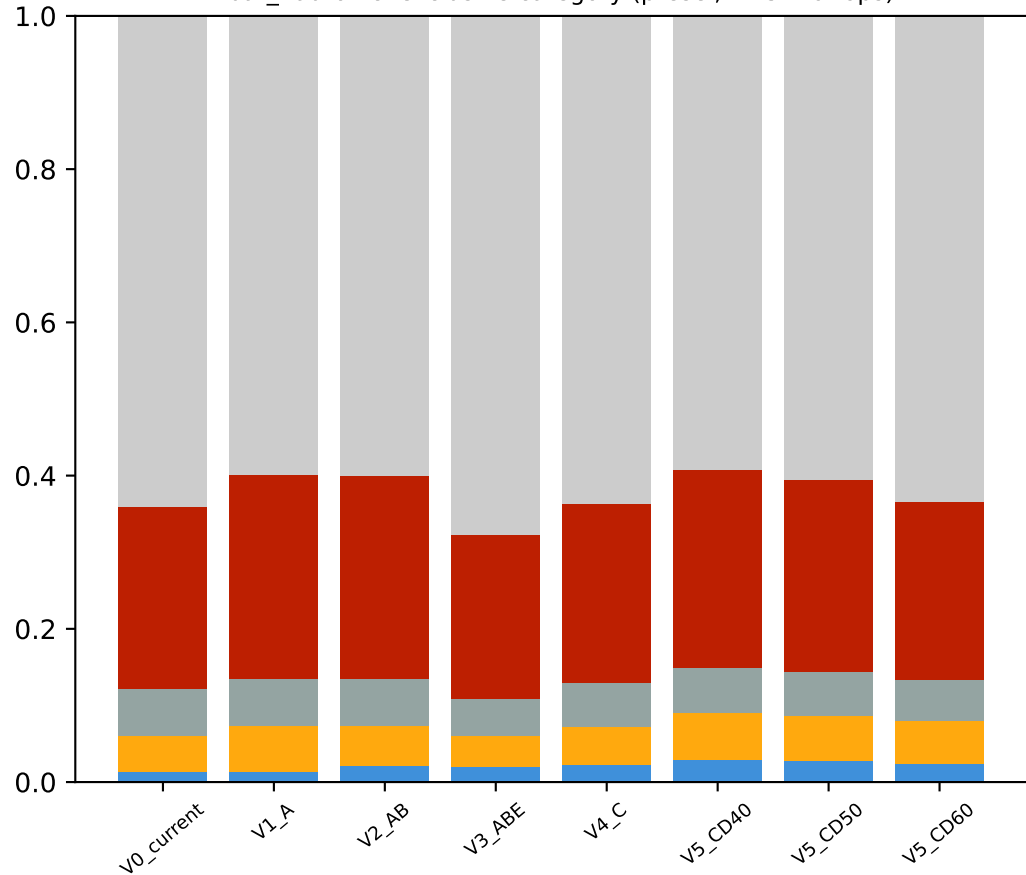
V5_CD50: {'threshold_slots': 2949, 'diffuse': 2631, 'merged': 1186, 'no_jet': 1786}

V5_CD60: {'diffuse': 3538, 'merged': 954, 'threshold_slots': 2519, 'no_jet': 1699}

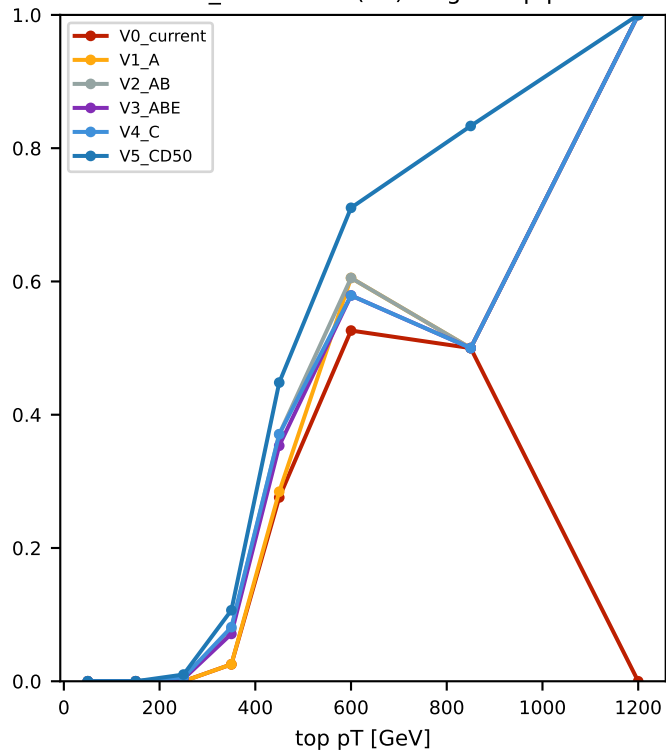
ttbar_hadronic: exclusive category (all, n=10706 tops)



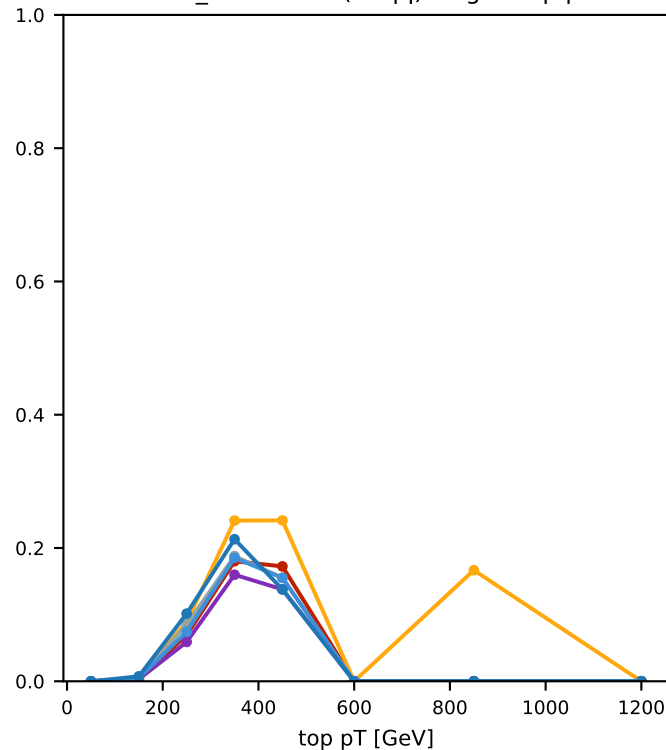
ttbar_hadronic: exclusive category (presel, n=3176 tops)



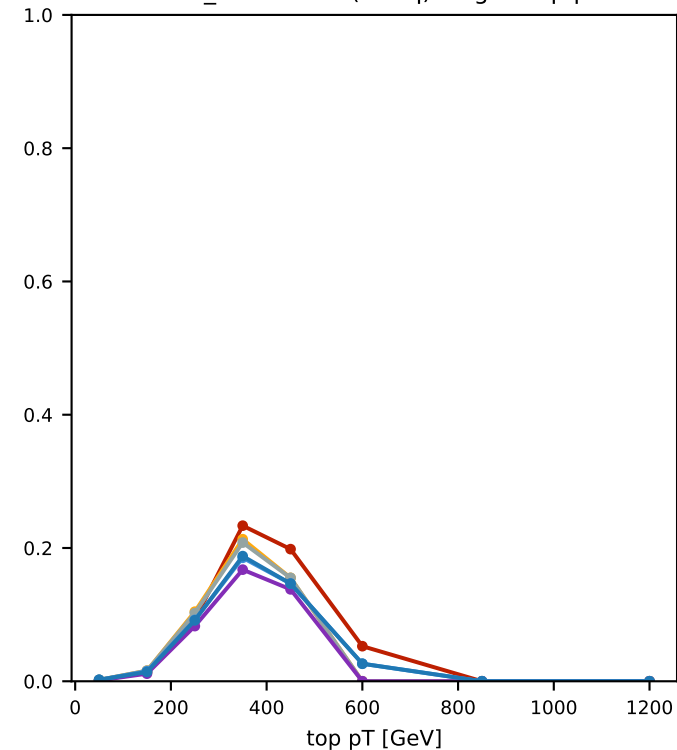
ttbar_hadronic: P(FB) vs gen top pT



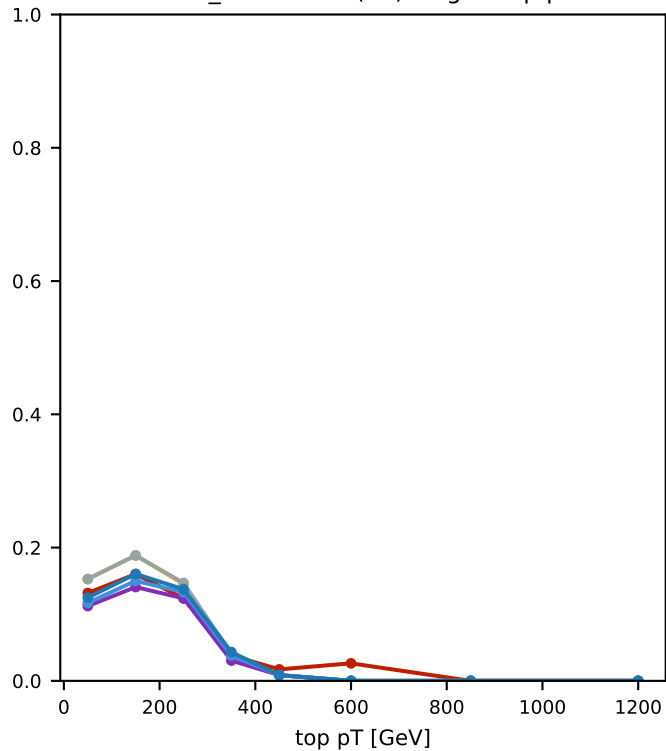
ttbar_hadronic: P(SRqq) vs gen top pT



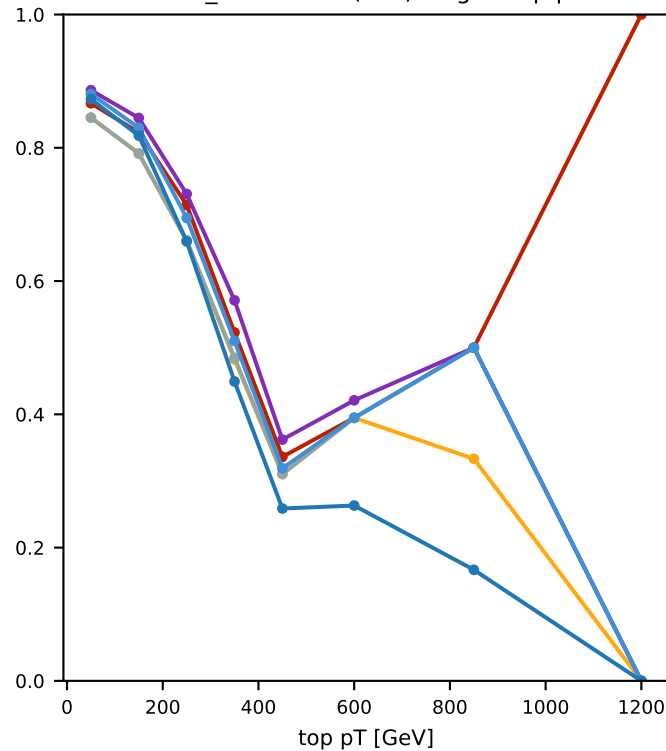
ttbar_hadronic: P(SRbq) vs gen top pT



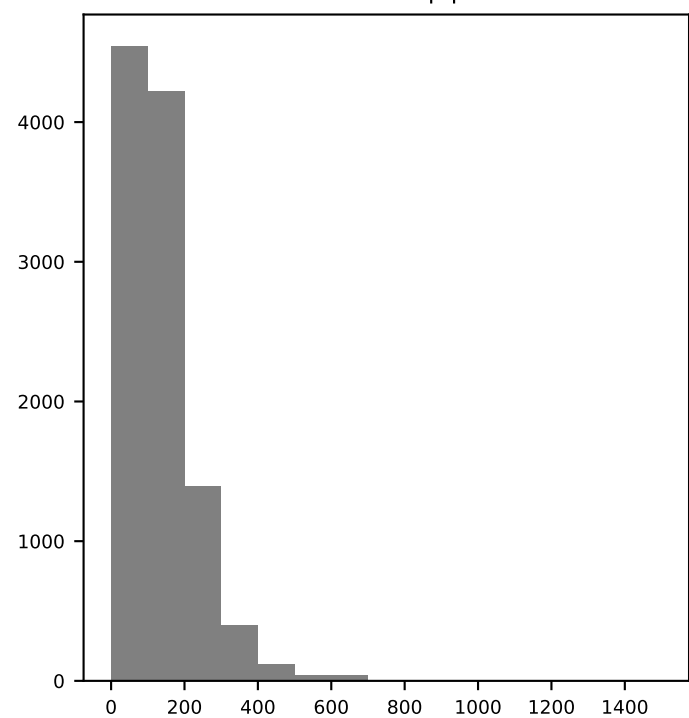
ttbar_hadronic: P(FR) vs gen top pT



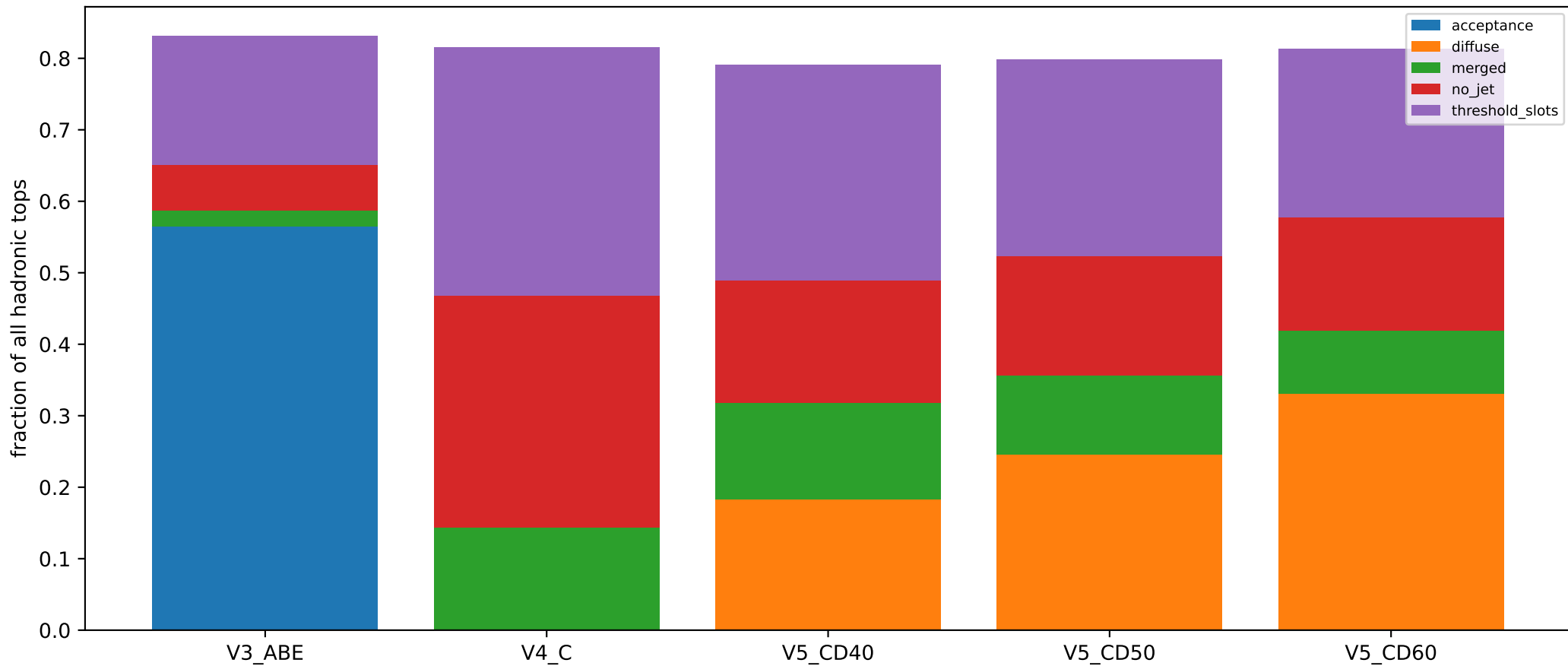
ttbar_hadronic: P(lost) vs gen top pT



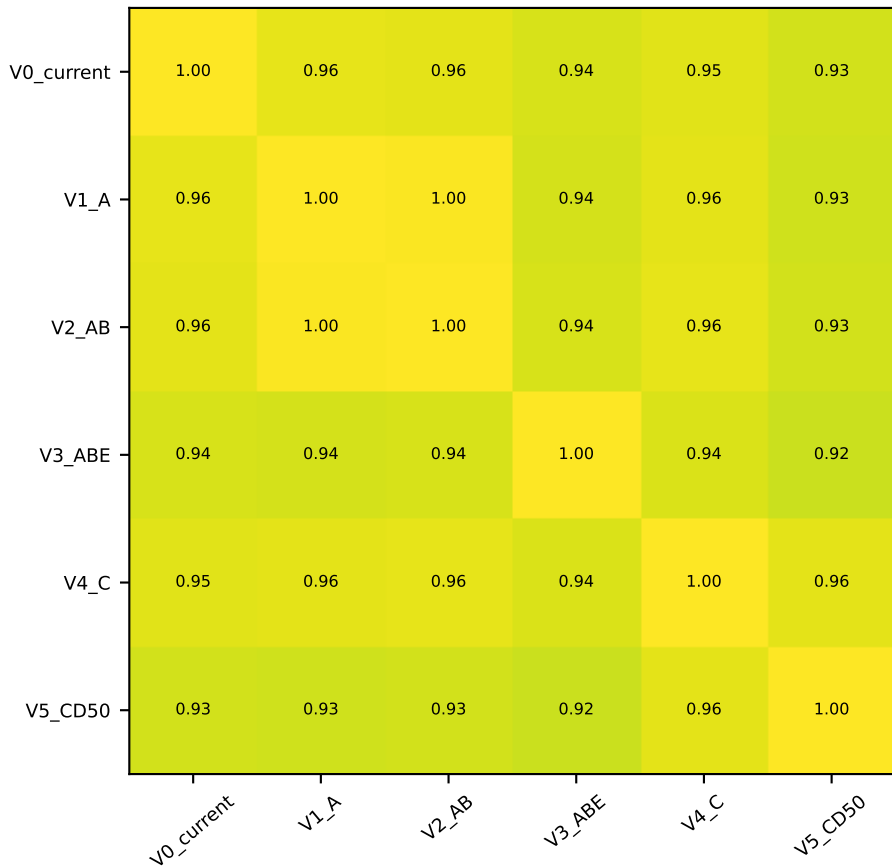
hadronic top pT



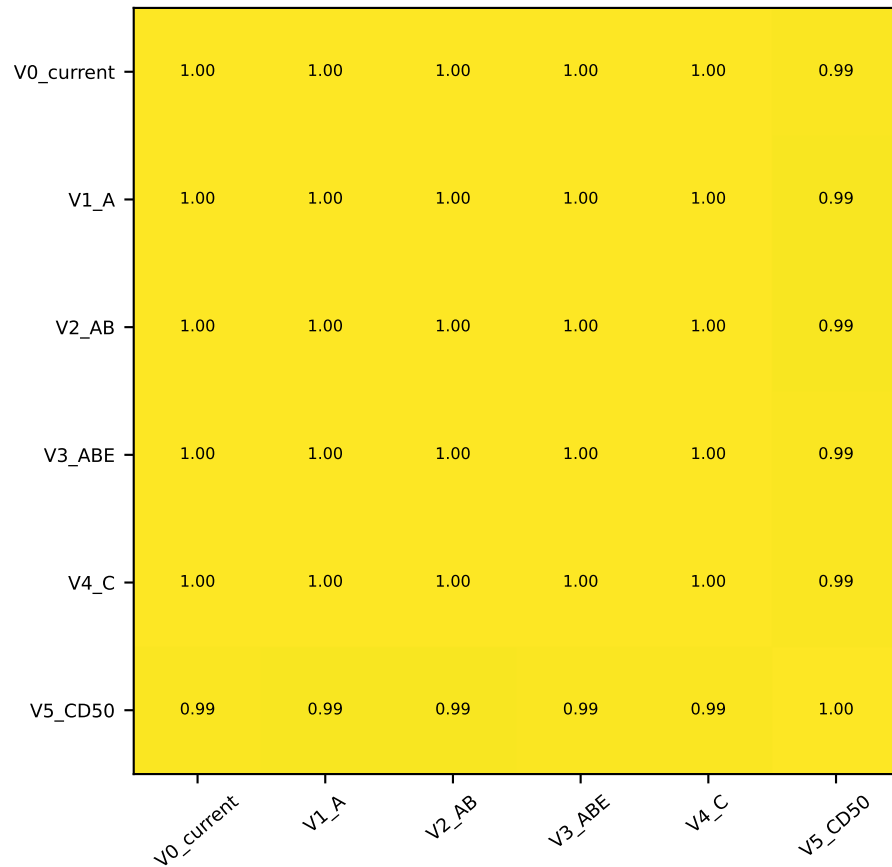
ttbar_hadronic: why tops are lost



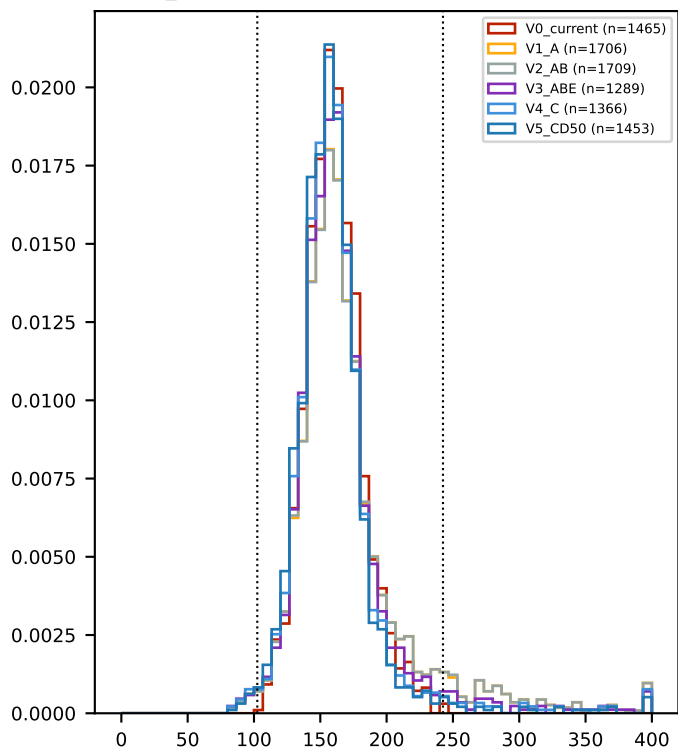
ttbar_hadronic: same exclusive category



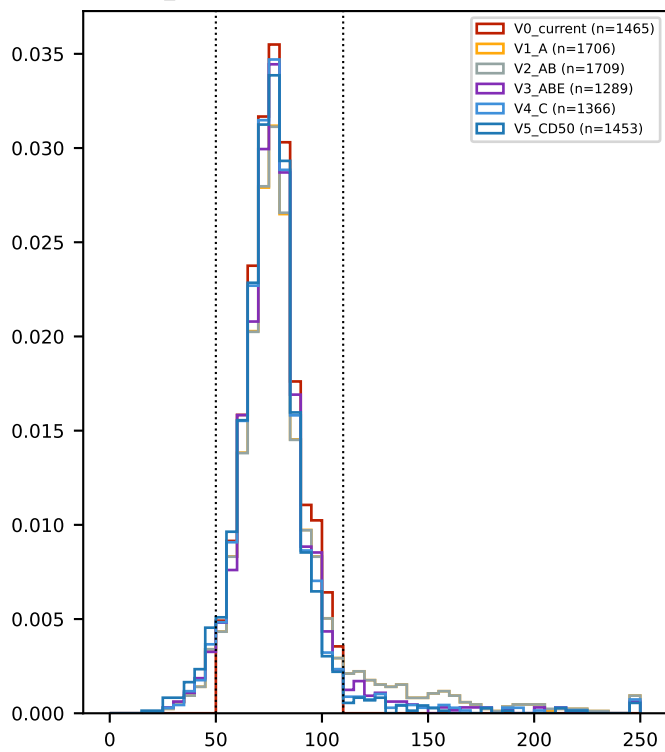
ttbar_hadronic: same jets | same (non-lost) category



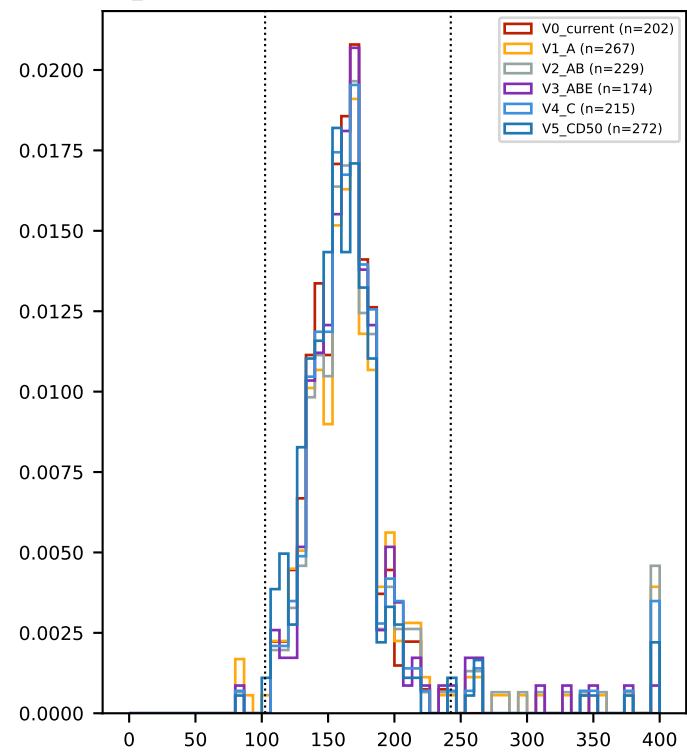
ttbar_hadronic: FR m(b q1 q2) (exclusive category)



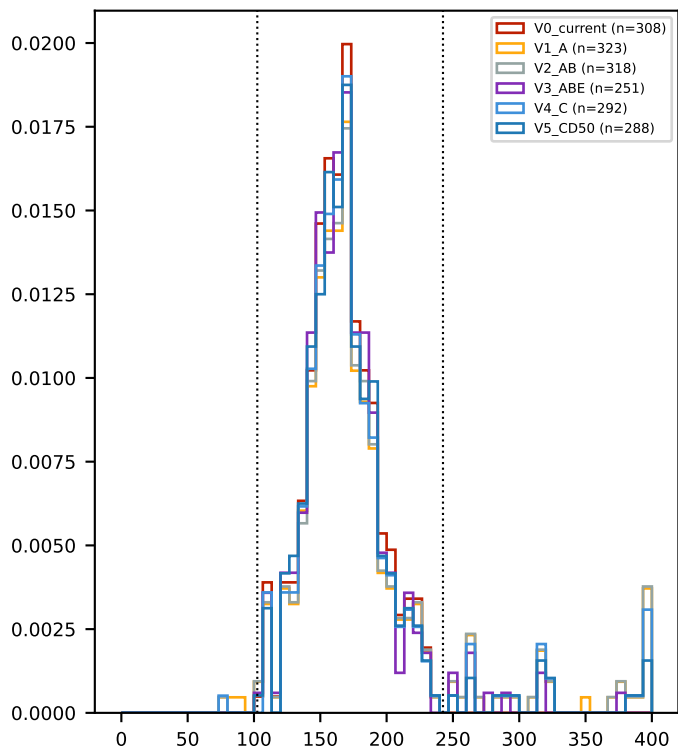
ttbar_hadronic: FR m(q1 q2) (exclusive category)



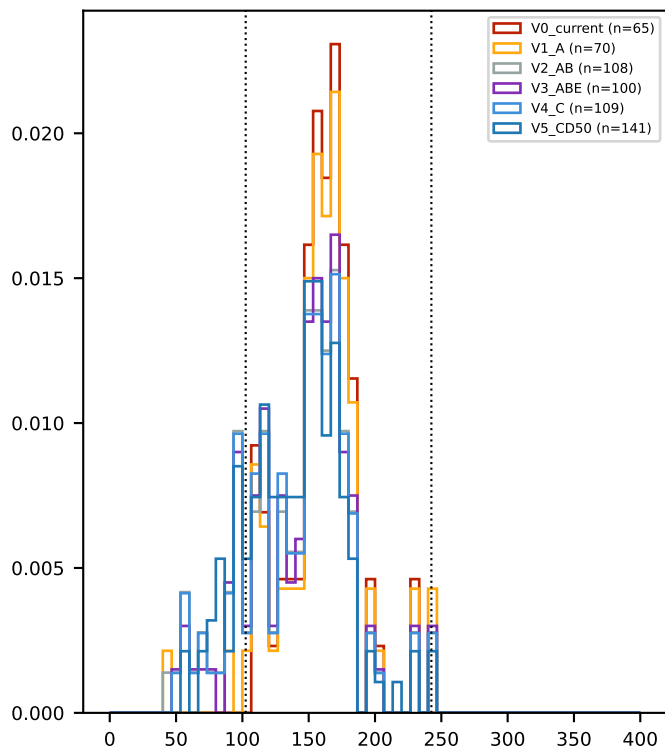
ttbar_hadronic: SRqq m(b-jet + fatjet) (exclusive category)



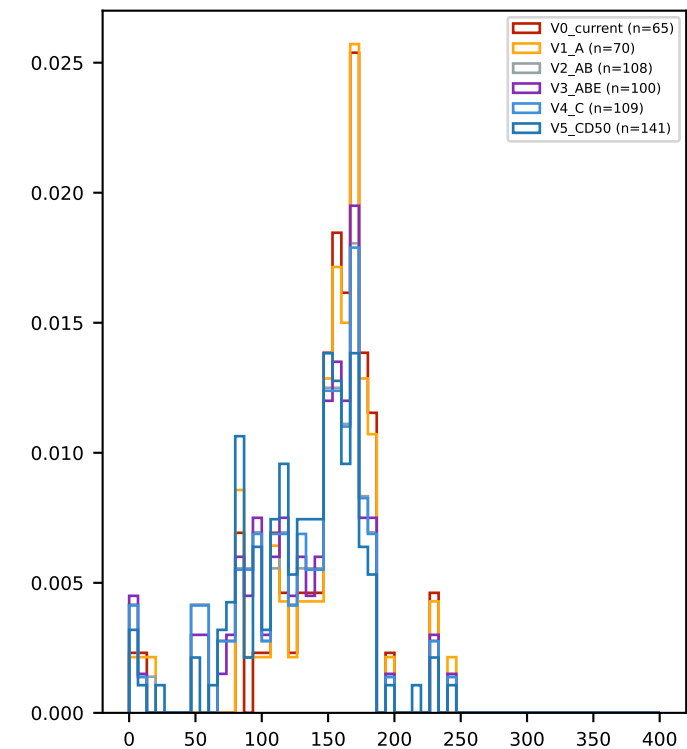
ttbar_hadronic: SRbq m(q-jet + fatjet) (exclusive category)



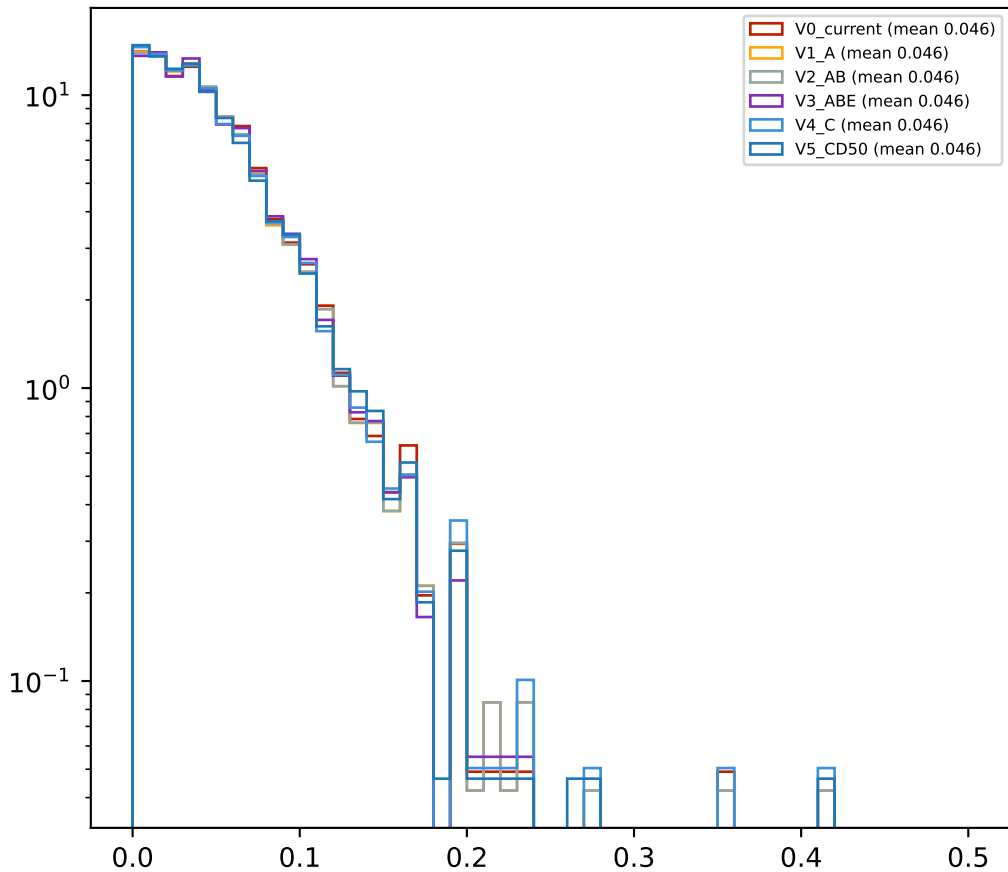
ttbar_hadronic: FB fatjet mass (exclusive category)



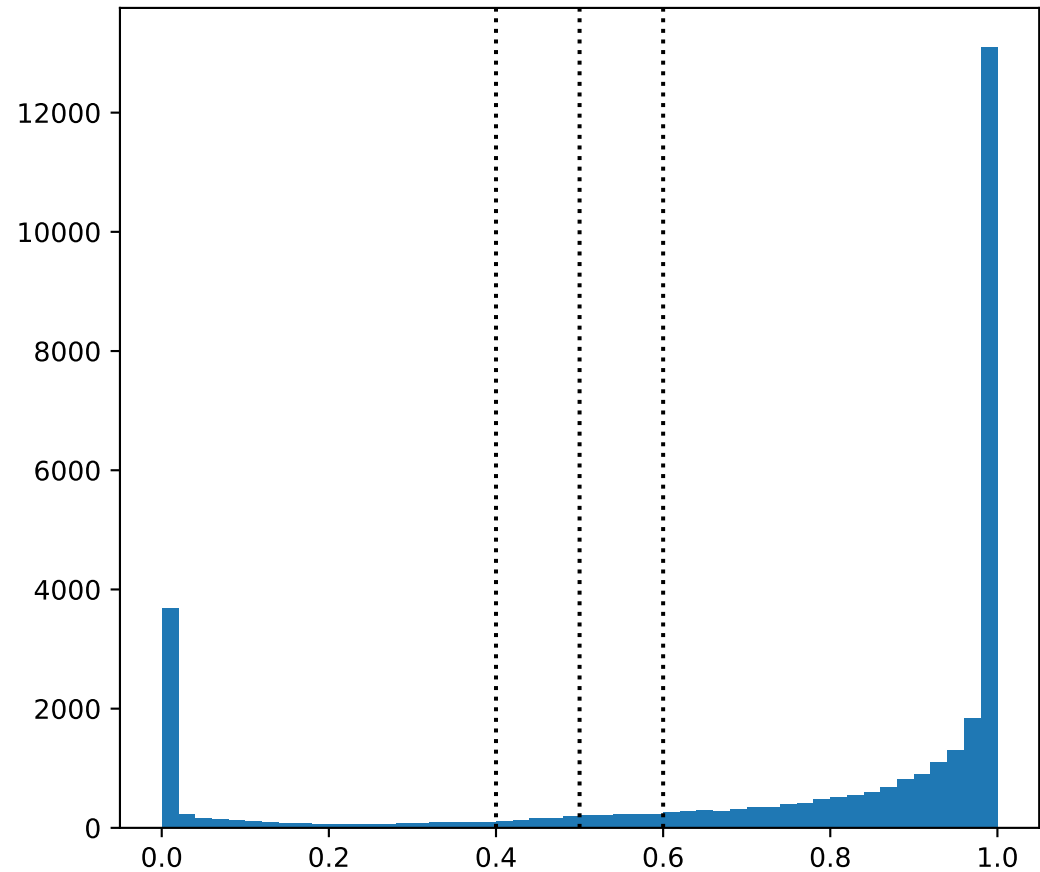
ttbar_hadronic: FB fatjet soft-drop mass (exclusive category)



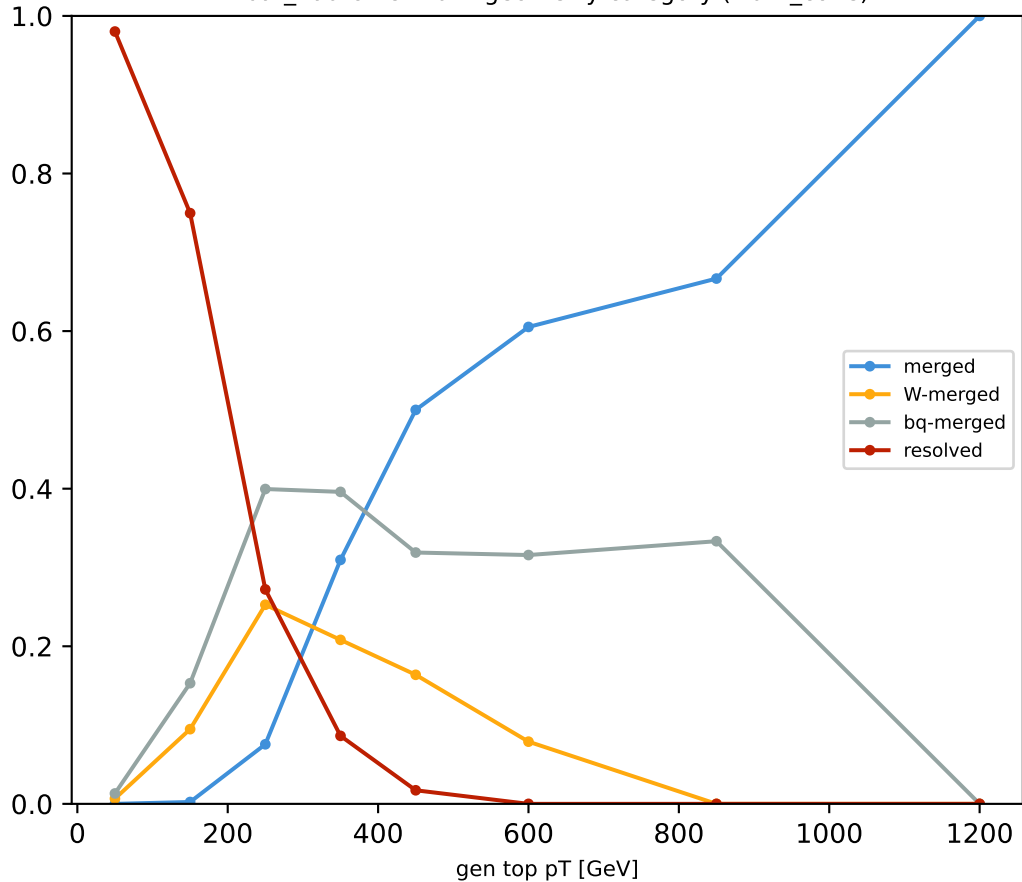
ttbar_hadronic: pileup energy fraction of target jets



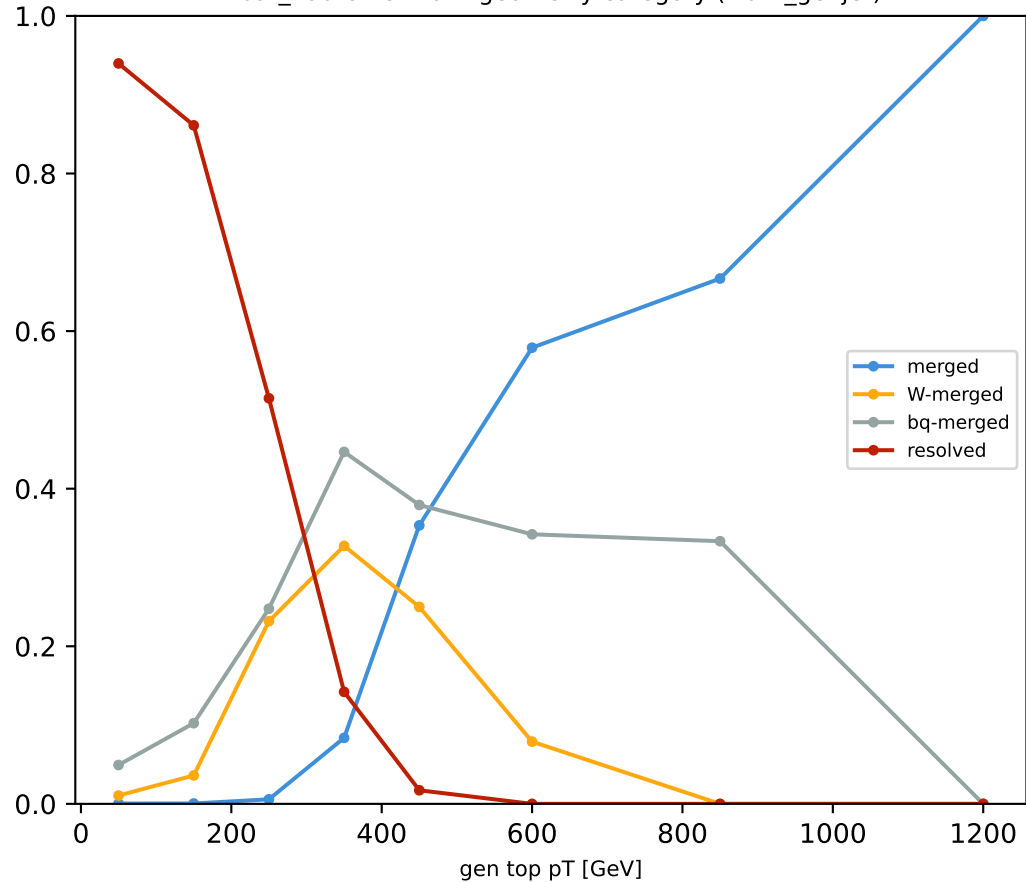
ttbar_hadronic: largest AK4 energy share per daughter (V5)



ttbar_hadronic: truth-geometry category (truth_cone)

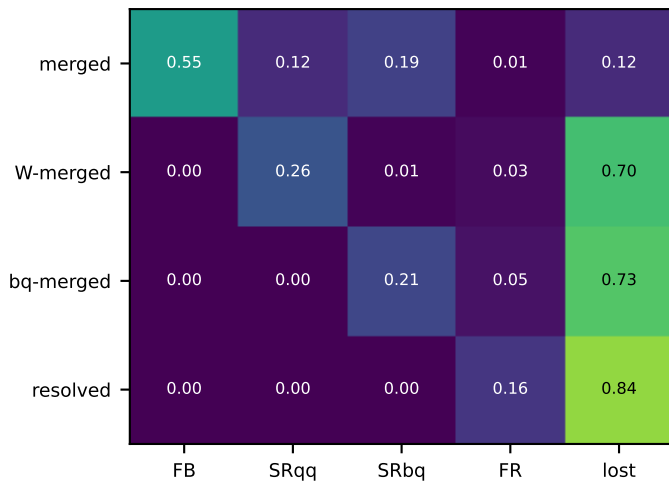


ttbar_hadronic: truth-geometry category (truth_genjet)

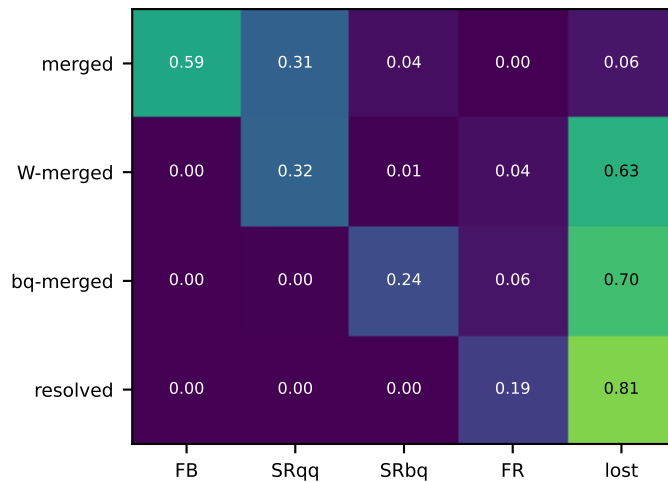


t $\bar{t}$ bar_hadronic: rows = truth-geometry category, columns = label after priority rule (row-normalized)

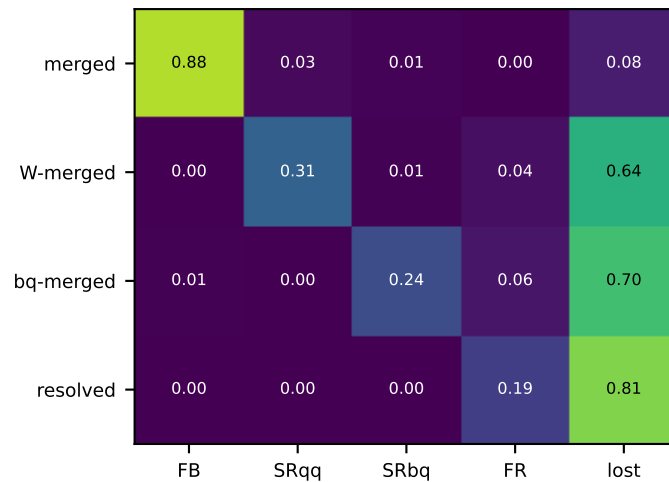
V0_current: truth (gen-jet) vs exclusive label



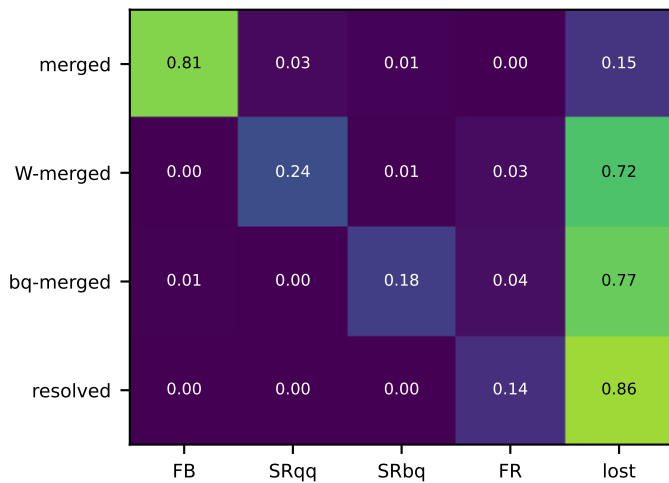
V1_A: truth (gen-jet) vs exclusive label



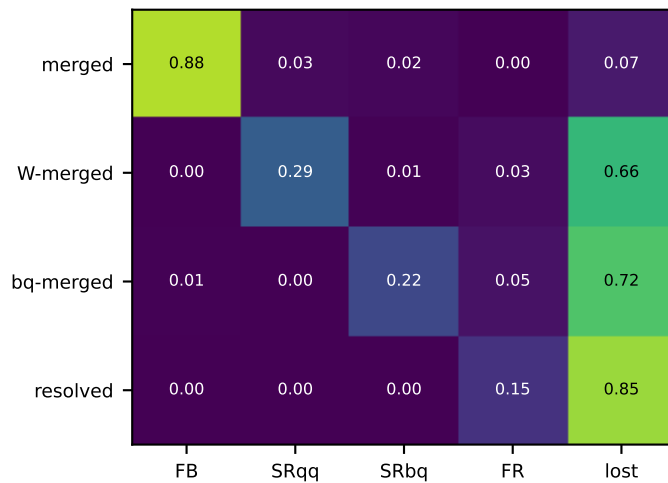
V2_AB: truth (gen-jet) vs exclusive label



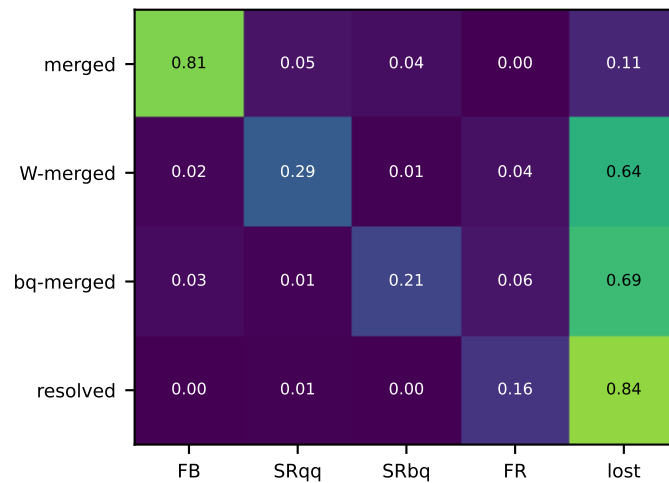
V3_ABE: truth (gen-jet) vs exclusive label



V4_C: truth (gen-jet) vs exclusive label

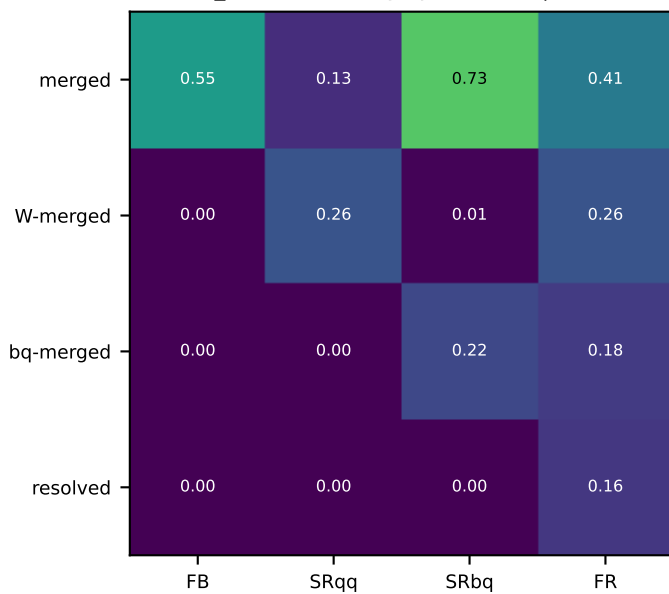


V5_CD50: truth (gen-jet) vs exclusive label

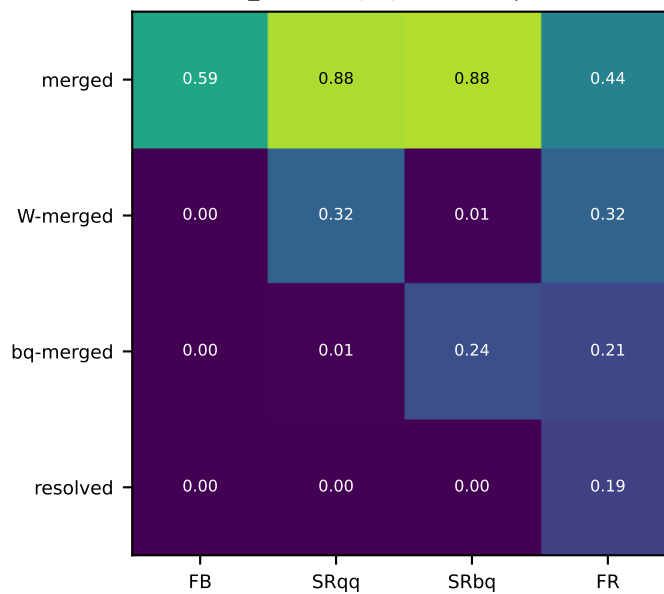


ttbar_hadronic: multi-label view, fraction of tops in each truth category with each target available

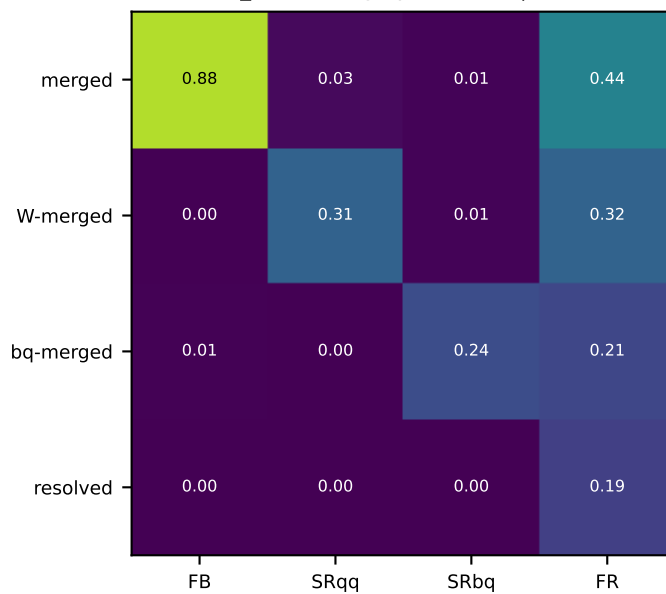
V0_current: P(category available | truth)



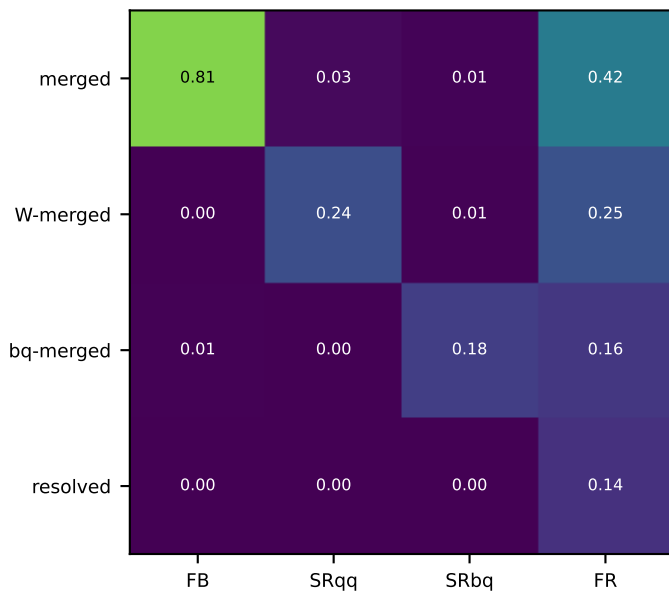
V1_A: P(category available | truth)



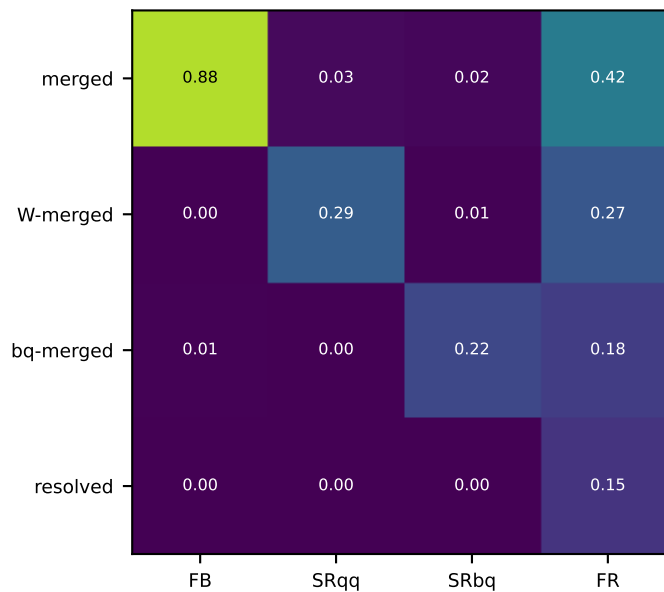
V2_AB: P(category available | truth)



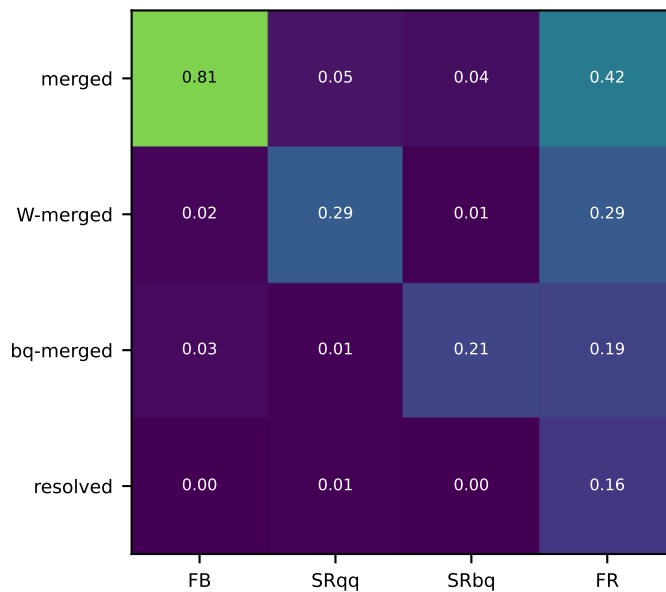
V3_ABE: P(category available | truth)



V4_C: P(category available | truth)



V5_CD50: P(category available | truth)



ttbar_hadronic: multi-label patterns (fraction of hadronic tops)

V0_current	none:0.809	FR:0.137	SRbq+FR:0.017	SRqq+FR:0.015	SRbq:0.012	FB+SRbq+FR:0.003	SRqq:0.002	FB+SRbq:0.002
V1_A	none:0.779	FR:0.159	SRbq+FR:0.019	SRqq+FR:0.018	SRbq:0.011	SRqq:0.003	FB+SRqq+SRbq+FR:0.003	FB+SRqq+SRbq:0.003
V2_AB	none:0.779	FR:0.160	SRbq+FR:0.019	SRqq+FR:0.018	SRbq:0.011	FB:0.005	FB+FR:0.005	SRqq:0.003
V3_ABE	none:0.831	FR:0.120	SRbq+FR:0.015	SRqq+FR:0.014	SRbq:0.008	FB:0.005	FB+FR:0.004	SRqq:0.002
V4_C	none:0.815	FR:0.128	SRbq+FR:0.016	SRqq+FR:0.016	SRbq:0.011	FB:0.006	FB+FR:0.004	SRqq:0.004
V5_CD40	none:0.791	FR:0.139	SRqq+FR:0.018	SRbq+FR:0.016	SRbq:0.012	FB:0.010	SRqq:0.009	FB+FR:0.005
V5_CD50	none:0.799	FR:0.136	SRqq+FR:0.017	SRbq+FR:0.016	SRbq:0.011	FB:0.009	SRqq:0.008	FB+FR:0.004
V5_CD60	none:0.814	FR:0.126	SRqq+FR:0.016	SRbq+FR:0.015	SRbq:0.010	FB:0.008	SRqq:0.007	FB+FR:0.004

truth-geometry fractions:

cone {'merged': 0.03016999813188866, 'W-merged': 0.08266392677003549, 'bq-merged': 0.13711937231458995, 'resolved': 0.7500467027834858}
genjet {'merged': 0.010554829067812441, 'W-merged': 0.06379600224173361, 'bq-merged': 0.11535587521016252, 'resolved': 0.8102932934802914}

truth_cone (rows) vs truth_genjet (columns), counts:

	merged	W-merged	bq-merged	resolved
merged	109	73	94	47
W-merged	1	486	31	367
bq-merged	1	19	684	764
resolved	2	105	426	7497

Target-definition study: tttt_incl

files: 3; nonzero-weight events: 30000; hadronic tops: 80576

hadronic tops per event: {2: 8833, 3: 11922, 1: 2828, 4: 6079, 0: 338}

AK4 re-clustering closure: {'provided_kept_jets': 245042, 'reclustered_pt30_matched': 245241, 'mean_pt_ratio': np.float64(1.0010026400998346), 'frac_within_1pct': np.fl

Variants: V0 current | V1 A (no mass windows) | V2 A+B (exclusive containment) | V3 A+B+E (+acceptance, global matching)

V4 C (ghost association of last-copy partons) | V5 C+D (shower-parton ghosts, energy share >= 40/50/60%)

Exclusive category = first available of FB > SRqq > SRbq > FR (for every variant), else lost.

Category fractions (all hadronic tops):

variant	FB	SRqq	SRbq	FR	lost
V0_current	0.051	0.037	0.062	0.101	0.749
V1_A	0.056	0.061	0.072	0.131	0.680
V2_AB	0.066	0.052	0.070	0.132	0.680
V3_ABE	0.061	0.041	0.054	0.096	0.748
V4_C	0.065	0.044	0.060	0.094	0.738
V5_CD40	0.084	0.057	0.061	0.097	0.701
V5_CD50	0.078	0.054	0.059	0.096	0.713
V5_CD60	0.072	0.050	0.056	0.090	0.732

Lost reasons:

V3 ABE: {'acceptance': 39343, 'merged': 3666, 'threshold_slots': 11922, 'no_jet': 5328}

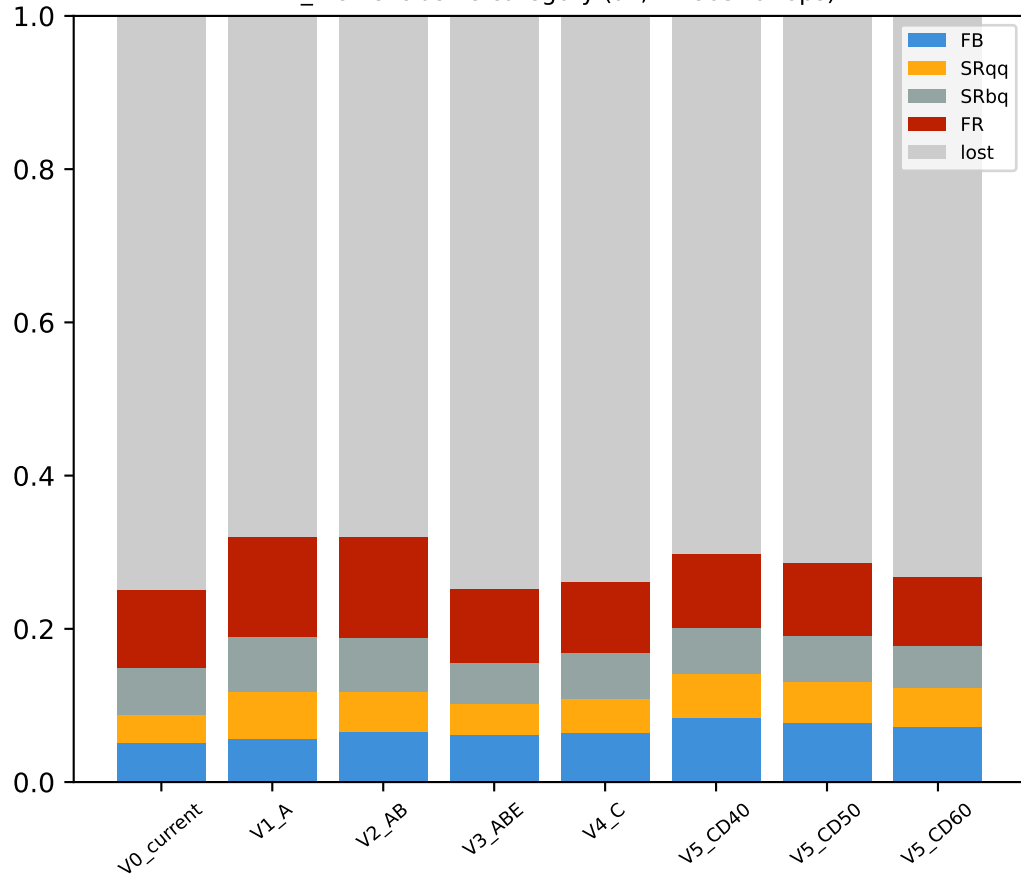
V4_C: {'no_jet': 21302, 'merged': 18762, 'threshold_slots': 19390}

V5_CD40: {'no_jet': 9964, 'merged': 15481, 'threshold_slots': 16476, 'diffuse': 14600}

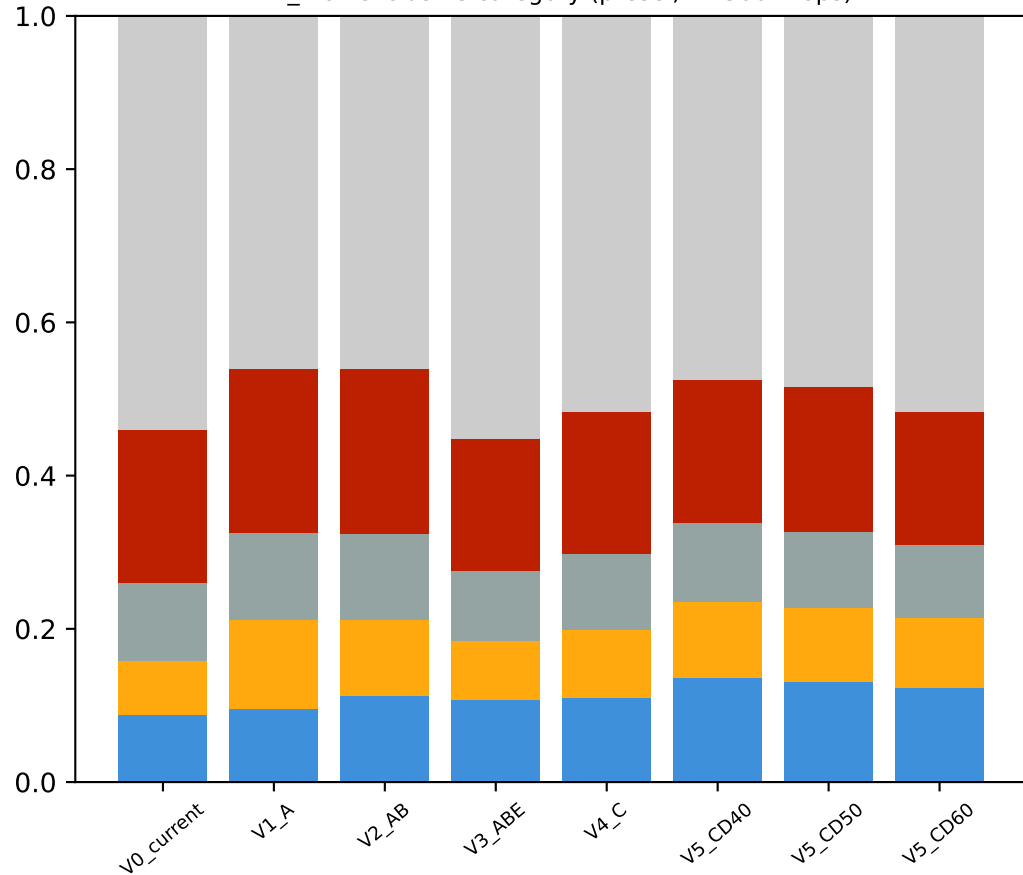
V5_CD50: {'no_jet': 9870, 'merged': 13564, 'threshold_slots': 15290, 'diffuse': 18760}

V5_CD60: {'no_jet': 9514, 'merged': 11003, 'threshold_slots': 13227, 'diffuse': 25244}

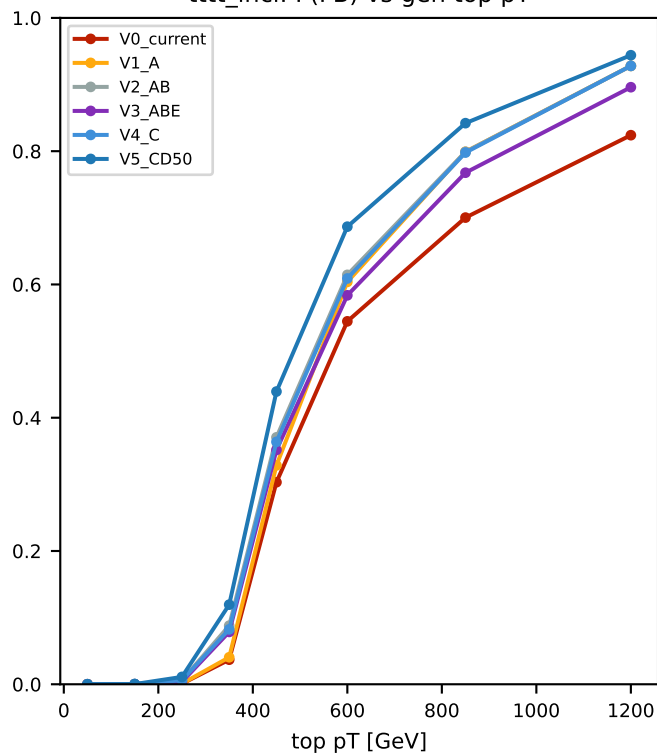
tttt_incl: exclusive category (all, n=80576 tops)



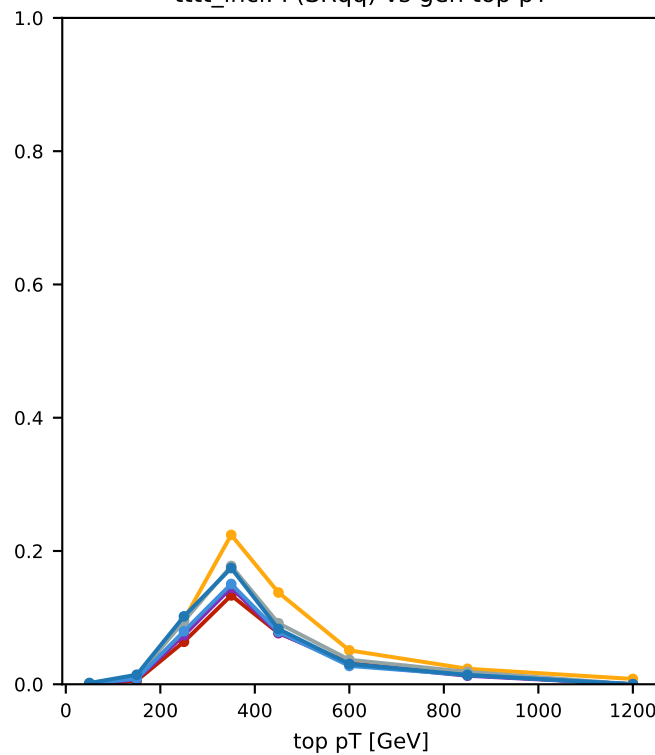
tttt_incl: exclusive category (presel, n=3604 tops)



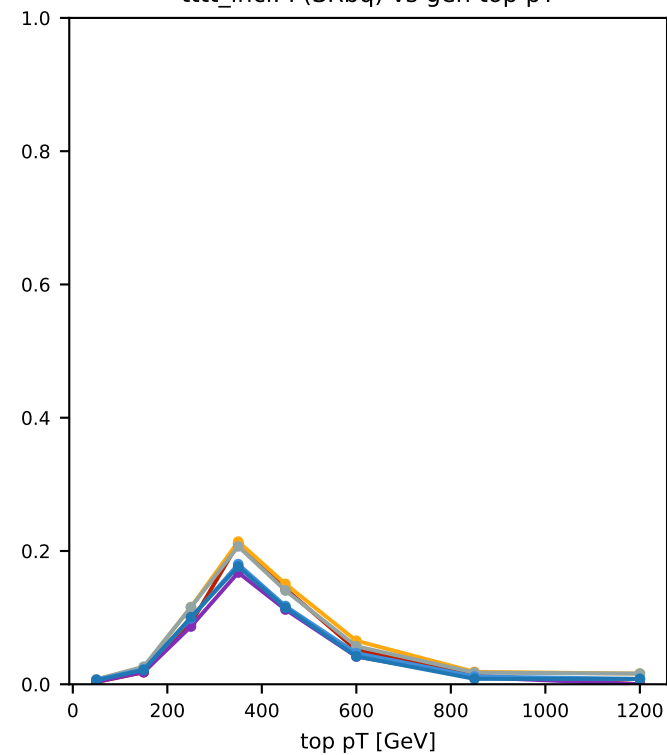
tttt_incl: P(FB) vs gen top pT



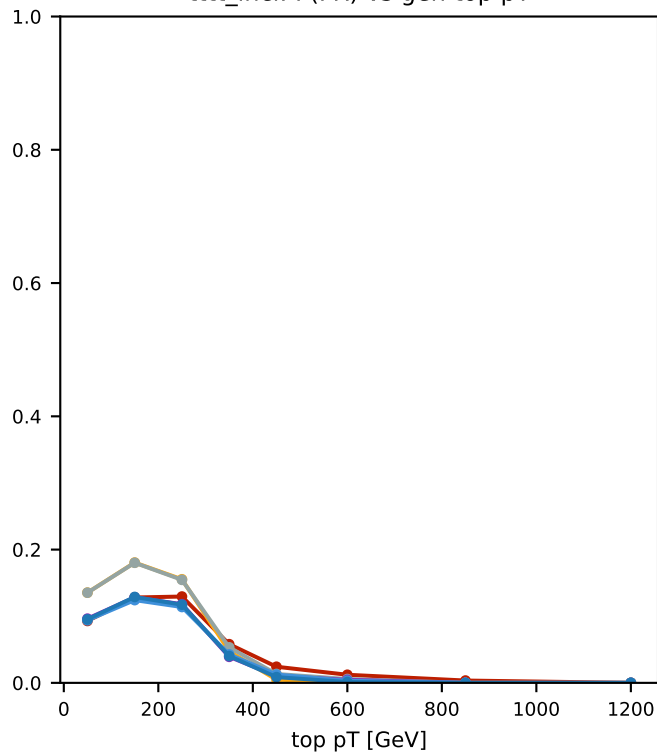
tttt_incl: P(SRqq) vs gen top pT



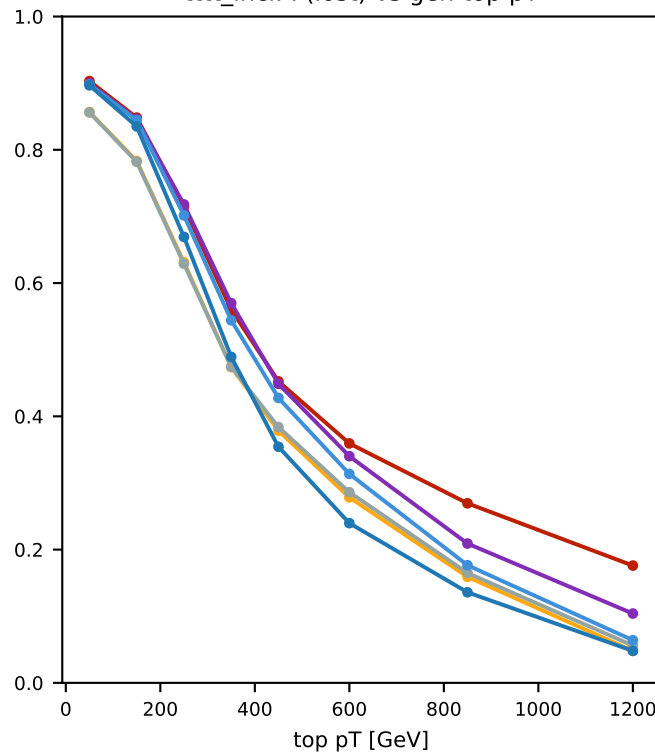
tttt_incl: P(SRbq) vs gen top pT



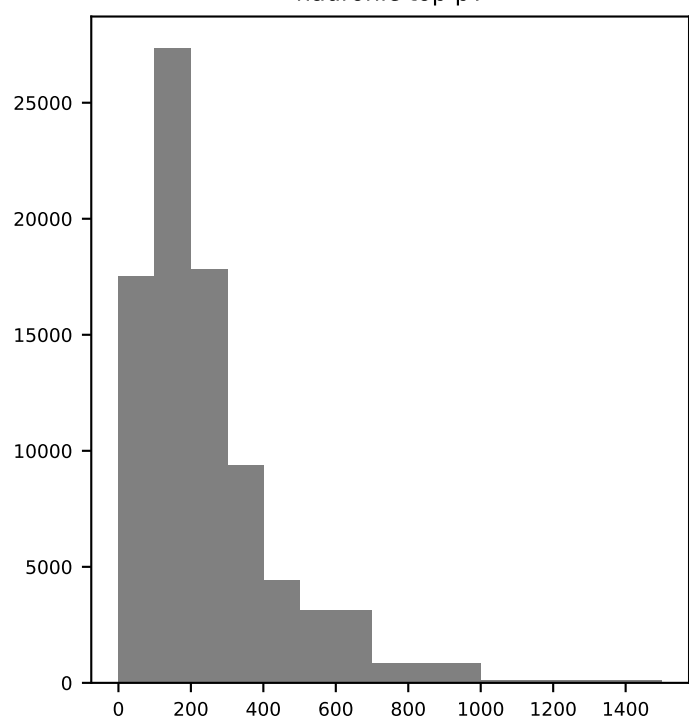
tttt_incl: P(FR) vs gen top pT



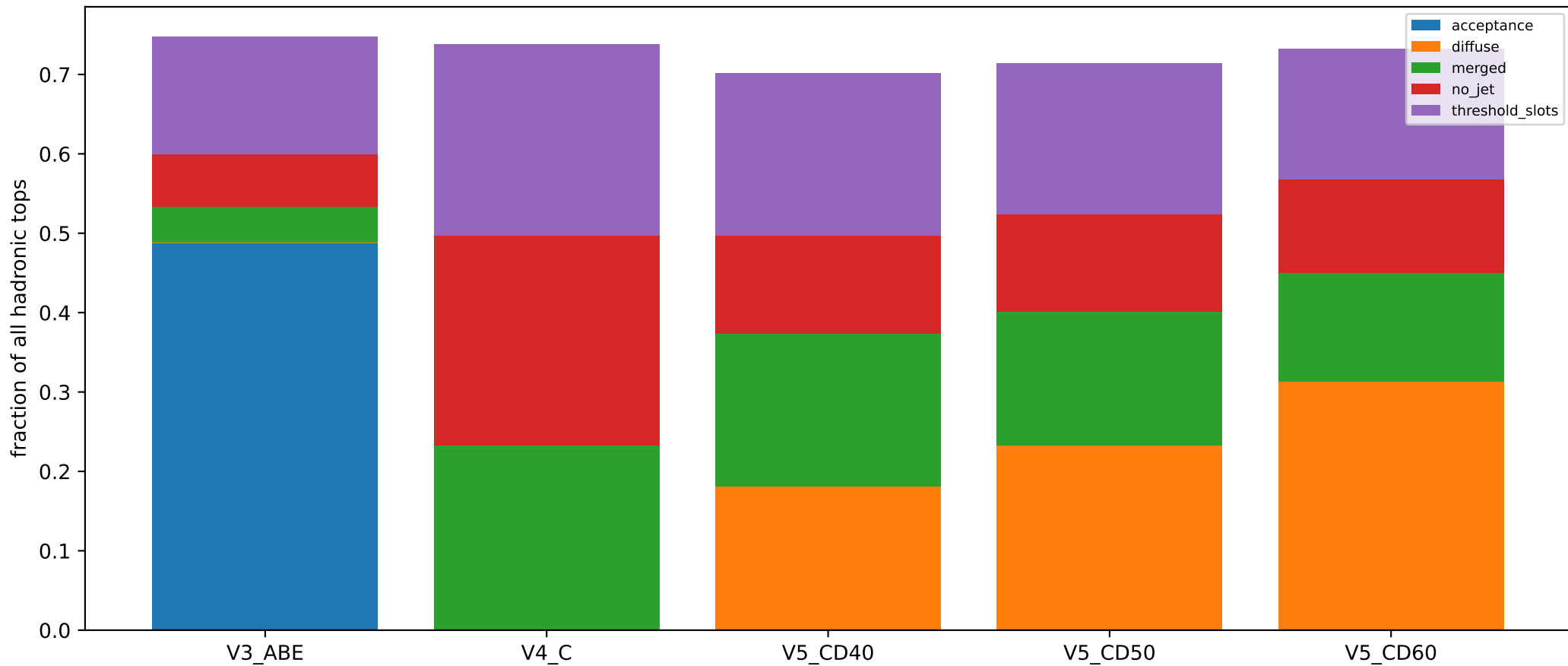
tttt_incl: P(lost) vs gen top pT



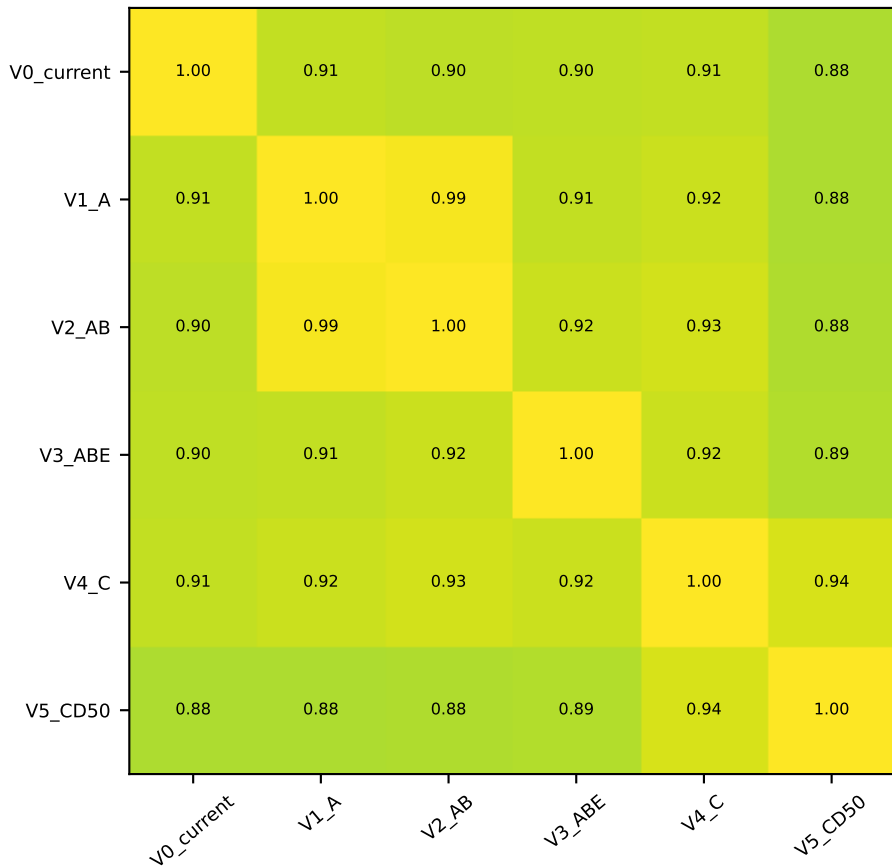
hadronic top pT



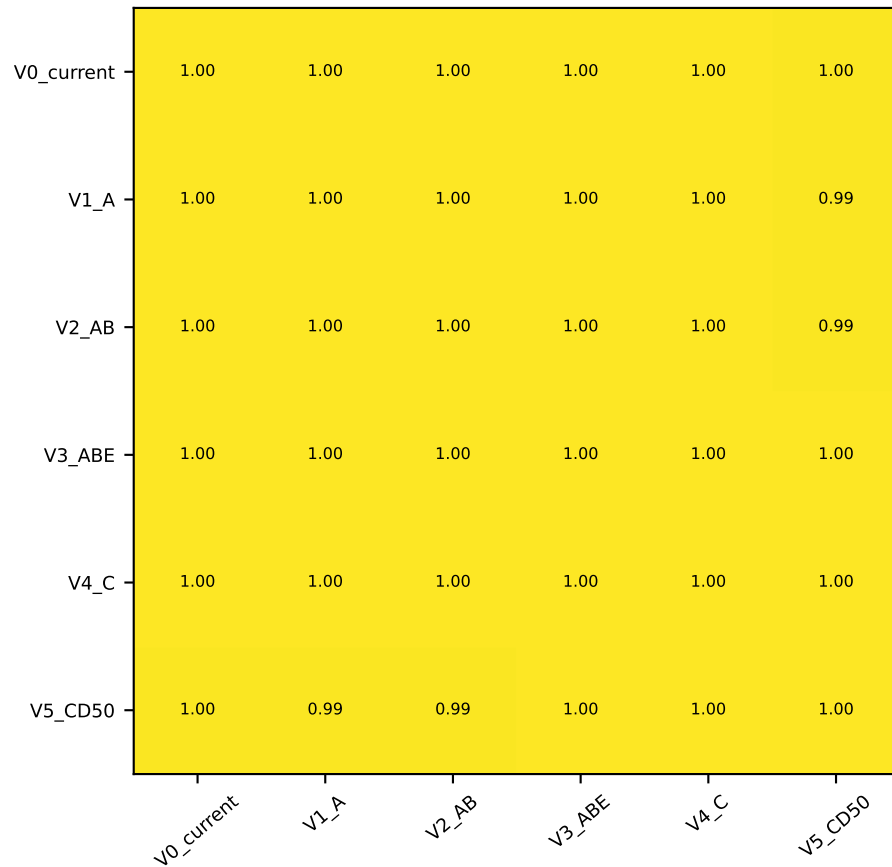
tttt_incl: why tops are lost



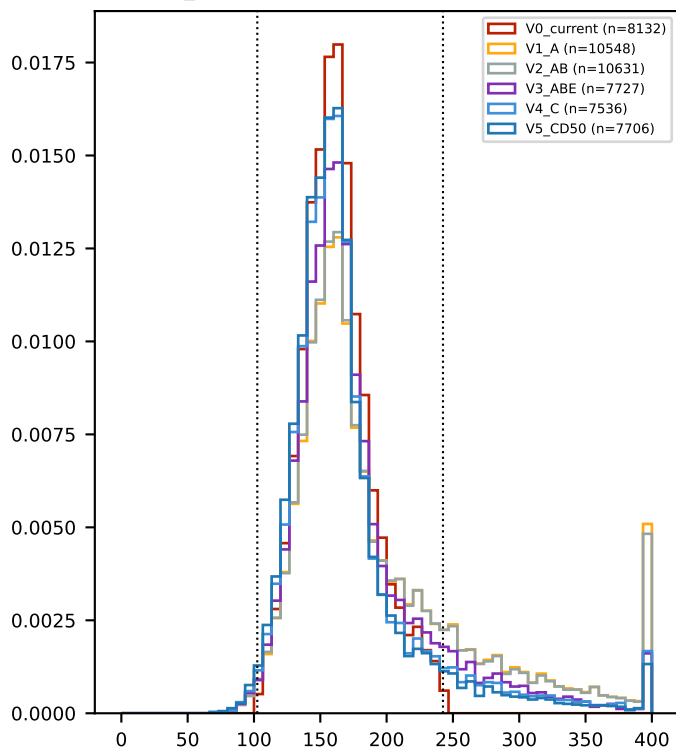
tttt_incl: same exclusive category



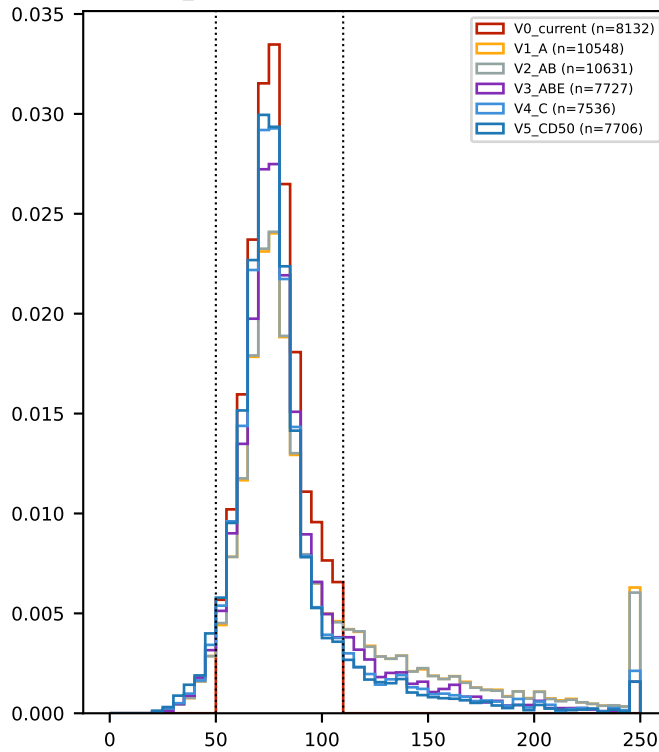
tttt_incl: same jets | same (non-lost) category



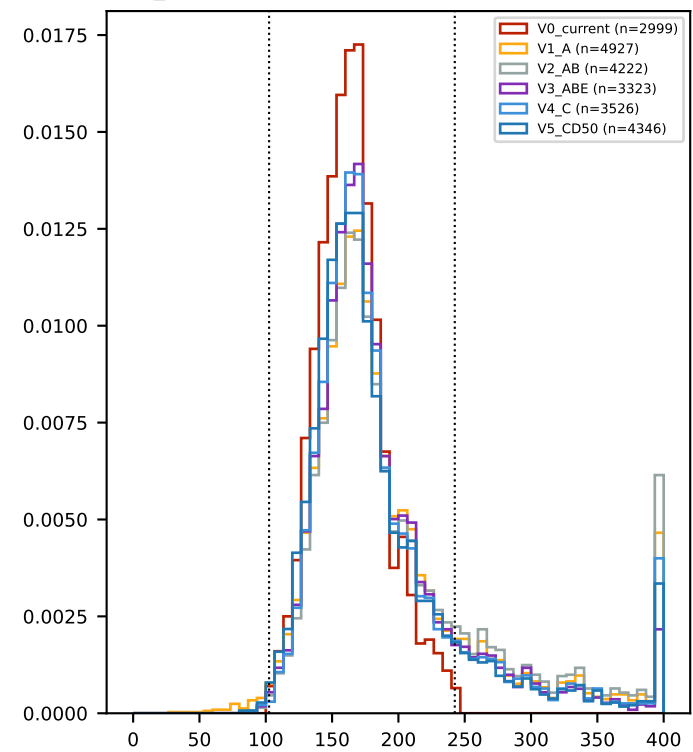
tttt_incl: FR m(b q1 q2) (exclusive category)



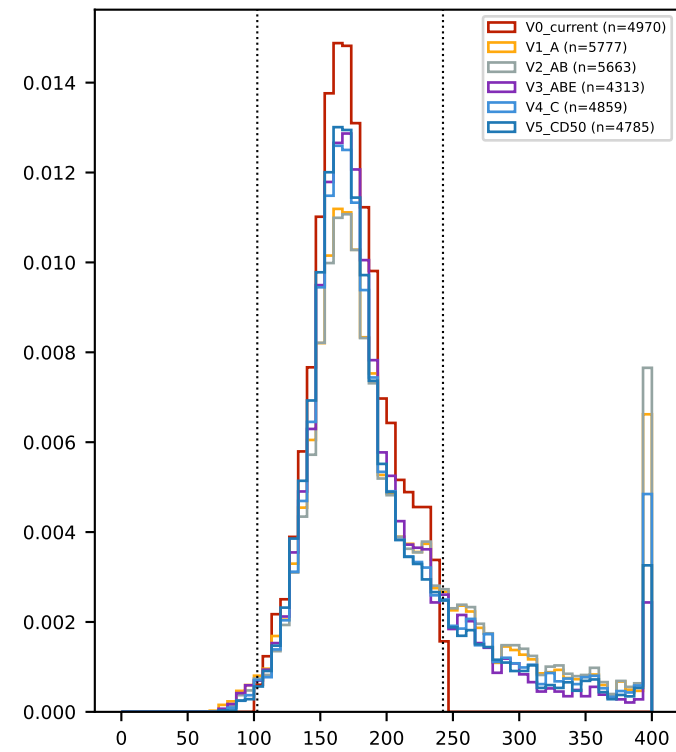
tttt_incl: FR m(q1 q2) (exclusive category)



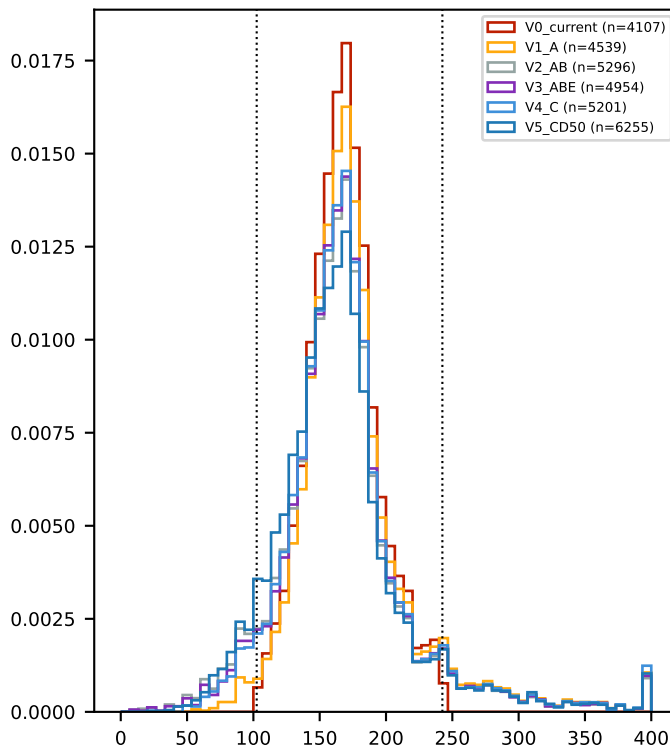
tttt_incl: SRqq m(b-jet + fatjet) (exclusive category)



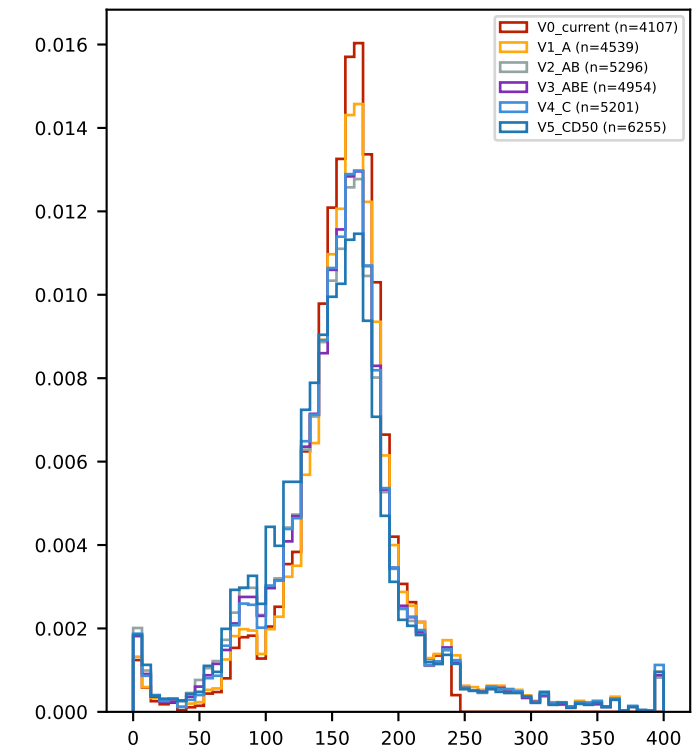
tttt_incl: SRbq m(q-jet + fatjet) (exclusive category)



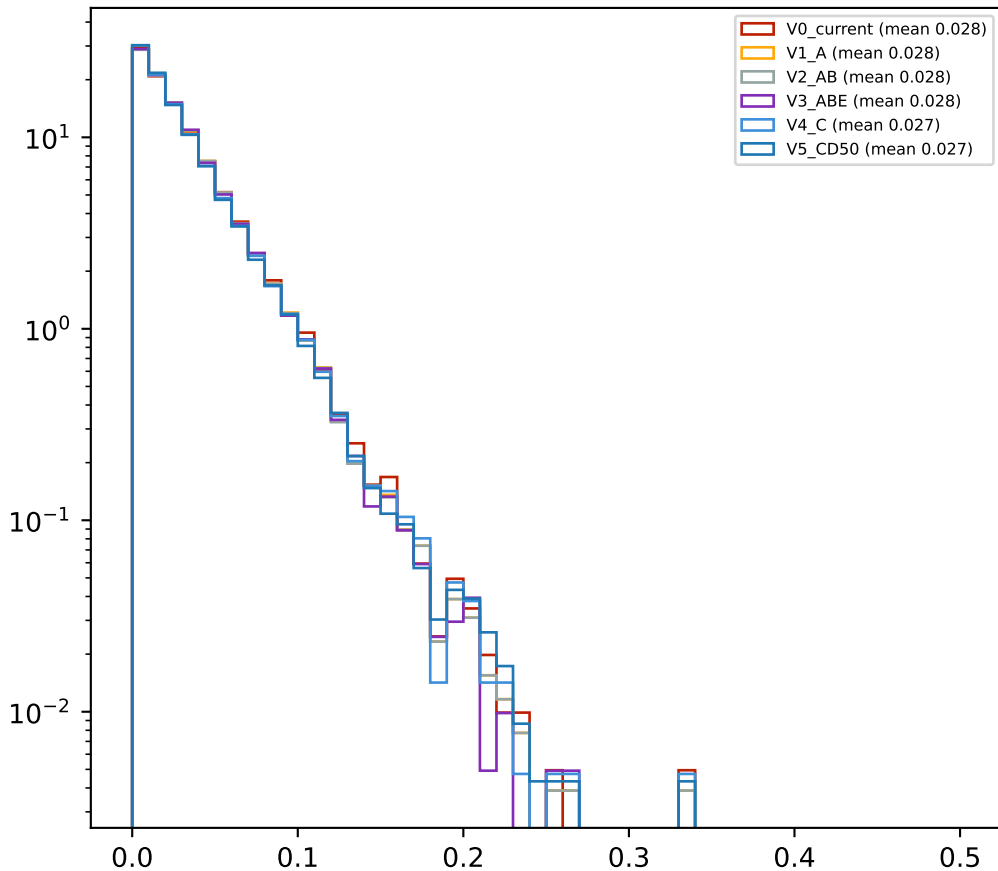
tttt_incl: FB fatjet mass (exclusive category)



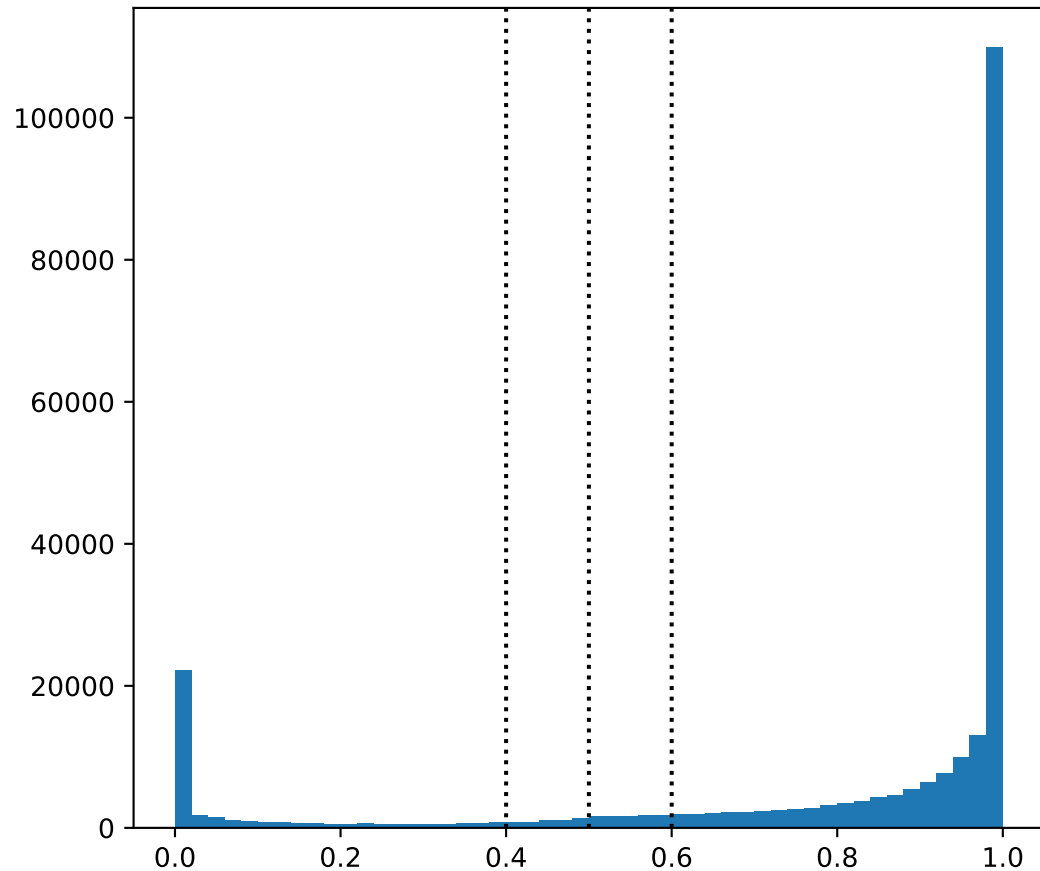
tttt_incl: FB fatjet soft-drop mass (exclusive category)



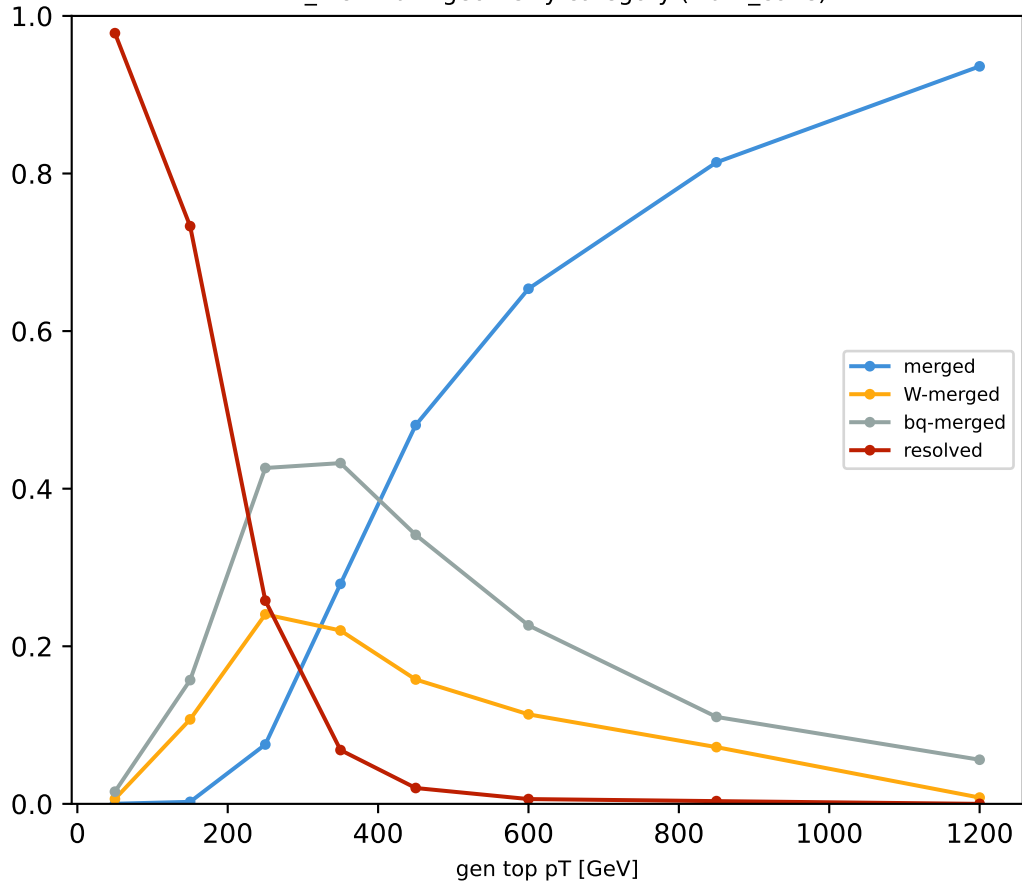
tttt_incl: pileup energy fraction of target jets



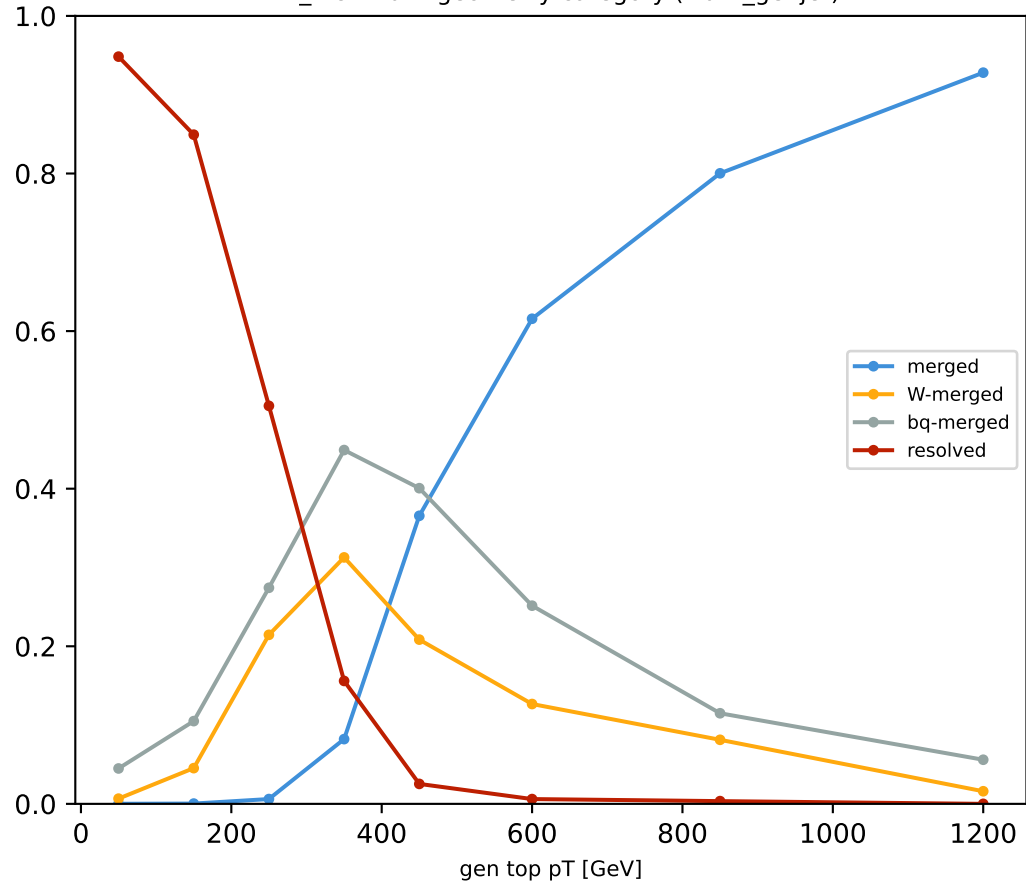
tttt_incl: largest AK4 energy share per daughter (V5)



tttt_incl: truth-geometry category (truth_cone)

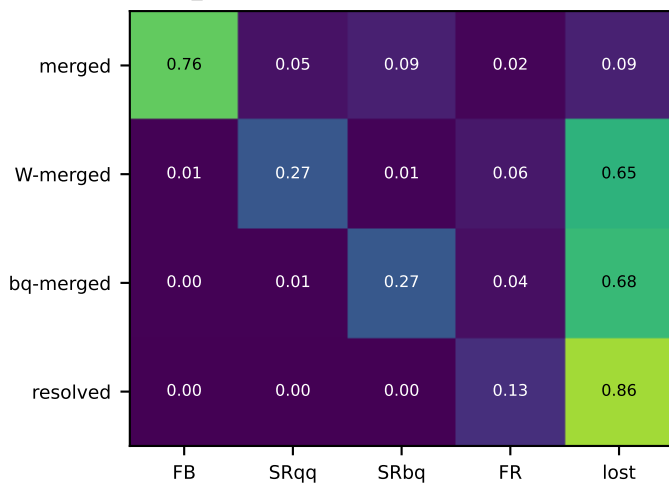


tttt_incl: truth-geometry category (truth_genjet)

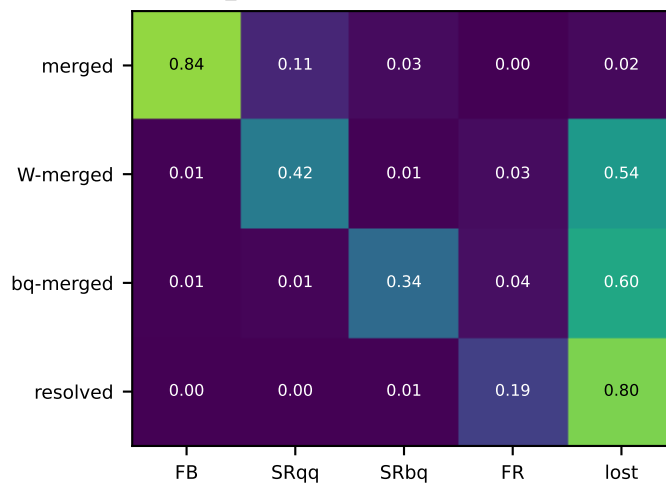


tttt_incl: rows = truth-geometry category, columns = label after priority rule (row-normalized)

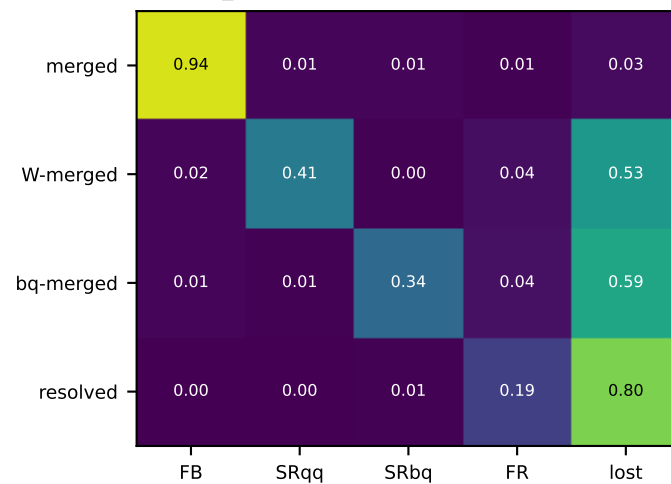
V0_current: truth (gen-jet) vs exclusive label



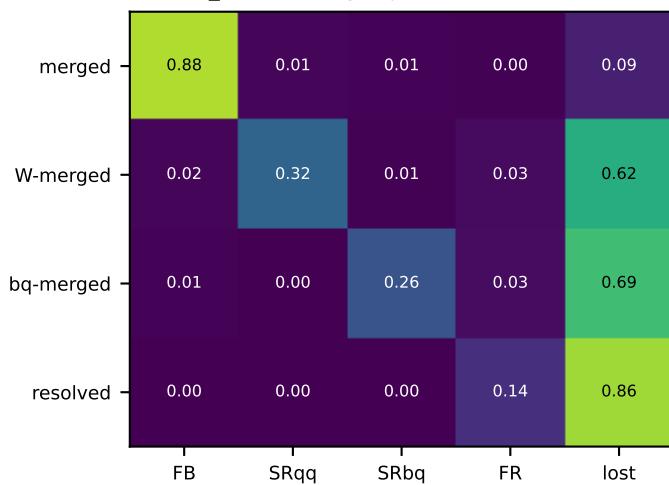
V1_A: truth (gen-jet) vs exclusive label



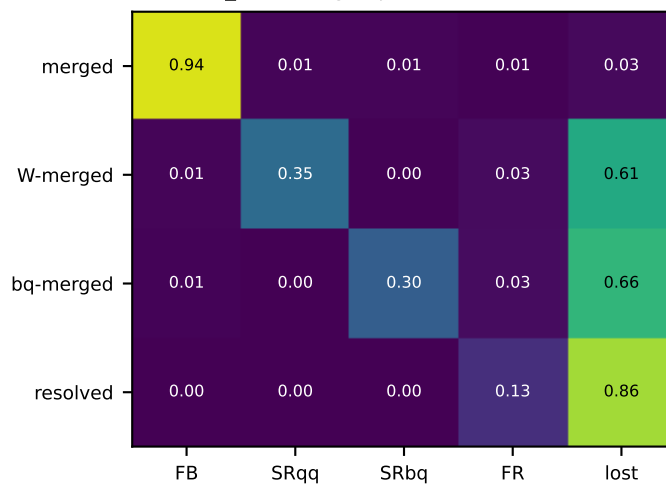
V2_AB: truth (gen-jet) vs exclusive label



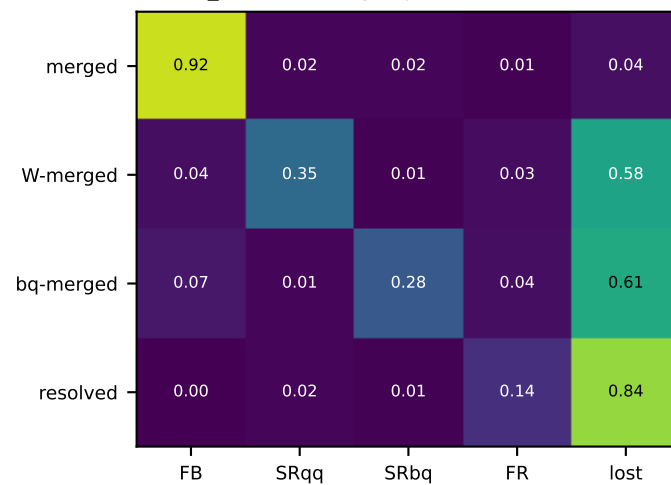
V3_ABE: truth (gen-jet) vs exclusive label



V4_C: truth (gen-jet) vs exclusive label

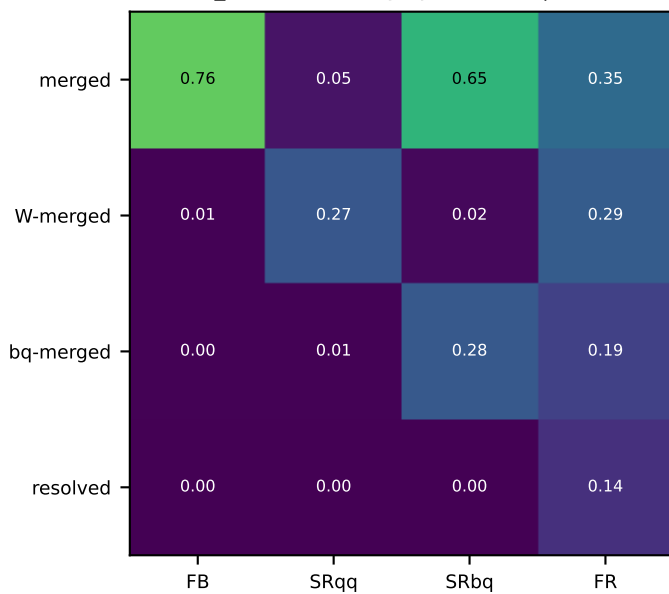


V5_CD50: truth (gen-jet) vs exclusive label

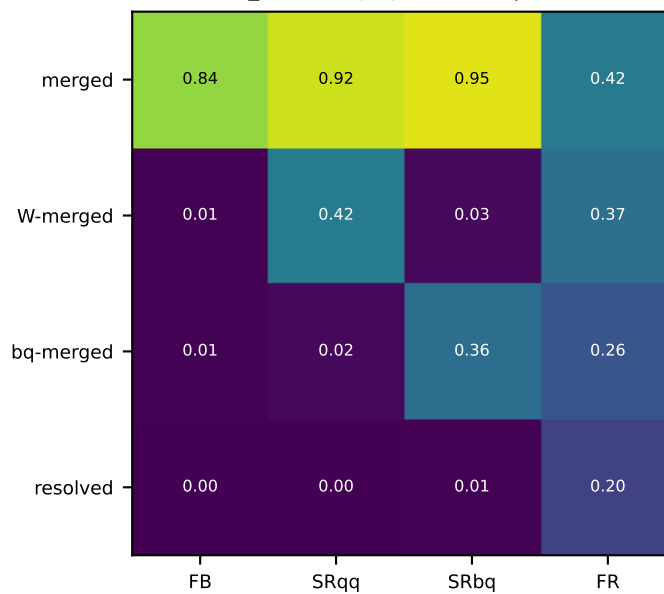


tttt_incl: multi-label view, fraction of tops in each truth category with each target available

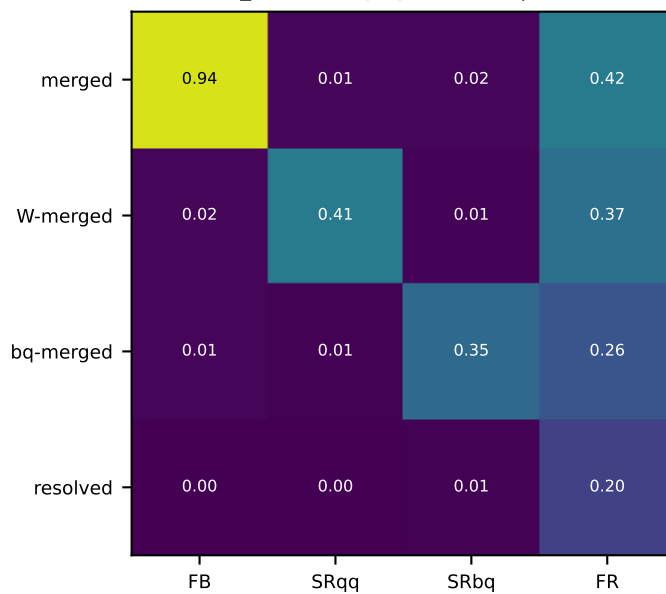
V0_current: P(category available | truth)



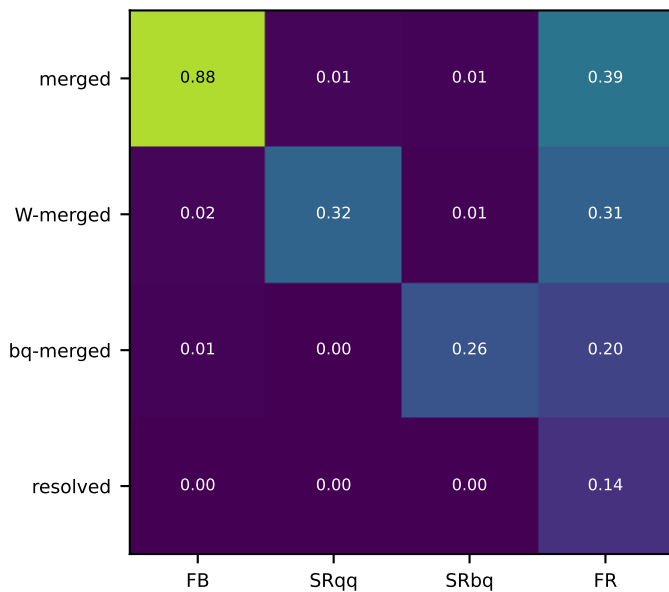
V1_A: P(category available | truth)



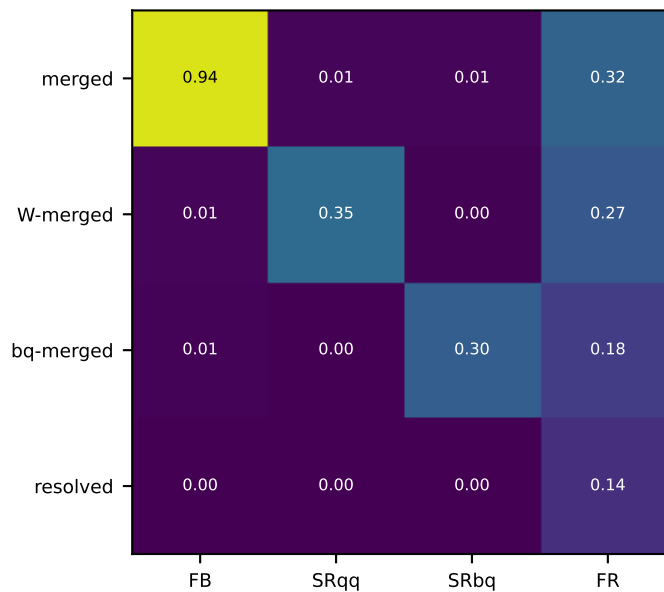
V2_AB: P(category available | truth)



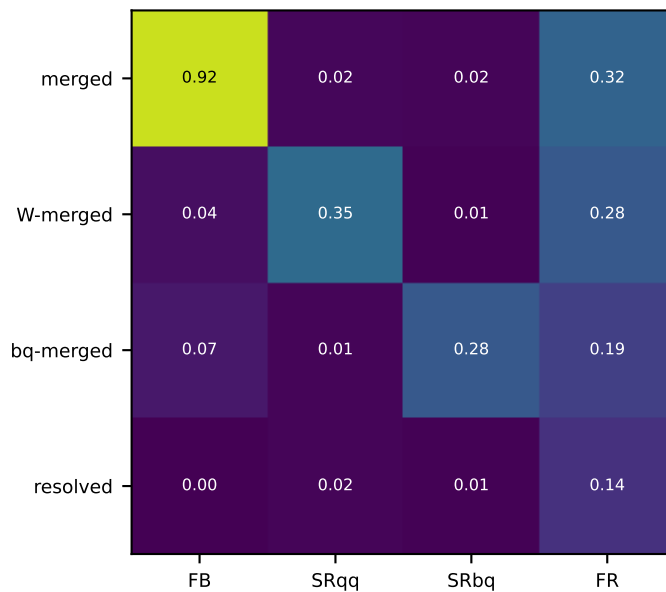
V3_ABE: P(category available | truth)



V4_C: P(category available | truth)



V5_CD50: P(category available | truth)



tttt_incl: multi-label patterns (fraction of hadronic tops)

V0_current	none:0.749	FR:0.101	SRbq+FR:0.033	SRbq:0.029	SRqq+FR:0.027	FB+SRbq:0.018	FB+SRbq+FR:0.017	FB:0.014
V1_A	none:0.680	FR:0.131	SRbq+FR:0.044	SRqq+FR:0.040	FB+SRqq+SRbq:0.032	SRbq:0.028	FB+SRqq+SRbq+FR:0.023	SRqq:0.011
V2_AB	none:0.680	FR:0.132	SRbq+FR:0.043	SRqq+FR:0.040	FB:0.037	FB+FR:0.028	SRbq:0.027	SRqq:0.011
V3_ABE	none:0.748	FR:0.096	FB:0.035	SRbq+FR:0.034	SRqq+FR:0.033	FB+FR:0.026	SRbq:0.020	SRqq:0.008
V4_C	none:0.738	FR:0.094	FB:0.044	SRbq:0.031	SRbq+FR:0.030	SRqq+FR:0.029	FB+FR:0.021	SRqq:0.014
V5_CD40	none:0.701	FR:0.097	FB:0.060	SRqq+FR:0.031	SRbq+FR:0.031	SRbq:0.030	SRqq:0.026	FB+FR:0.023
V5_CD50	none:0.713	FR:0.096	FB:0.056	SRqq+FR:0.031	SRbq+FR:0.030	SRbq:0.029	SRqq:0.023	FB+FR:0.022
V5_CD60	none:0.732	FR:0.090	FB:0.052	SRqq+FR:0.029	SRbq+FR:0.028	SRbq:0.027	SRqq:0.022	FB+FR:0.020

truth-geometry fractions:

cone {'merged': 0.11190677124702145, 'W-merged': 0.13038621922160445, 'bq-merged': 0.23005609610802225, 'resolved': 0.5276509134233519}
genjet {'merged': 0.06498212867355044, 'W-merged': 0.11790111199364575, 'bq-merged': 0.19132247815726766, 'resolved': 0.6257942811755361}

truth_cone (rows) vs truth_genjet (columns), counts:

	merged	W-merged	bq-merged	resolved
merged	5116	1455	1867	579
W-merged	31	6890	345	3240
bq-merged	88	299	10848	7302
resolved	1	856	2356	39303