

Current status of Vts

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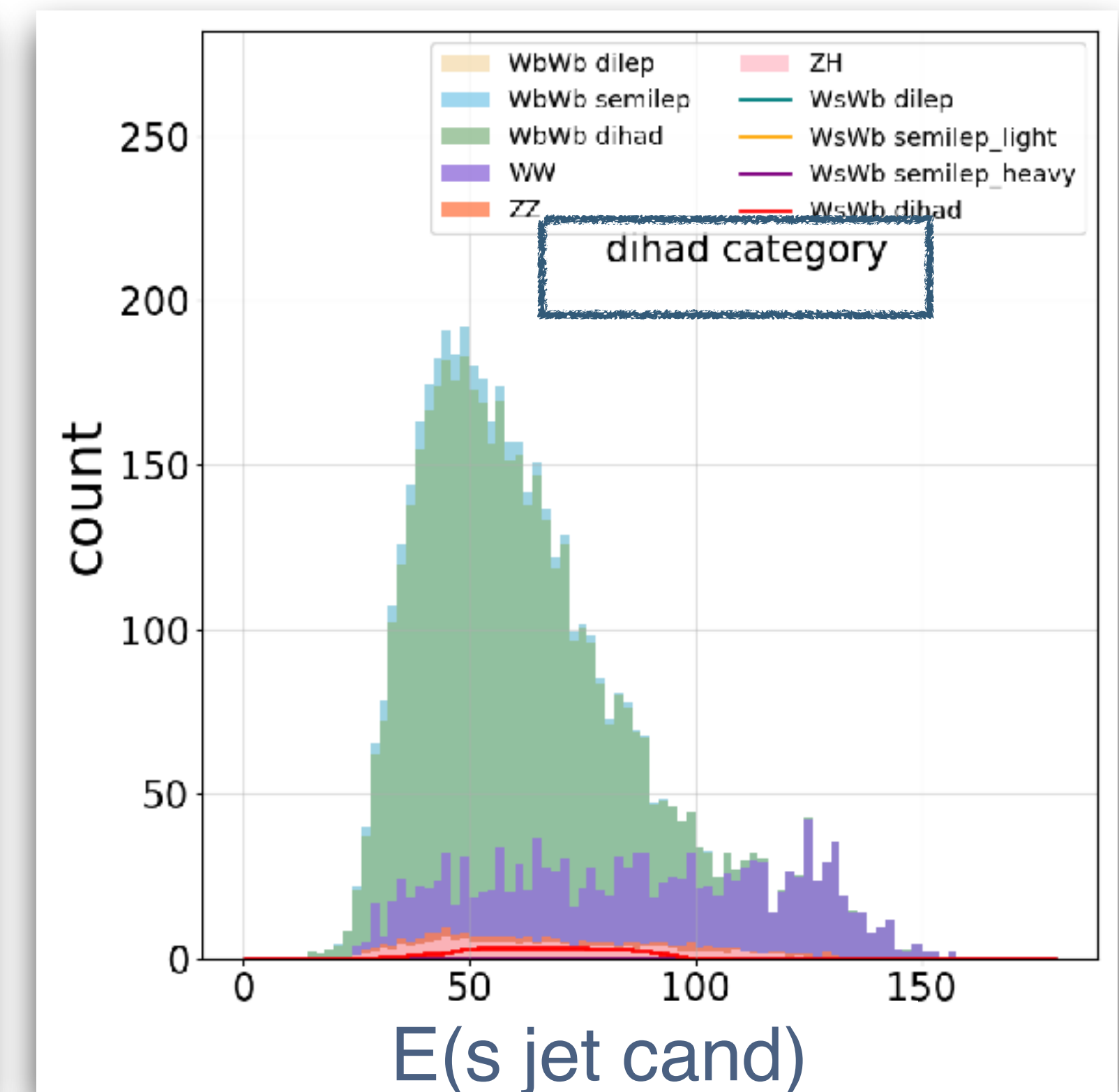
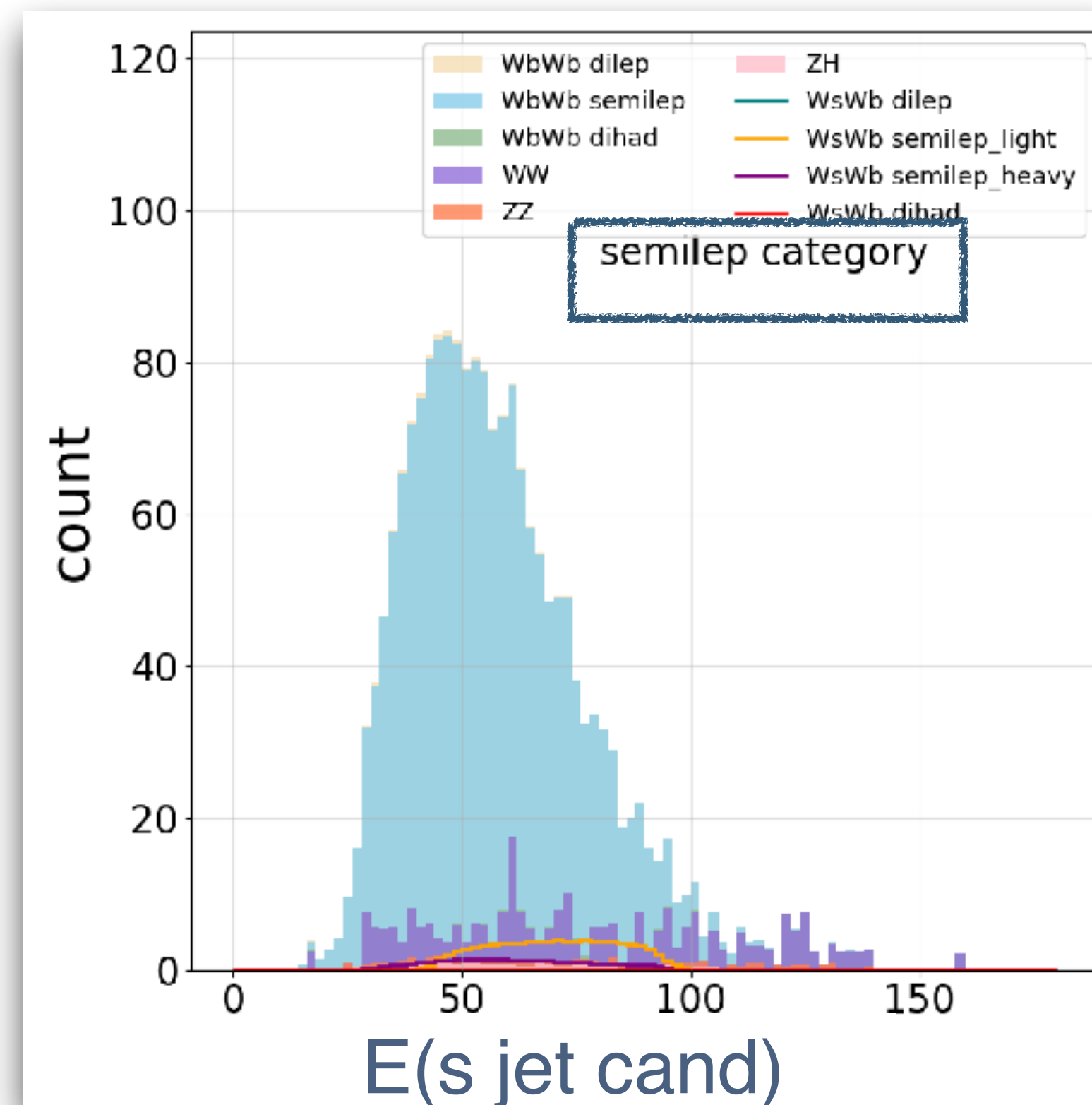
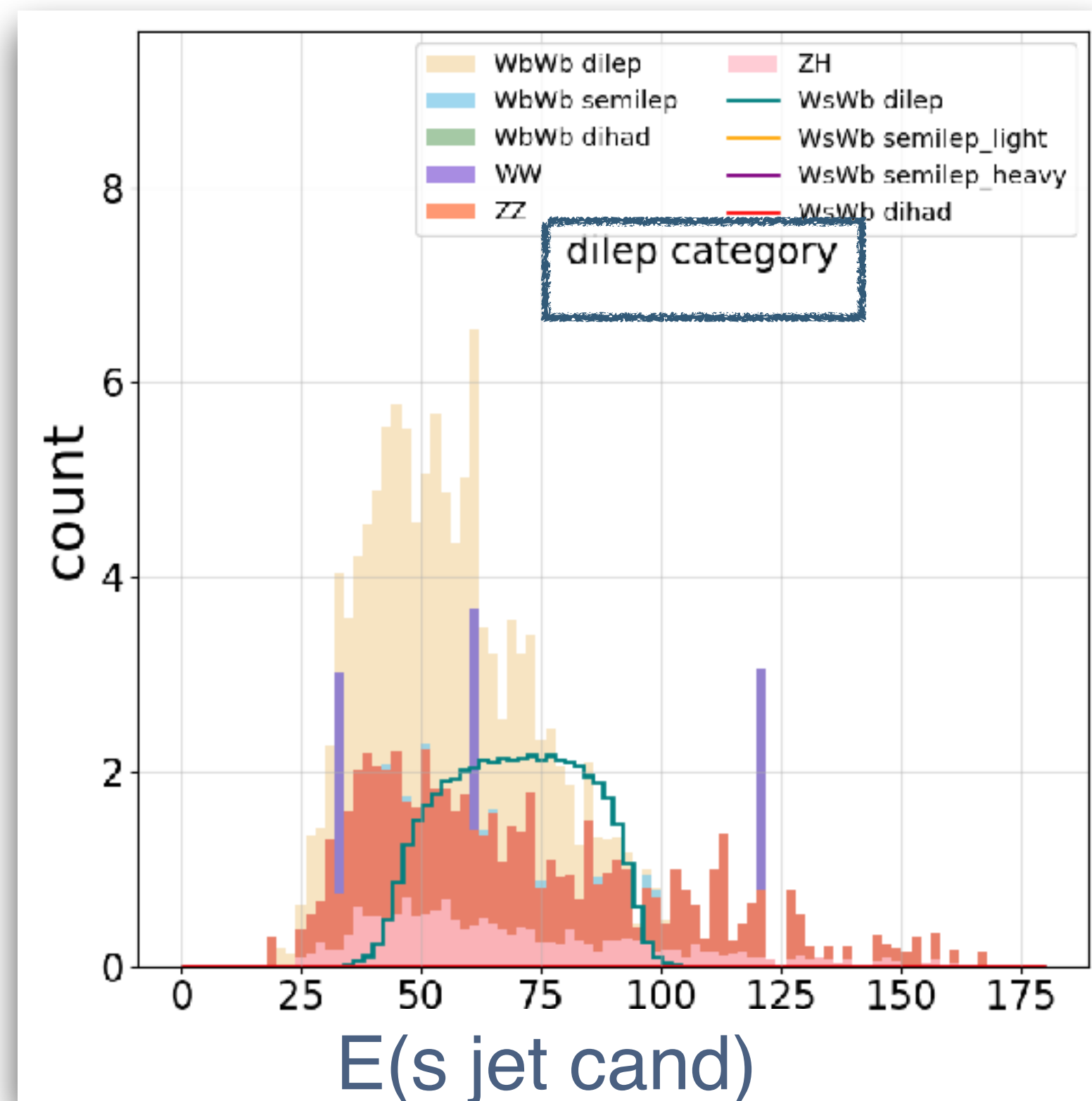
Quick summary



- Useful numbers
 - PDG, $|V_{ts}| = (41.5 \pm 0.9) \times 10^{-3}$, indirect measurement, mainly theo uncert
 - $1.9 \times 10^6 \times 2 \times |V_{ts}|^2 \sim 6400$ cases of $t \rightarrow Ws$ at FCC-ee
- Ingredients for FCC analysis
 - SM signal $tt \rightarrow Ws + Wb$
 - Full list of bkg (tt, WW, ZZ, ZH)
 - ParticleNet s-tagging (trained with Higgs events)
- **N.B.** This slides is not a full description of the study, just a flash of results. Many details are omitted. More material at https://xzuo.web.cern.ch/FCC/topVts/event_sel/yields_Aug08_070_Wqq_pair_tightBjet/

Phasespace composition

- Plots here made with simple selections on the number of objects and tagging scores to give a feeling of the background composition in different categories.



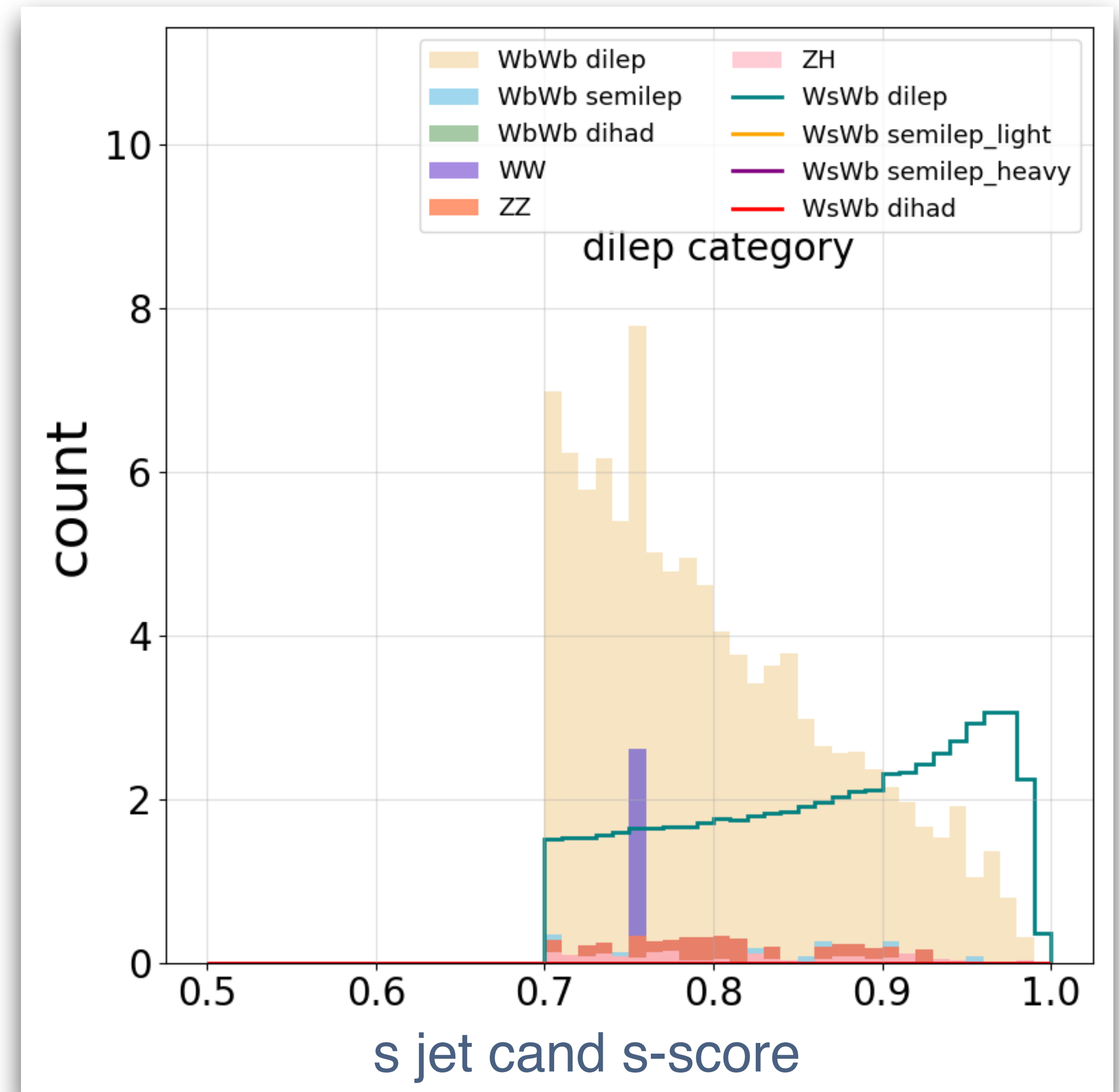
Common selections



- muons and electrons
 - $p_t > 20 \text{ GeV}$,
 - Relative iso ($R=0.5$) < 0.25
- Jets
 - Inclusive jets (generalised kt, $R=0.5$)
 - jet mass $< 50 \text{ GeV}$
 - jet energy $> 15 \text{ GeV}$
 - (Exclusive jets studied in parallel, not shown in this slides)
- Event pre-selection
 - Exactly 1 “tightly” b-tagged jet (b-score > 0.8),
 - Veto additional “loosely” b-tagged (b-score > 0.5)
 - At least 1 “tightly” s-tagged jet (s-score > 0.7)
- Categories
 - dilep: exactly 2 leps, 2 jets
 - semilep: exactly 1 lep, 4 jets
 - dihad: exactly 0 lep, 6 jets

dilep category

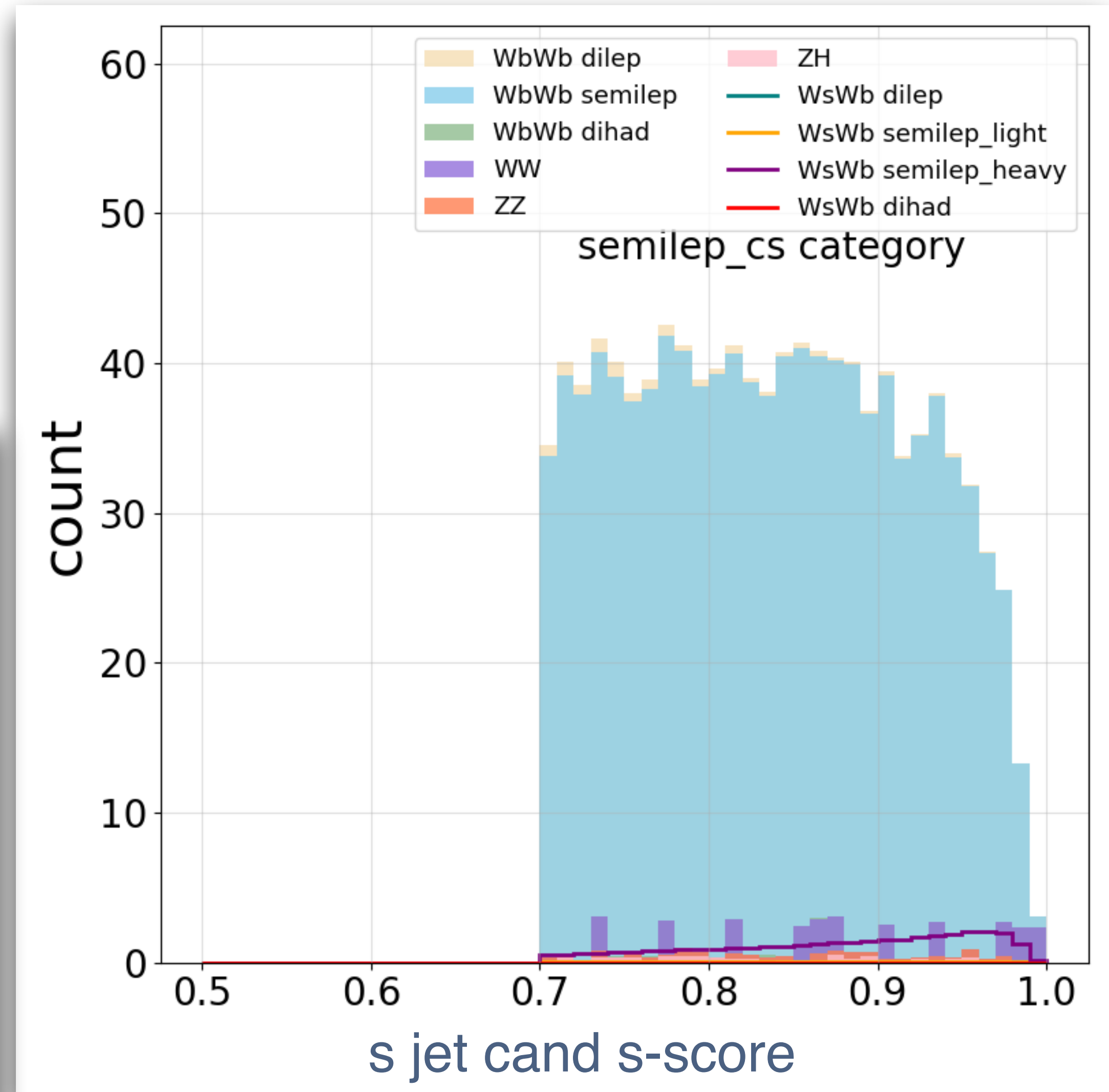
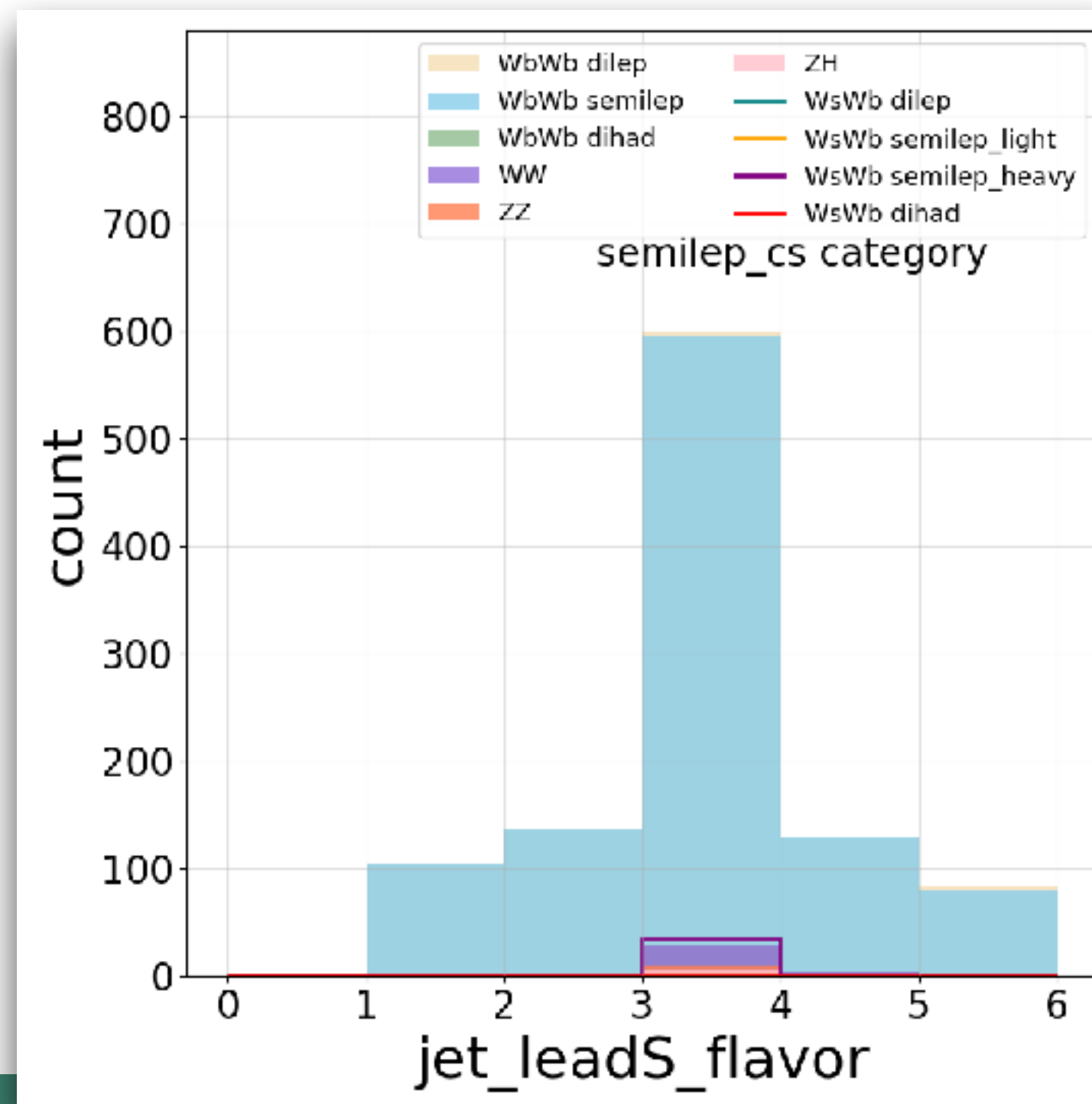
- In addition to common selections
 - missing energy > 80 GeV
 - s-jet candidate energy > 45 GeV
 - b-jet candidate energy > 25 GeV
 - b-jet b-score > 0.9



semilep(Wcs) category

- In addition to common selections
 - missing energy > 30 GeV
 - 2 jets other than the b-candidate and s-candidate from top decays make a c-s pair
 - c-score and s-score > 0.5

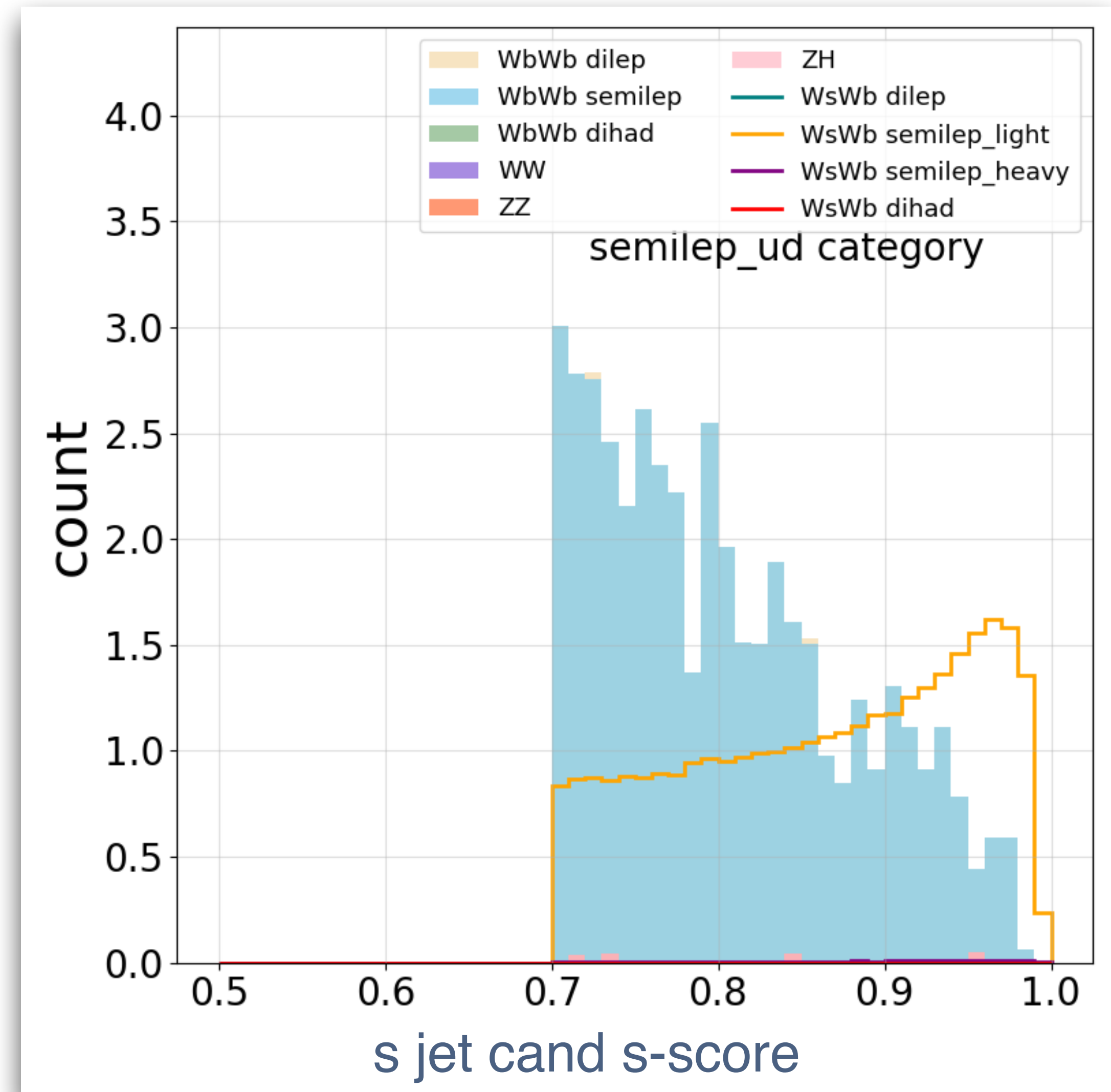
“Irreducible” bkg of true s-jets from $W \rightarrow cs$ decay



semilep(Wud) category

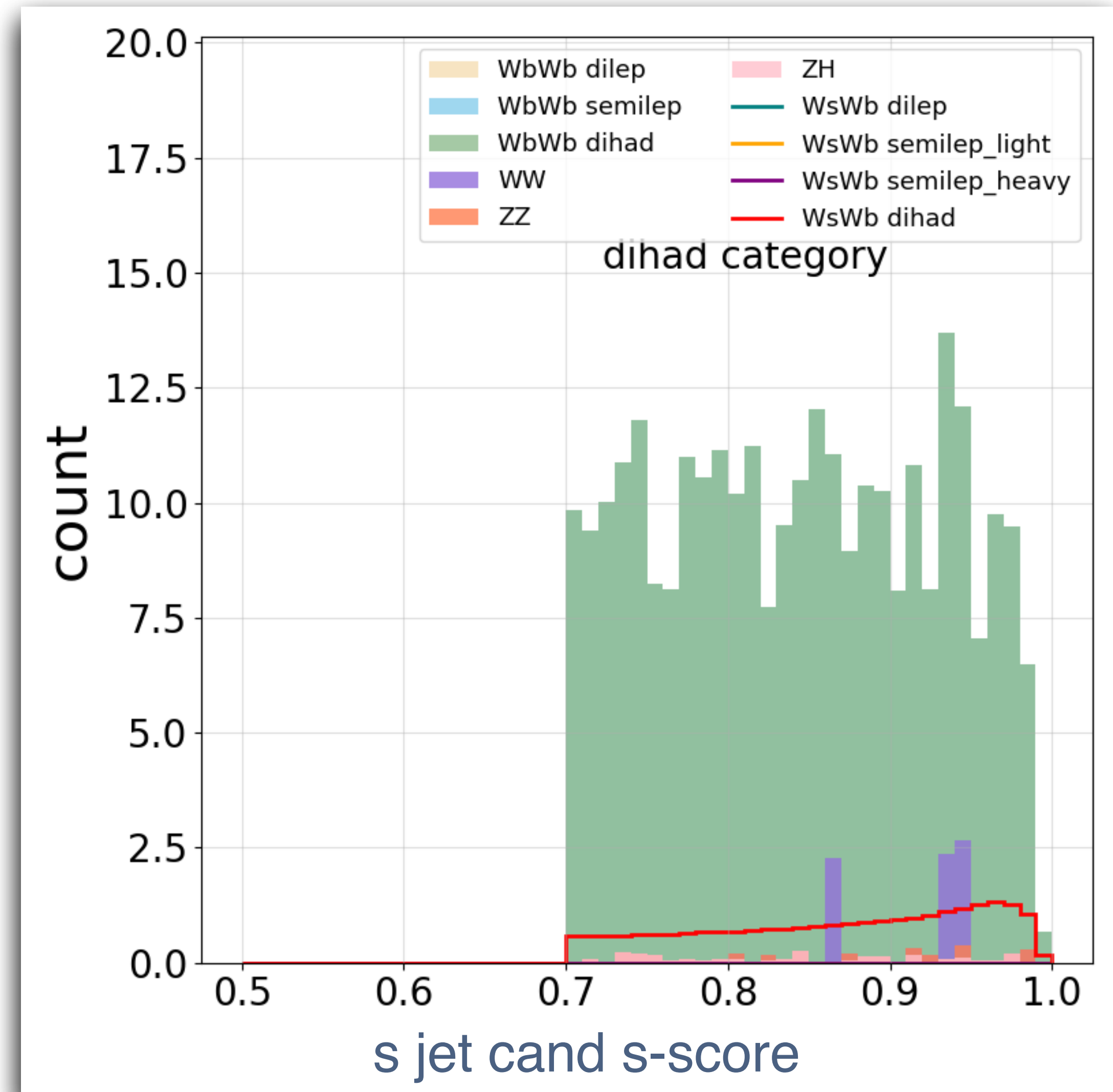


- In addition to common selections
 - missing energy > 30 GeV
 - 2 jets other than the b-candidate and s-candidate from top decays make a u-d pair
 - both u/d score > 0.5
 - s-jet candidate energy > 60 GeV
 - b-jet candidate energy > 40 GeV
 - b-jet b-score > 0.9



dihad category

- In addition to common selections
 - missing energy < 20 GeV
 - 4 jets other than the b-candidate and s-candidate from top decays make two pairs (c-s or u-d)
 - s-jet candidate energy > 60 GeV
 - b-jet candidate energy > 40 GeV
 - b-jet b-score > 0.9



Preliminary conclusions



- High purity achieved in dilep and semilep(Wus) categories
 - Background close to “irreducible” in all categories
- Could use s-score as the fit variable
 - Expect good sensitivity from statistics
 - Need to assess uncertainty from s-score calibration
- Towards a complete (not optimized) analysis
 - Run fit
 - Compare results with exclusive jets
 - Potentially: tagger retraining, top full reconstruction