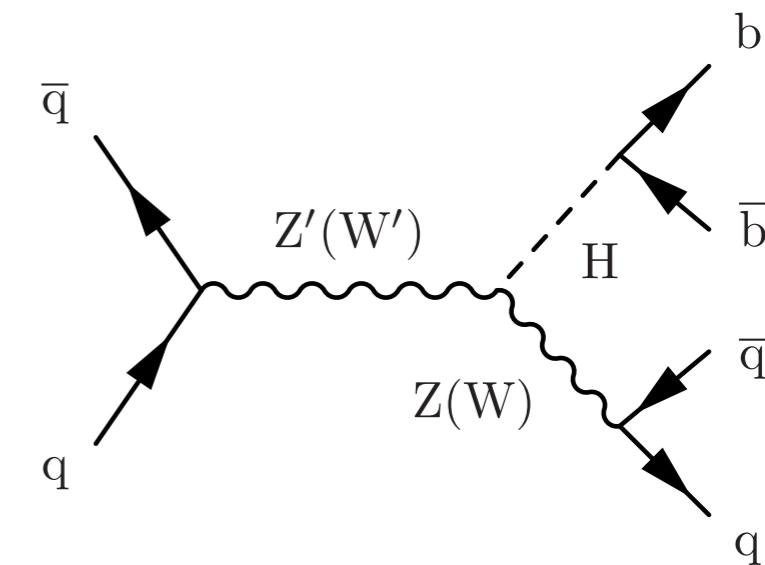
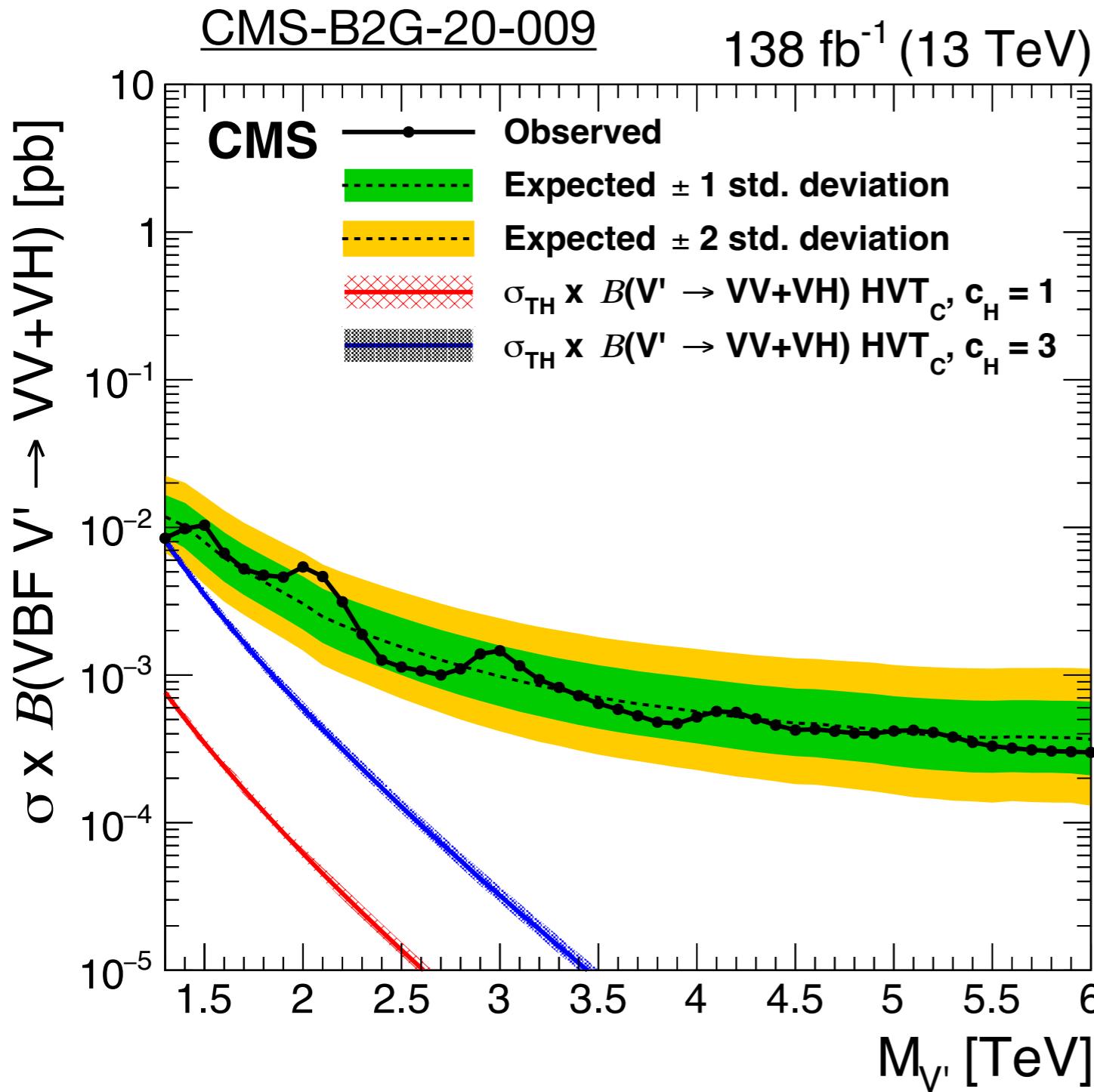


Substructure tagging with mass and p_T dependent variable-R jet clustering and a soft drop veto

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¹UCLouvain, ²UHH, ³DESY

Motivation

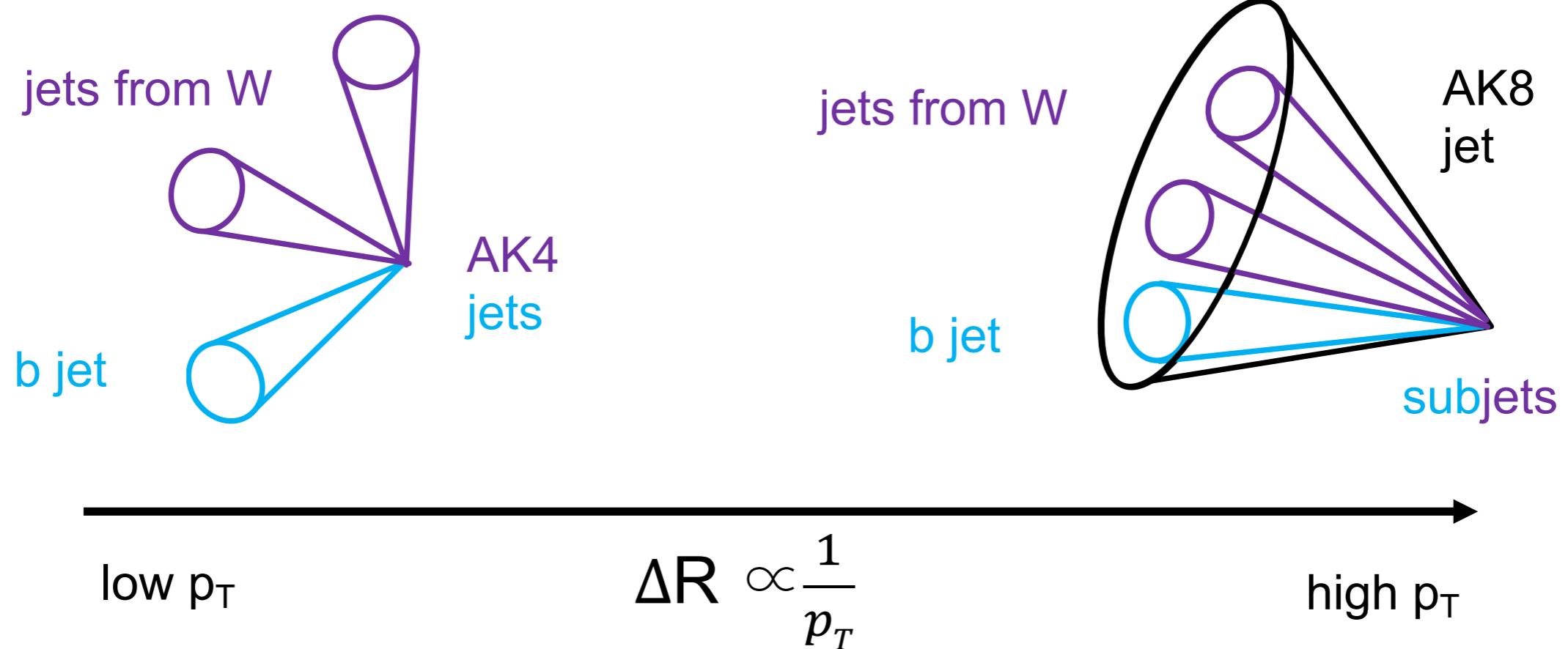


CMS-B2G-20-009

- Often search for high mass resonances decaying into heavy particles like W , Z , H bosons or top quarks

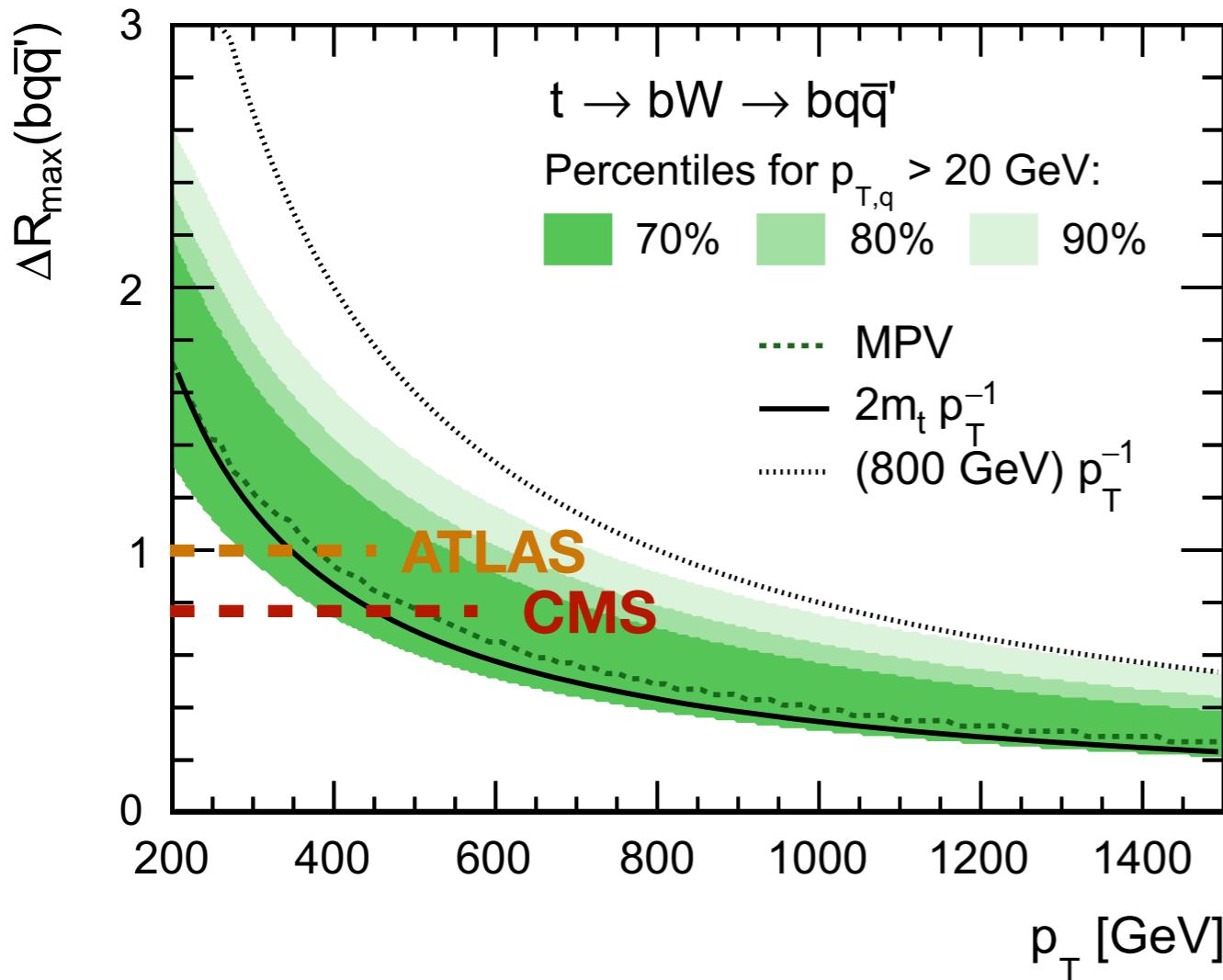
Boosted Objects

Example: Top quark decay to W b



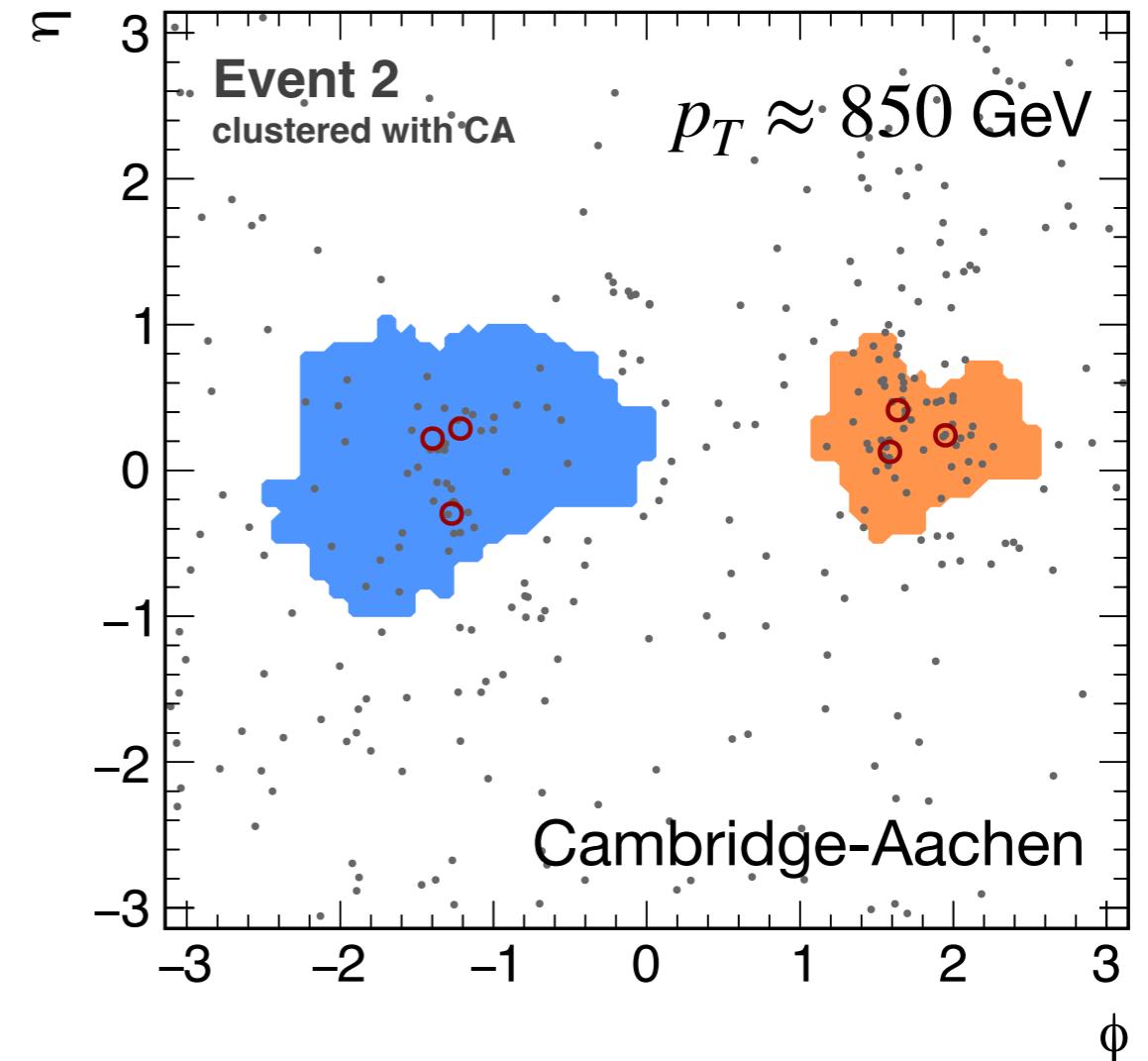
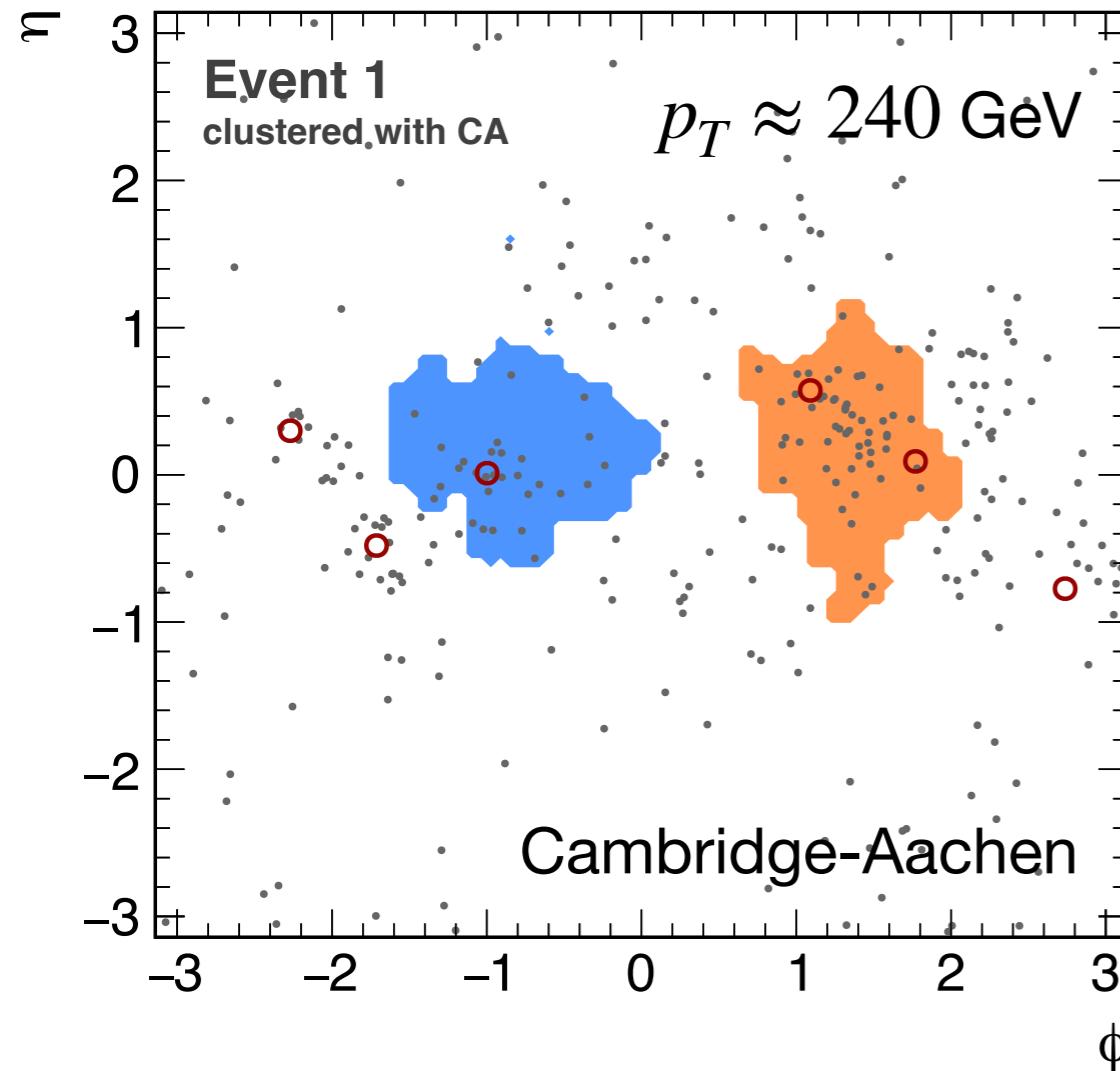
Boosted Objects

R. Kogler, Advances in Jet Substructure at the LHC

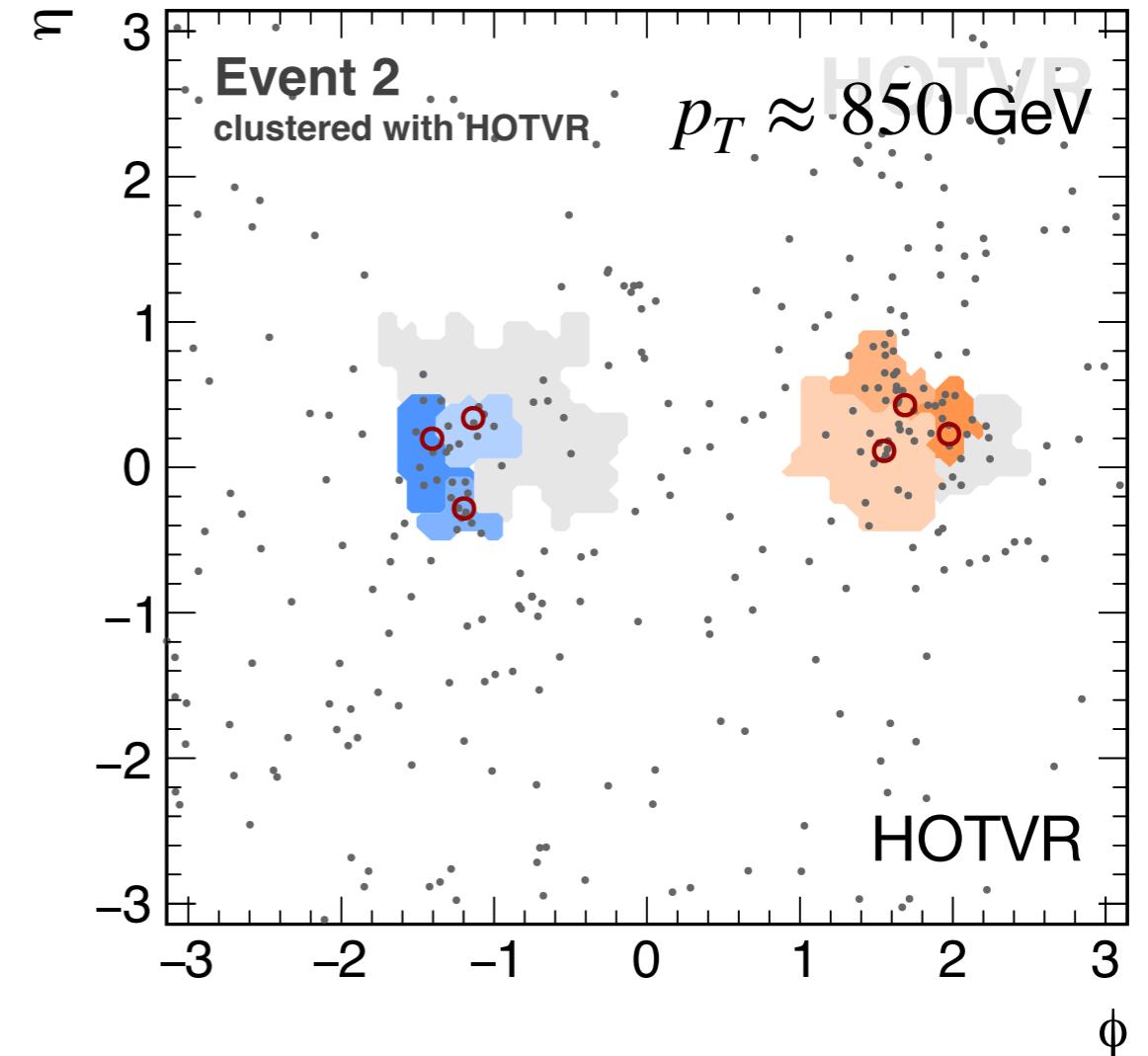
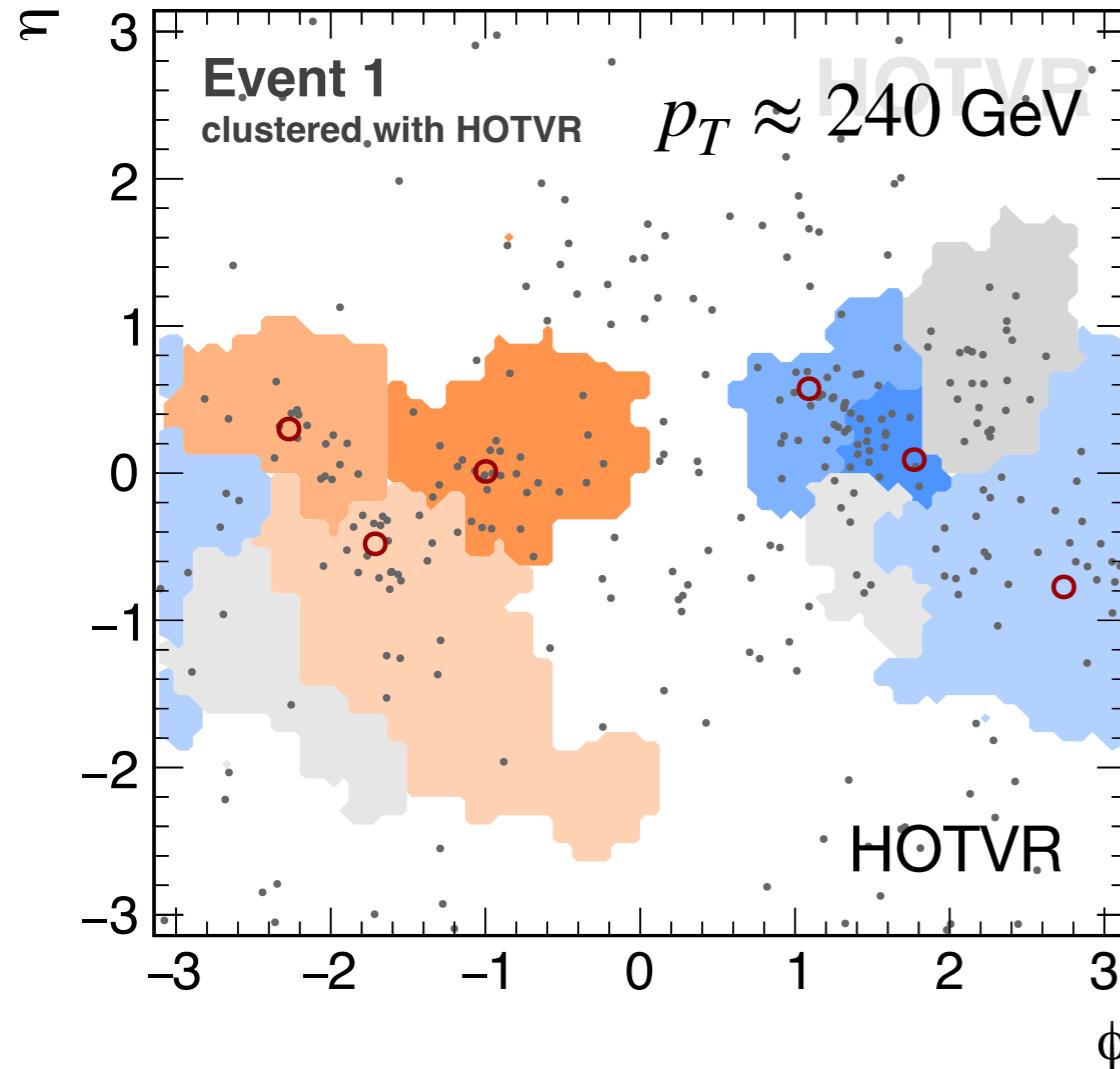


- With a fixed jet radius, the jet has a fixed p_T threshold to capture the decay
- At high p_T of the top quark the jet fixed radius is too large

Fixed R clustering

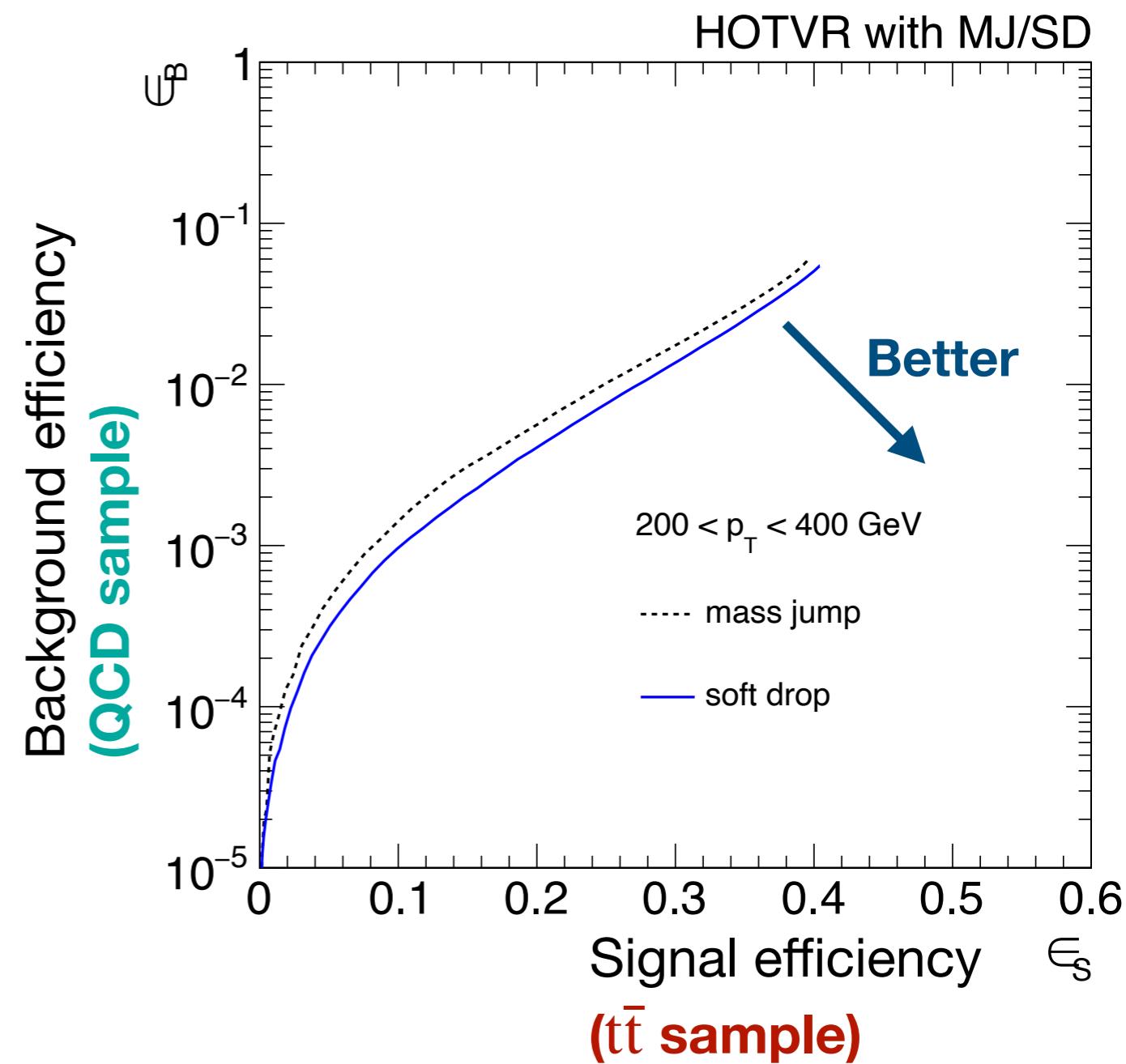
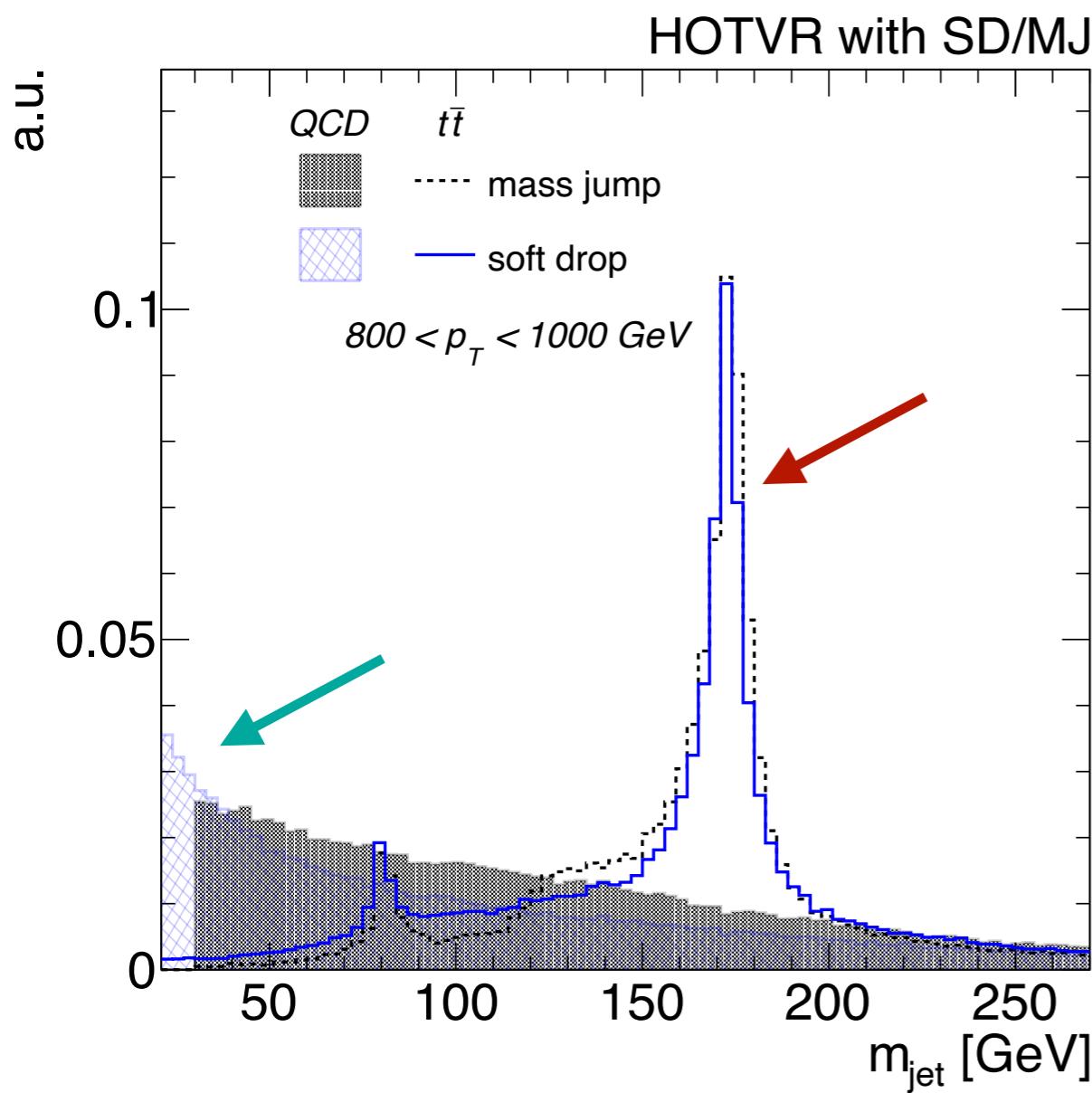


Variable R jet clustering



Grooming during jet clustering

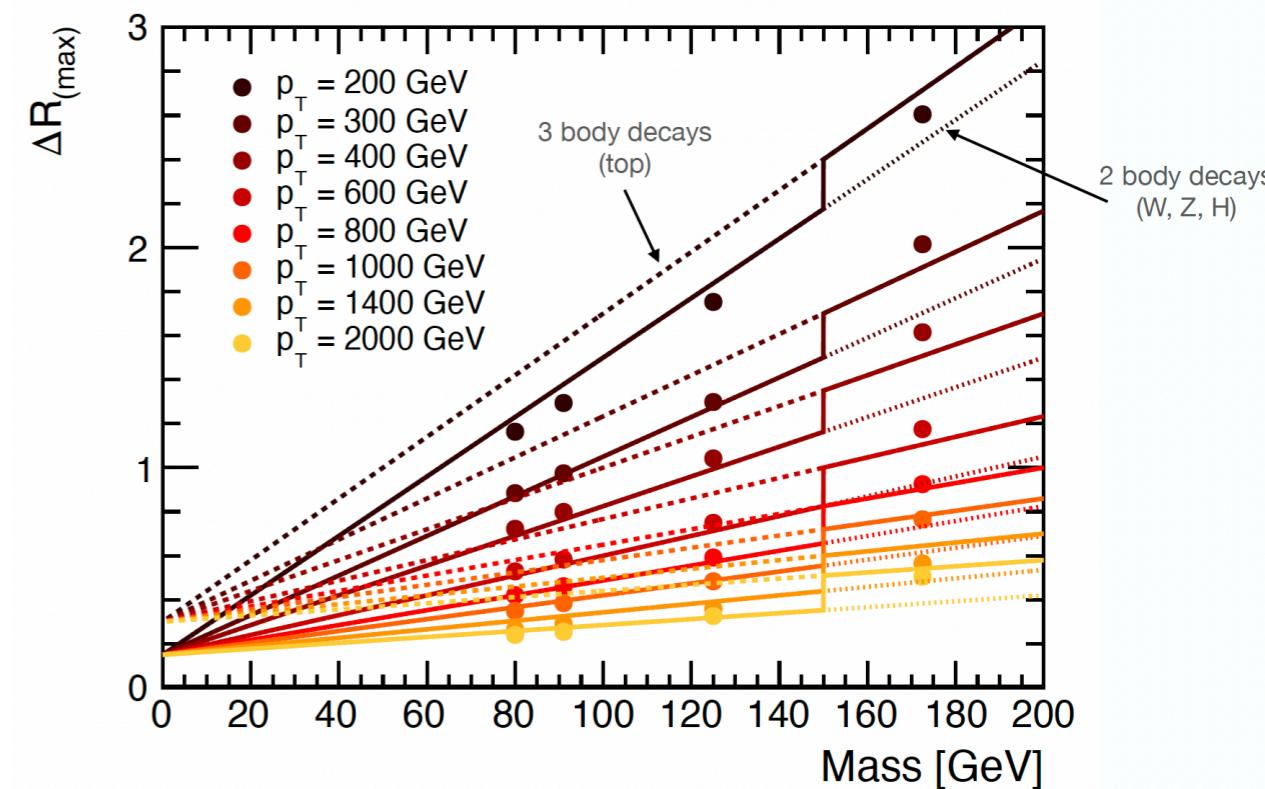
QCD distribution is shifted to lower masses;
TOP peak sharper



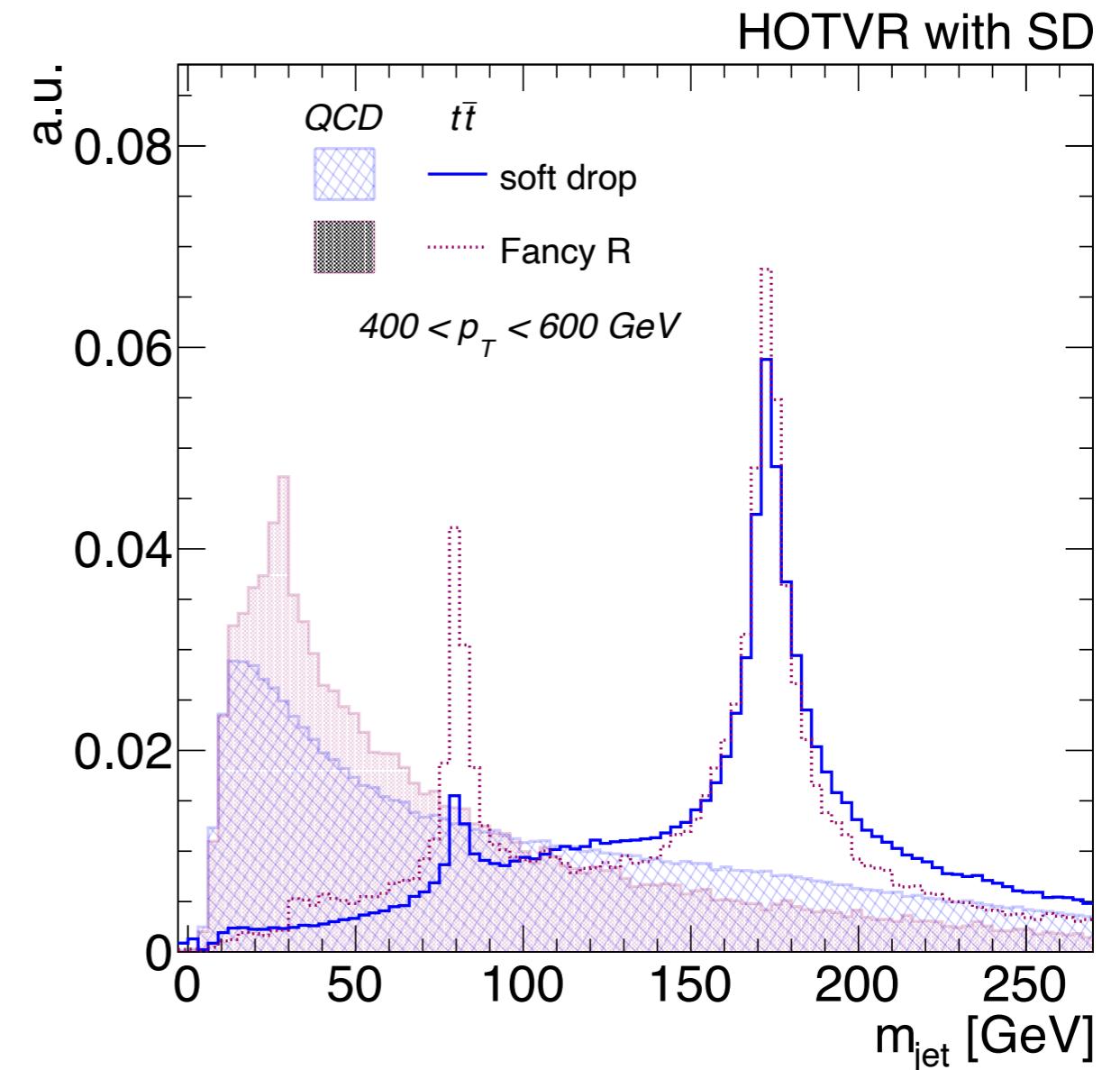
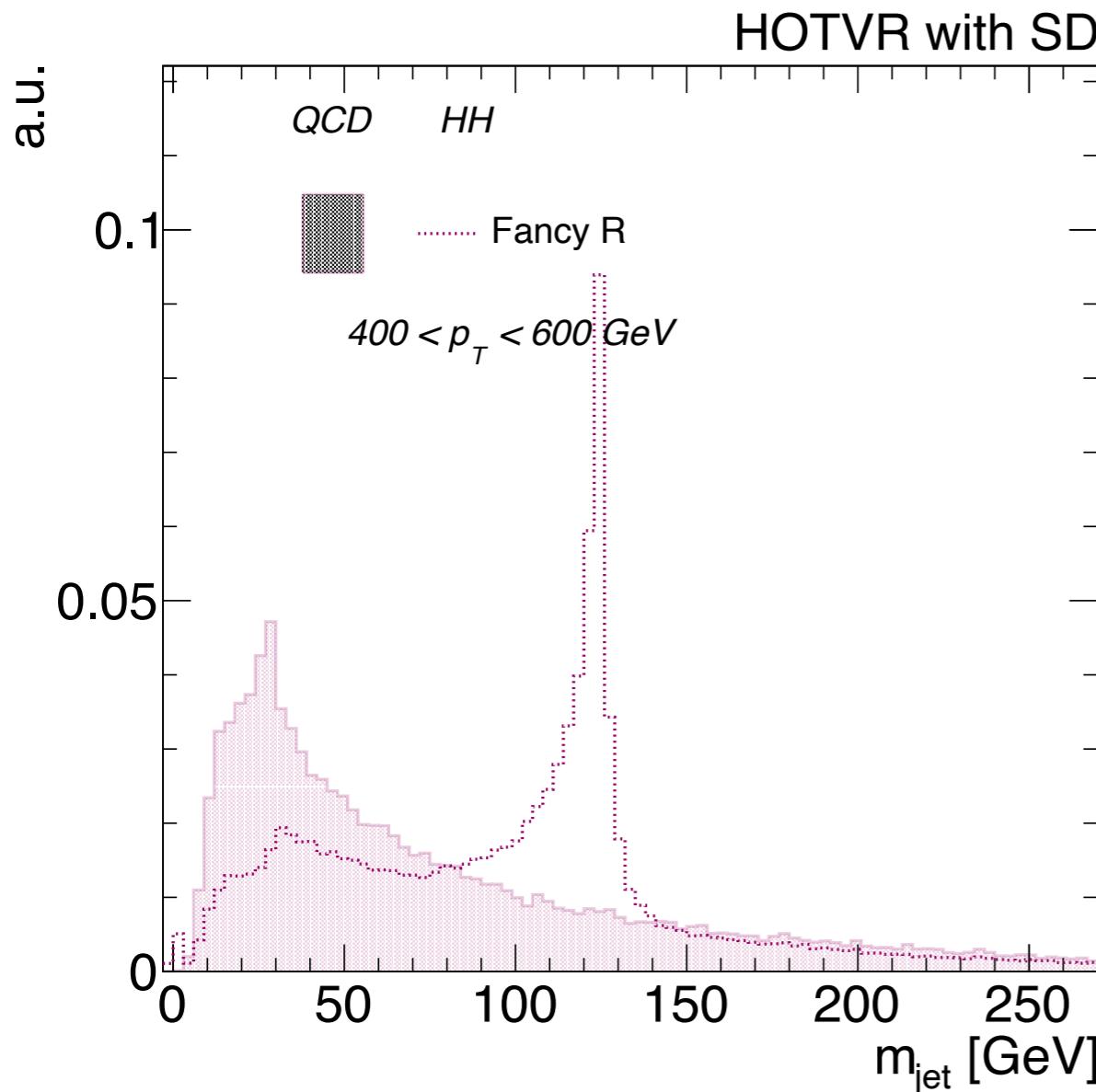
2 and 3-body decays

Idea:

- Combine 2 and 3 body decay
- One function $R_{\text{eff}}(m, p_T)$
- Simultaneous tagging of top, W, Z and Higgs possible



First results



Summary

- Fixed radius clustering has a p_T threshold and a too big radius at high p_T
- Variable R algorithm allow to adapt and overcome these issues
- Working on the inclusion of 2-body decays

