A short remark on cuts in boosted top studies

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Extensive effort has gone into studying how to tag hadronic decays of boosted top quarks.

ATLAS and CMS have both obtained impressive results in getting jetsubstructure techniques to work experimentally.

The core "remark" of these slides:
there may be scope for refinements of other event cuts.

As an example: fully hadronic $t\bar{t}$ search.

"Background:" dijets	"Signal:" $t\bar{t}$
production diagram includes *t*-channel gluon exchange in $qq \to qq$	production diagram involves *s*-channel gluon or *t*-channel top quark.
big enhancement at large Δy for given M_{qq} (large s/t).	$t\bar{t}$ pair usually has more modest Δy.

This is a bit like the situation for a classic dijet resonance search.

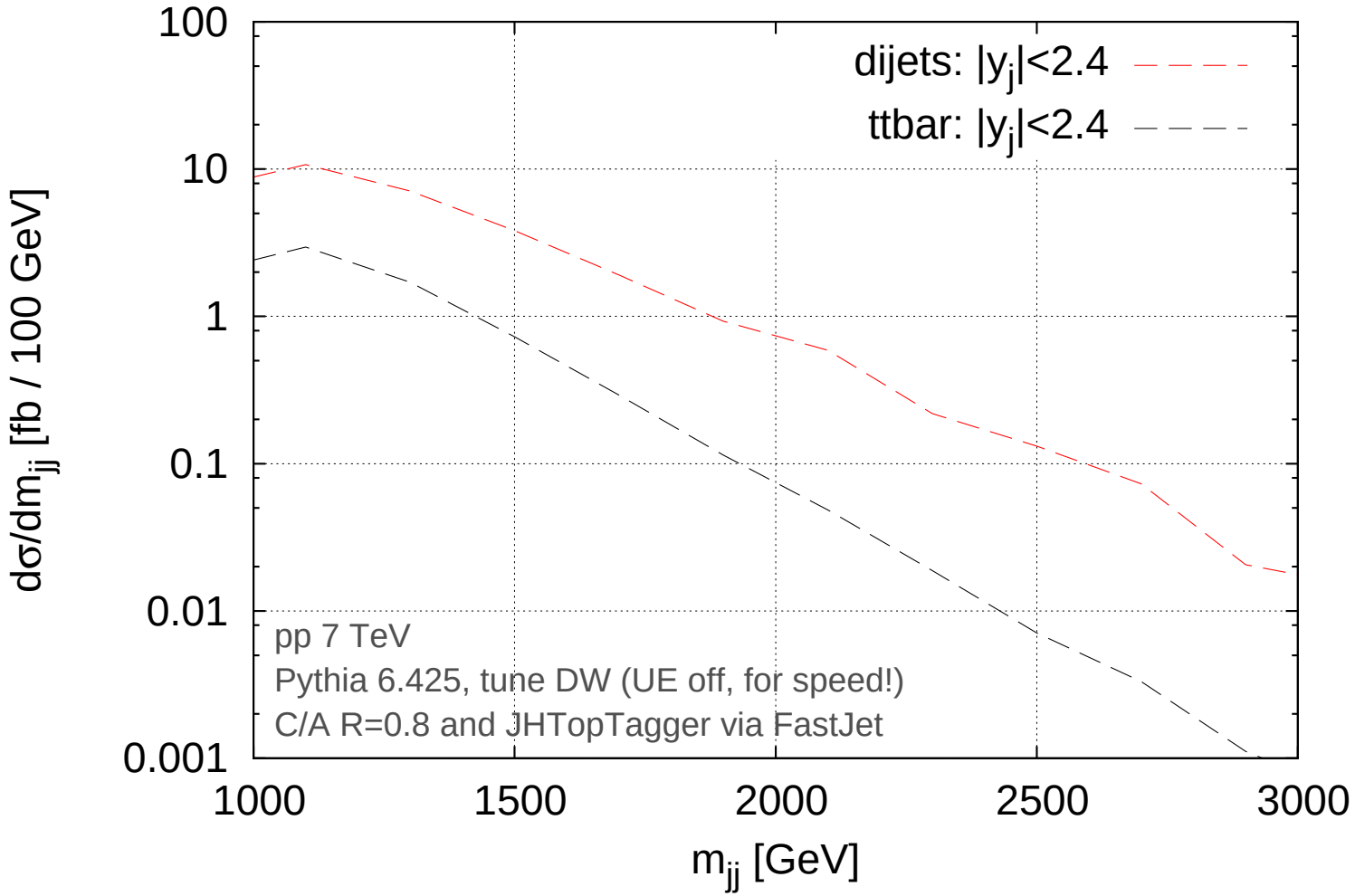
So compare two options:

(a): $|y| < 2.4$, as used so far

(b): $|y| < 2.4$ and $|\Delta y| < 1.3$

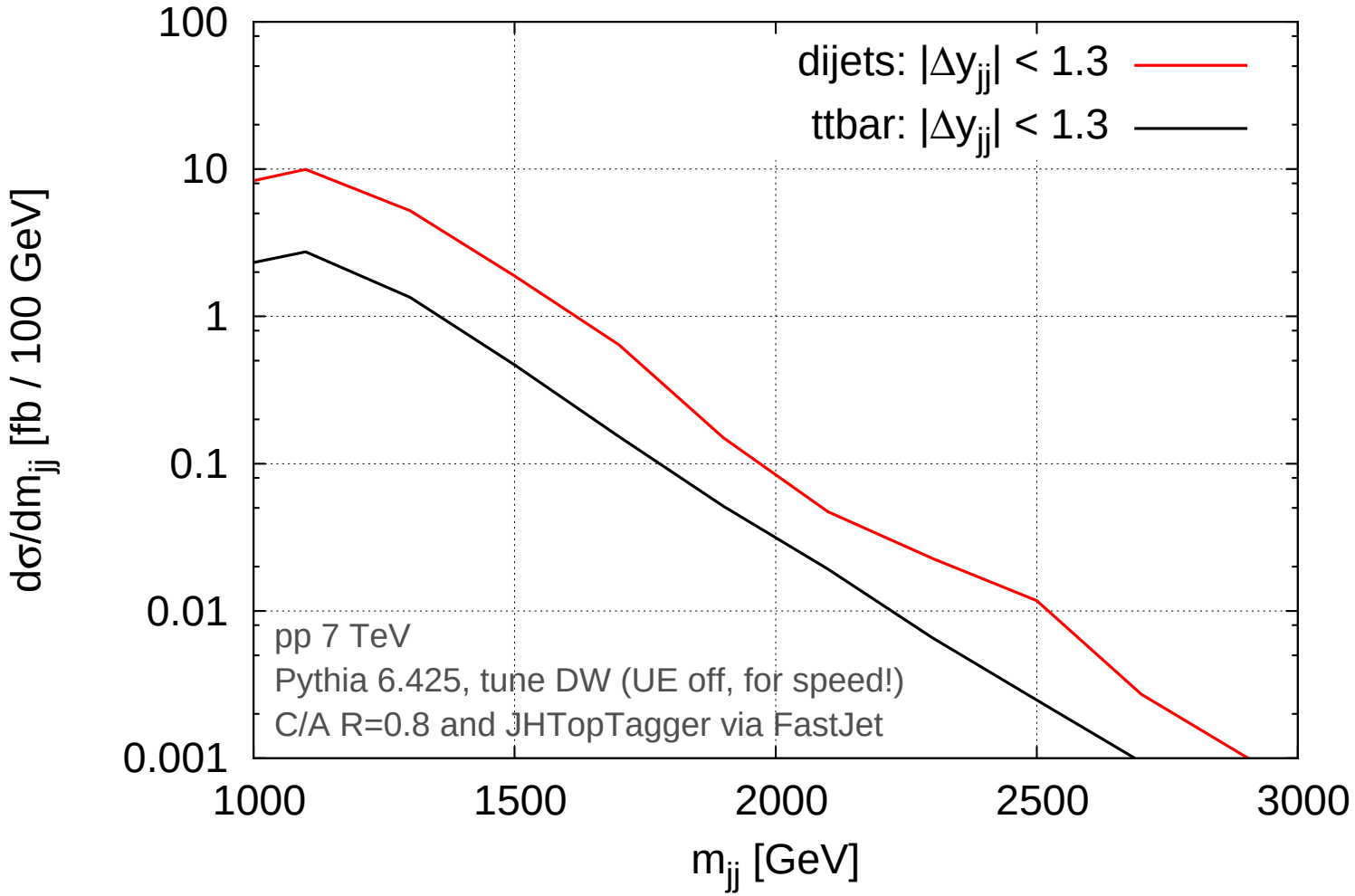
$|\Delta y| < 1.3$ is a standard cut in dijet reconance searches
it might need optimising for $t\bar{t}$ case

Result of quick & rough MC study



Without Δy cut

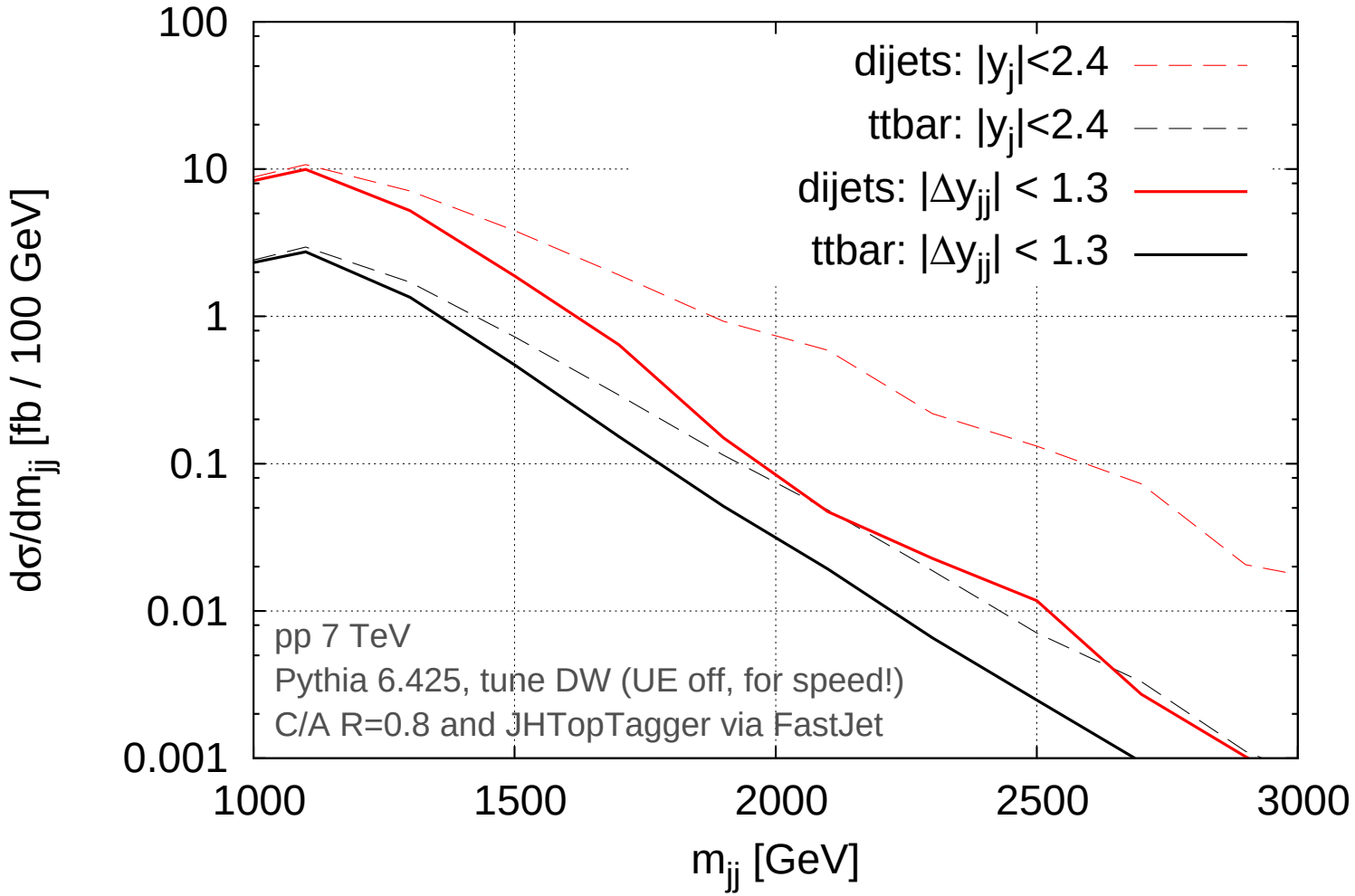
Result of quick & rough MC study



With Δy cut

At high mass:
big improvement in S/B, modest $(20-50\%)$ improvement in $S/\sqrt{B}$

Result of quick & rough MC study



Both options shown together

At high mass:
big improvement in S/B, modest $(20-50\%)$ improvement in $S/\sqrt{B}$