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# Top taggers : an analytical perspective

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We carry out first analytical calculations for top taggers along similar lines to those already performed for the most common W/Z/H taggers. We discuss both the CMS top tagger as well as the Y-splitter method adapted for top tagging. A novel feature of our calculations is the use of triple-collinear splitting functions to describe 1 \to 3 decays. We find that the default CMS tagger is infrared unsafe and propose new variants of the tagger that are more robust theoretically, while giving a near identical performance to the default tagger. We also show that the Y-splitter based methods give rise to a much stronger suppression of the QCD background but that eventual tagger performance also depends crucially on details of the Sudakov form factor for the coloured signal jets. Lastly we compare analytics to Monte Carlo and draw some conclusions about factors influencing tagger performance and stability.

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