FastPV in $\mu + 2\,b$ jets trigger and CSV in $\mu_{\text{iso}} + b$ jet trigger

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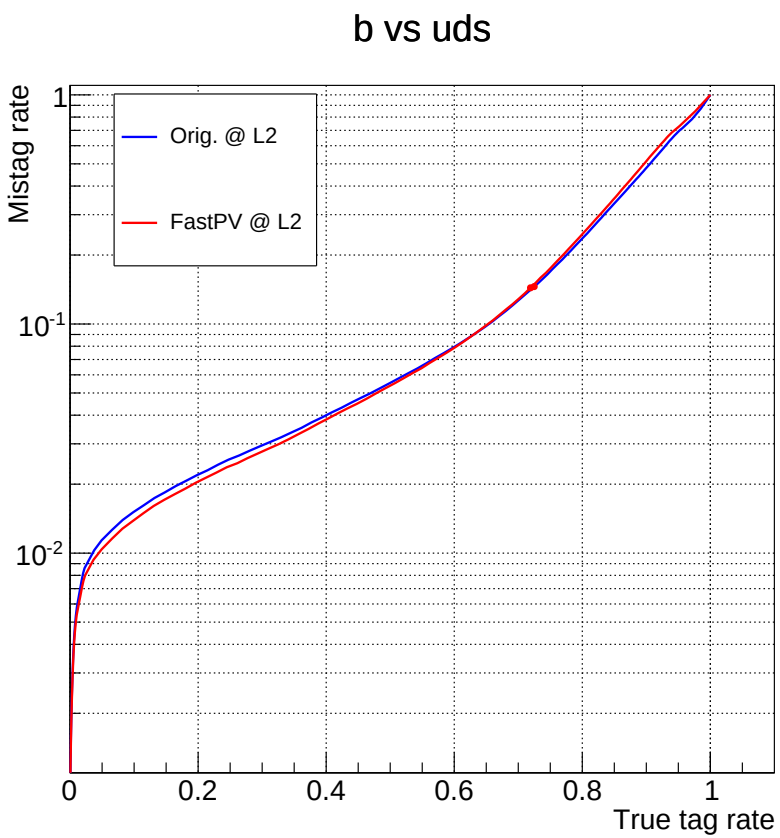
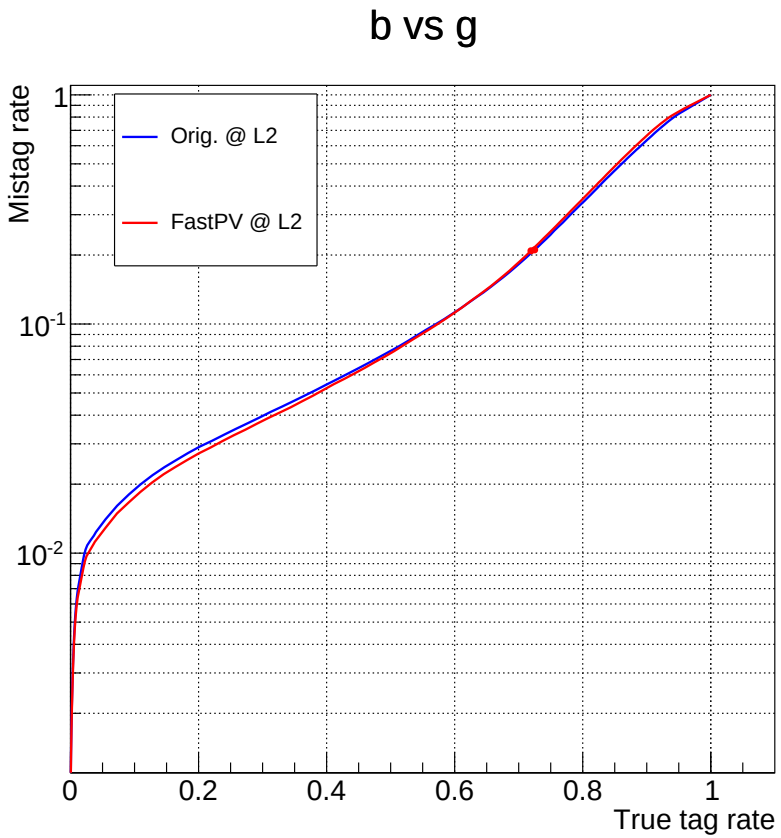
FastPV in $\mu + 2\,b$ jets trigger

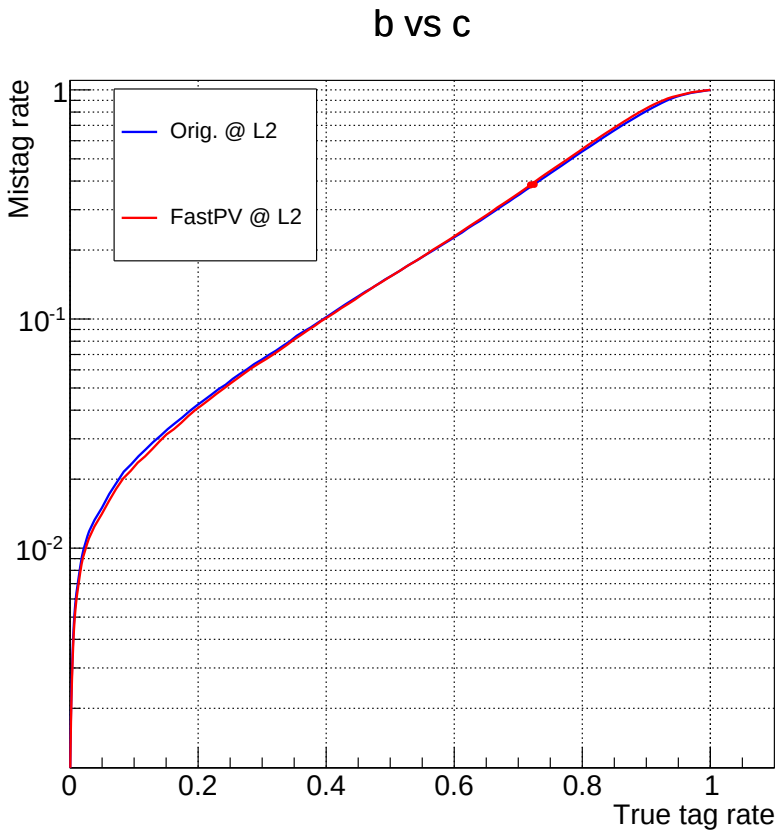
- Modified path `HLT_Mu12_eta2p1_DiCentral_40_20_DiBTagIP3D1stTrack_v8` from `8e33v2` menu to use FastPV
- Since b-tagging is done in two steps, implemented two versions:
  - "FullFastPV" exploits FastPV at both levels
  - "L2FastPV" deploys FastPV at L2 only and runs L3 with pixel vertices
- Online performance is studied with `/TTbar_TuneZ2star_13TeV-pythia6-tauola/Summer13dr53X-PU25bx25_START53_V19D-v1/GEN-SIM-RAW` dataset

Online performance of $\mu + 2\,b$ jets trigger at L2



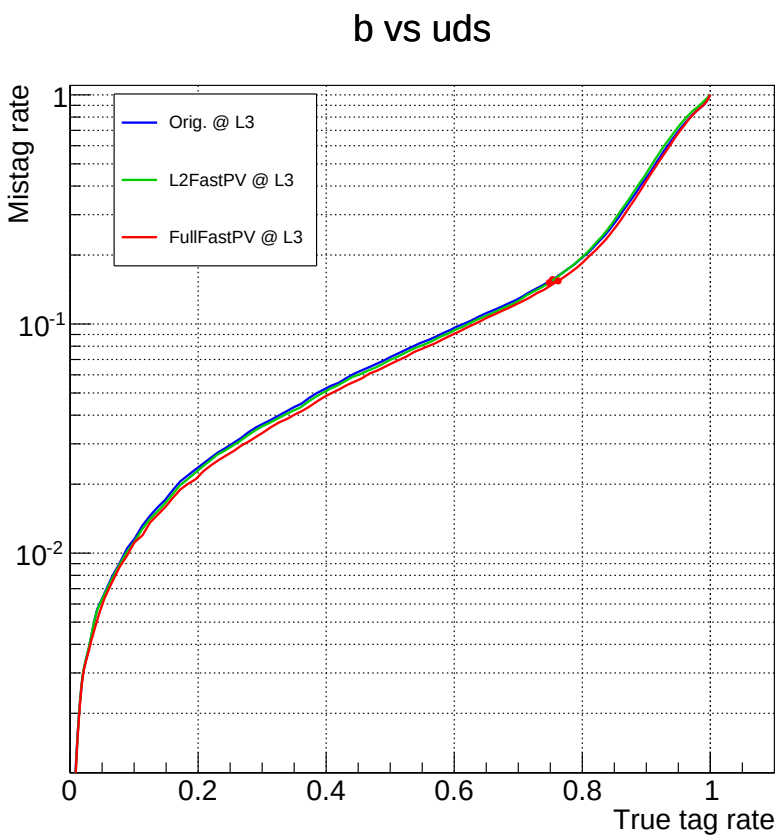


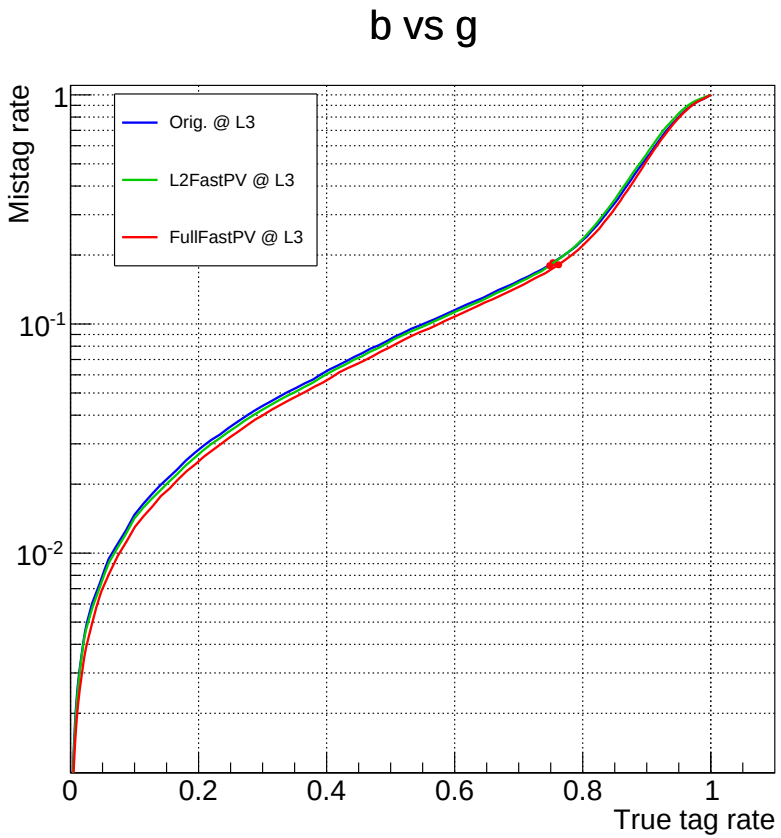
Online performance of $\mu + 2\,b$ jets trigger at L2



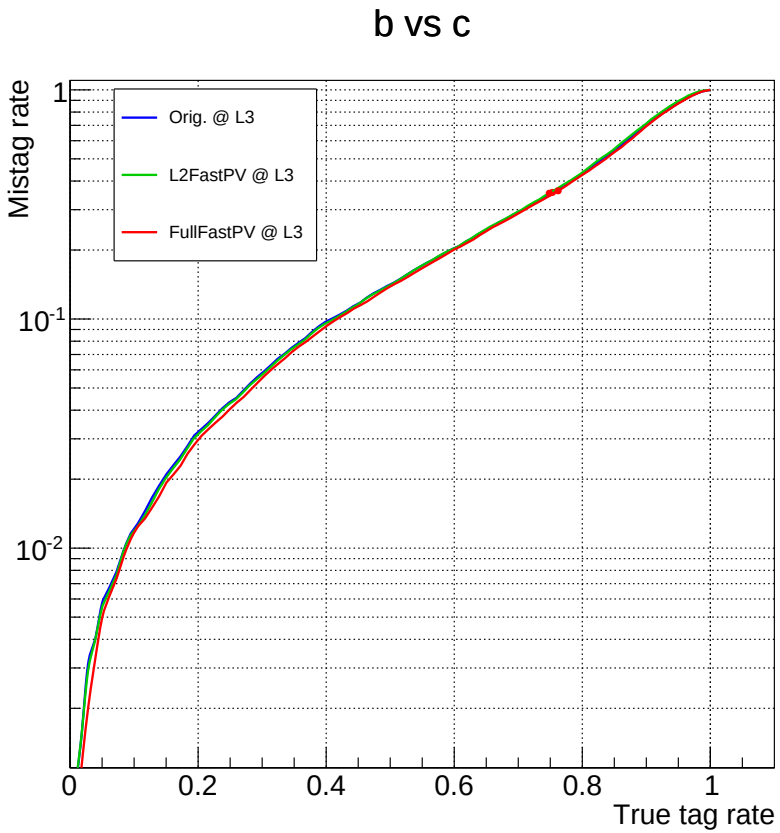
- Marked working points correspond to tag value 2.5

Online performance of $\mu + 2\,b$ jets trigger at L3





Online performance of $\mu + 2\,b$ jets trigger at L3



- Marked working points correspond to tag value 3.5

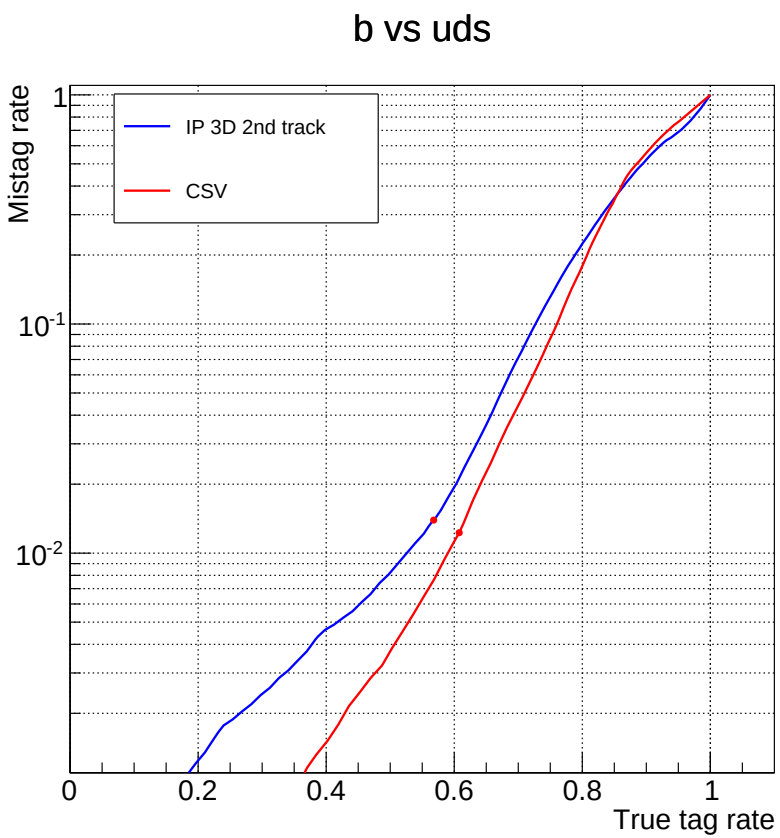
Summary and plans for $\mu + 2\,b$ jets trigger

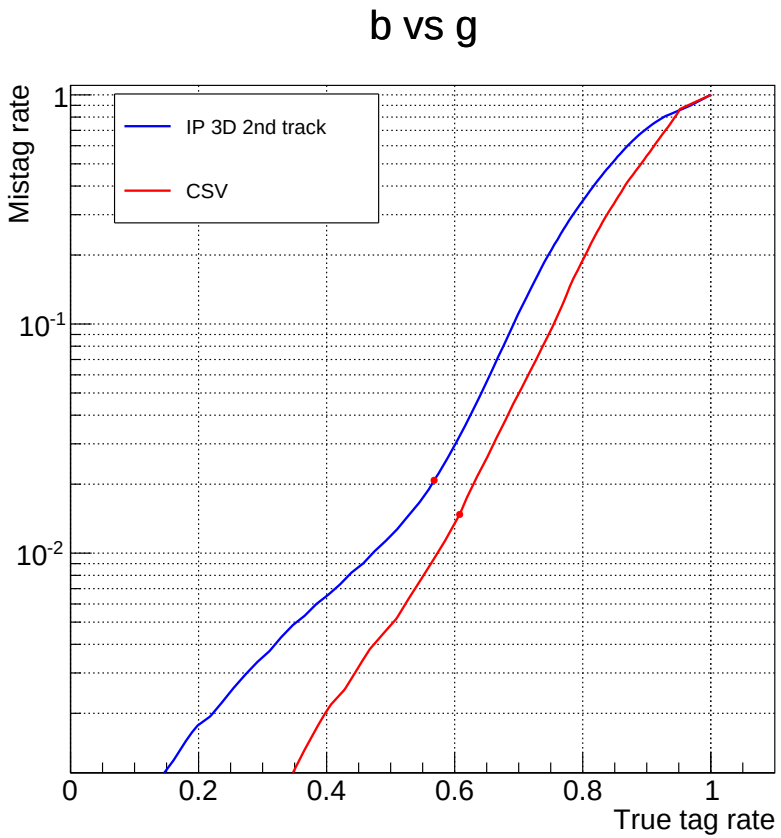
- Online performance is not affected by the switch to FastPV
  - Surprisingly, it is even marginally better at L3
  - **Caveat**: Performance should be checked also with signal process as it might have less jets than $t\bar{t}$ (to be done within PAG?)
- As the next step plan to study timing of "FullFastPV" version w. r. t. the original path

CSV in $\mu_{\text{iso}} + b$ jet trigger

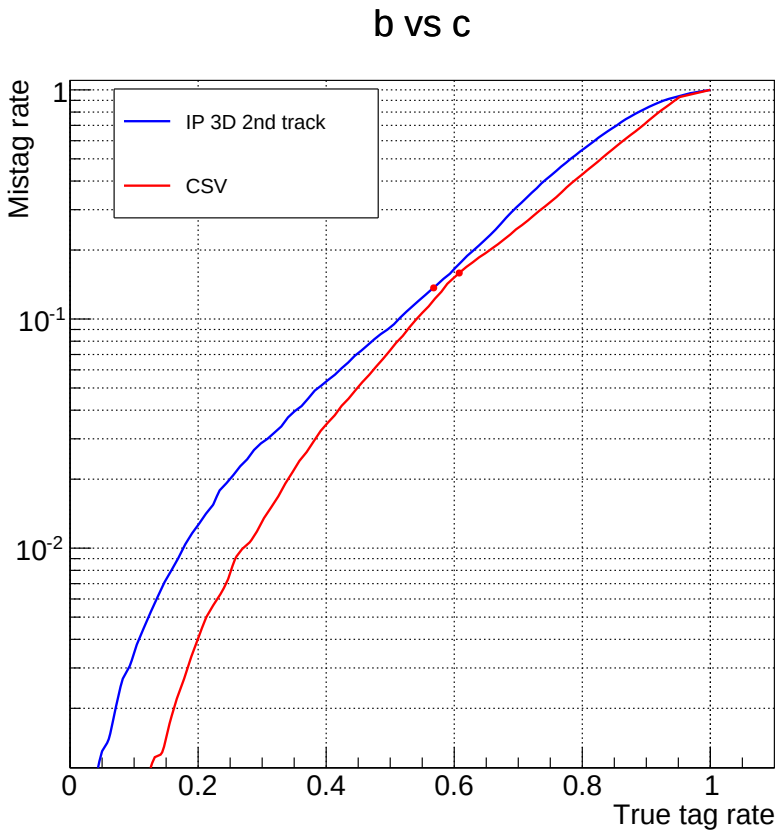
- Started from `HLT_IsoMu17_eta2p1_CentralPFNoPUJet30_BTagIPIter_v4` trigger from the `8e33v2` menu
  - Signal trigger for single-top physics
- Adapted an implementation of CSV b-tagging by M. Mait and D. Konstantinov
  - Originally developeded in early 2012 for an older version of the trigger
- Studied online performance with the same 13 TeV $t\bar{t}$ dataset

Online performance of $\mu_{\text{iso}} + b$ jet trigger





Online performance of $\mu_{\text{iso}} + b$ jet trigger



- Marked working points correspond to tag values:
  - 3.3 for IP-based algo
    - The cut applied in the actual trigger from 8e33v2 menu
  - 0.7 for CSV algo
    - Illustrative, not optimised value

Summary and plans for $\mu_{\text{iso}} + b$ jet trigger

- Significant gain in performance observed
  - Anyway, it is out of question if single-top triggers should be switched to CSV: they must
- Plans
  - Study of timing
    - Would like to postpone until early 2014 when Muon and EGamma POGs are ready with leptons
  - Optimisation of working point(s)
    - Will give the first try when signal samples for TSG studies are ready (I'm preparing a request through Top PAG)
    - The real study will be performed in 2014 with improvements from POGs incorporated
  - Check dedicated online CSV
    - When ready...
  - Study performance of the b-tagging fragment with different pile-up
    - Can be done now. Is it interesting?
  - Check impact of switching to DA vertices
    - Consider also performance w. r. t. offline objects
    - Can be done now