Performance of IP-based and CSV b-tagging fragments in $\mu_{\text{iso}} + b$ jet trigger as a function of pile-up

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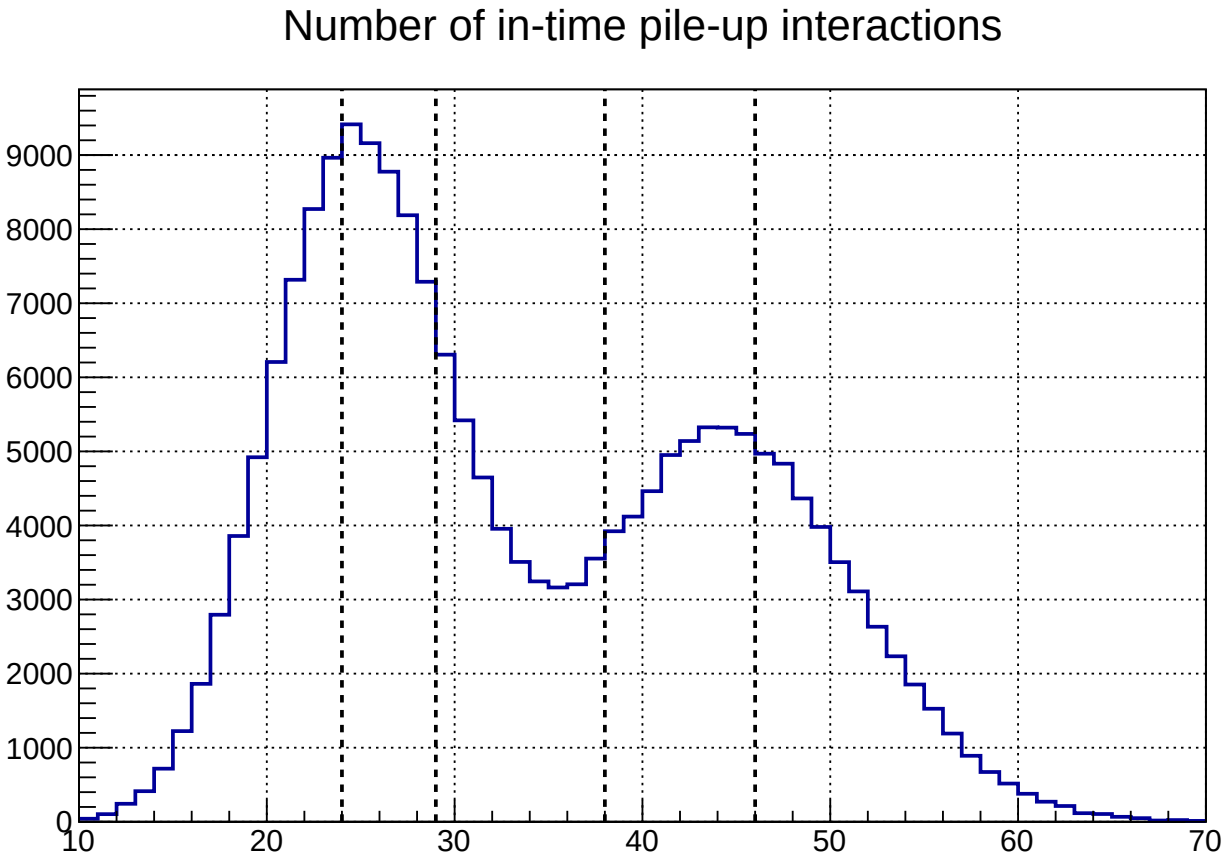
22 Oct 2013

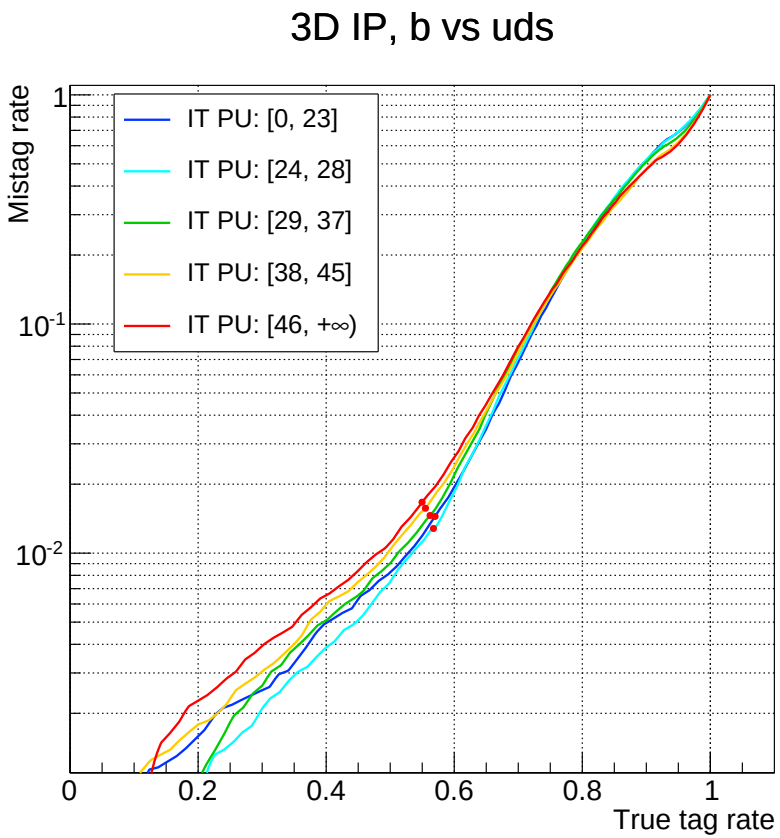
Outline

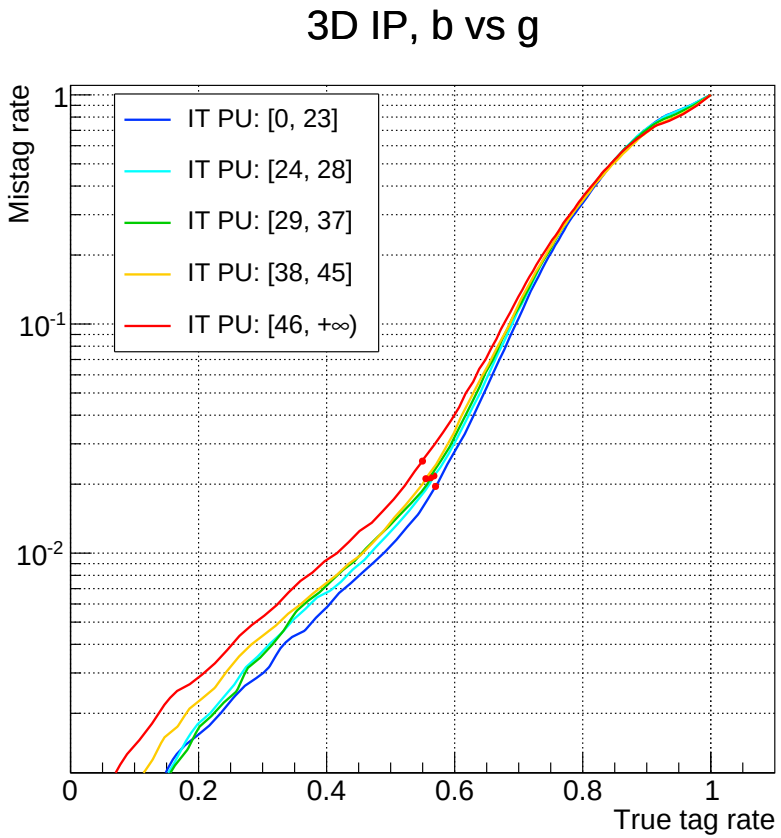
- Studied dependence of performance on pile-up with `HLT_IsoMu17_eta2p1_CentralPFNoPUJet30_BTagIPIter_v4` trigger from the 8e33v2 menu and its CSV version
- Used $t\bar{t}$ datasets
  - `/TTbar_TuneZ2star_13TeV-pythia6-tauola/Summer13dr53X-PU25bx25_START53_V19D-v1/GEN-SIM-RAW`
  - `/TTbar_TuneZ2star_13TeV-pythia6-tauola/Summer13dr53X-PU40bx25_START53_V19D-v1/GEN-SIM-RAW`
- Considered five ranges in number of in-time pile-up interactions
  - Selected in such a way that each range contain a similar number of events

Compined distribution over in-time pile-up

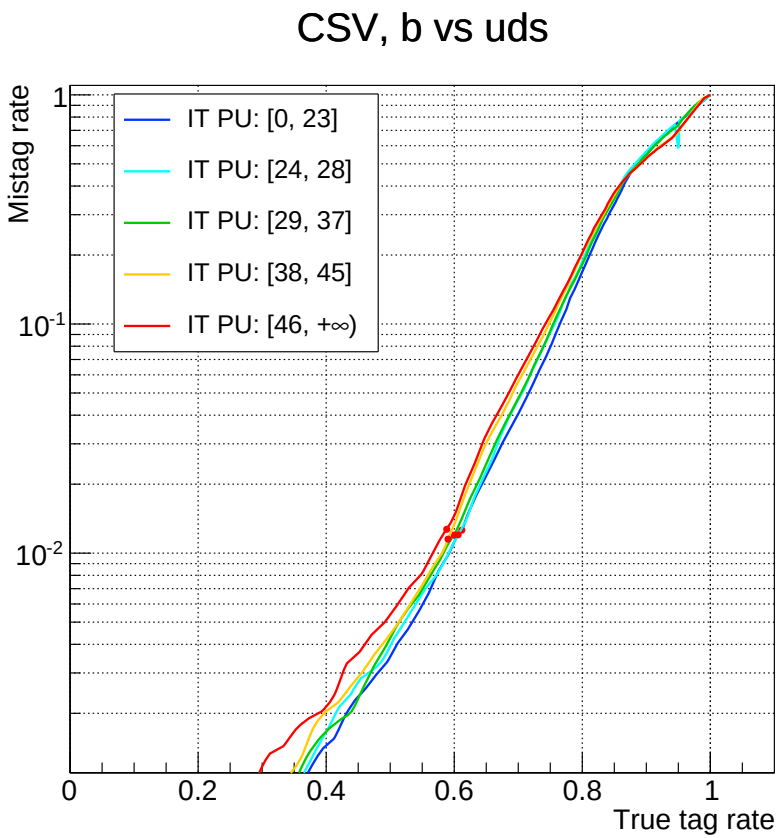


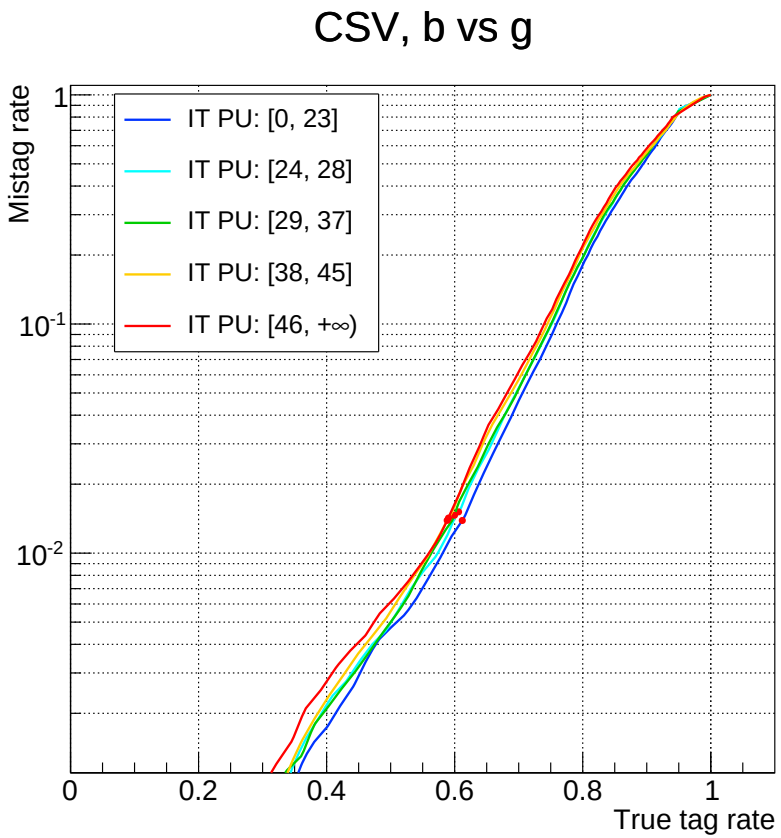
Online performance of IP-based *b*-tagging





Online performance of CSV *b*-tagging





Discussion

- For a given tag rate near the working point, both algorithms demonstrate a comparable increase of the mistag rate of $\sim 50\%$
- For a given mistag rate, degradation of performance is more visible for the IP-based algorithm
- Using the same working point for all pile-up conditions leads to a degradation in tag rate in both cases, but the CSV algorithm demonstrates a stable mistag rate
  - It suggests the rate of the CSV trigger will increase less at high pile-up

BACKUP

Discrimination of b and c jets