



Feasibility of High- p_T Single Electron Trigger with TRD L1

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Questions are

- Beauty signal electron statistics and momentum reach
- Trigger rate with certain single electron trigger algorithm
- Rejection factor
- Feasible momentum threshold

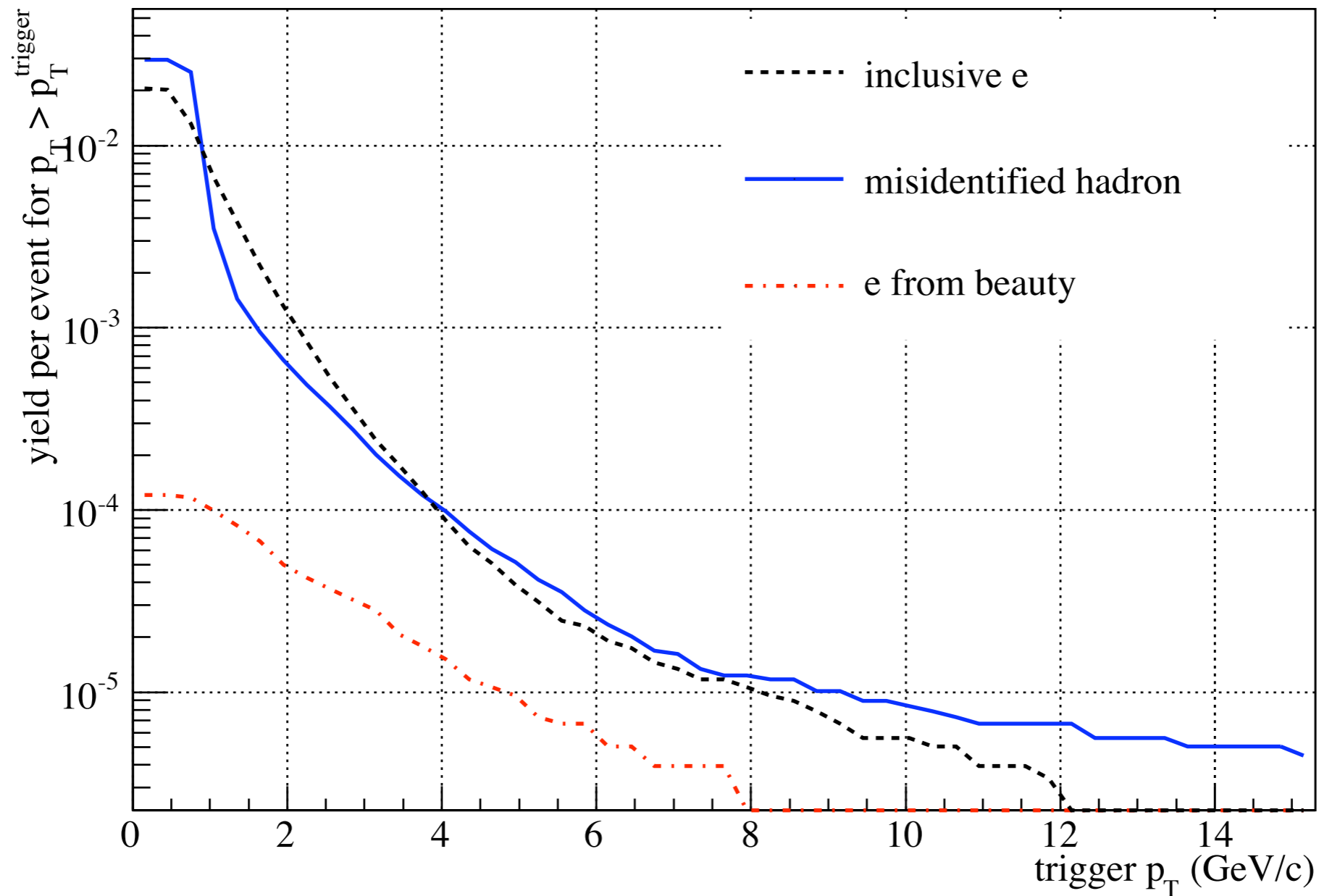
Data Sets and Track Selection

- Data Set:
 - p+p @ 10 TeV
 - ~ 2M minbias events produced with v4-16-Rev-06
 - Track selection to be close to online tracker
 - $|\eta| < 0.9$, 8 TRD super modules
 - TRDpidQuality ≥ 4
 , where TRDpidQuality is # of tracklets to used for PID
 - used TRDpid(NN method) for PID
- ➡ caution: tracks are still TPC prolonged Tracks!

Main Background Sources

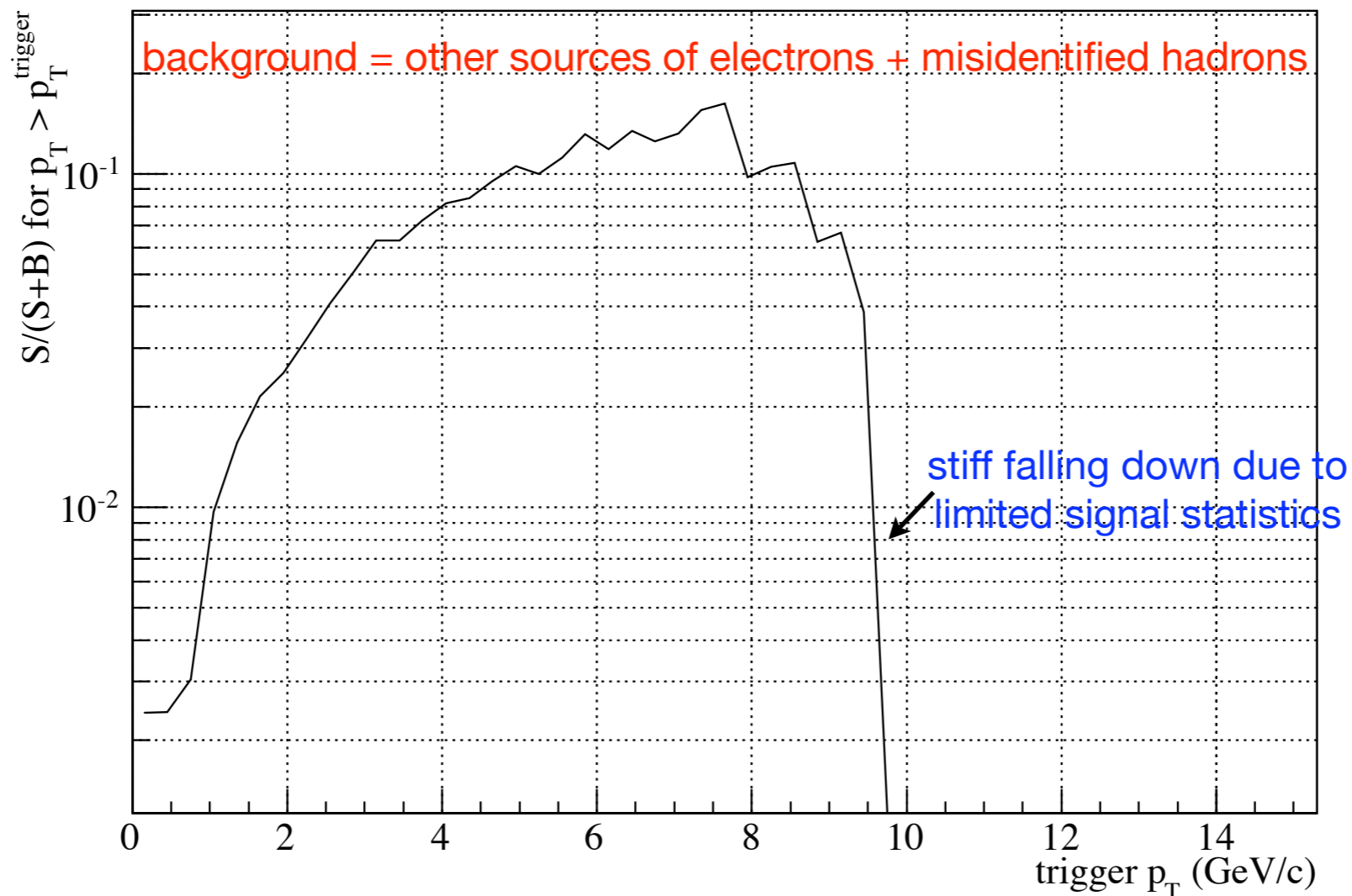
- Misidentified hadrons tracks
- Fake tracks from combination of clusters from different primary tracks
- True electron tracks due to conversion of photons before TRD

p_T distribution of signal and background



- using mc p_T
- TRD geometrical acceptance and offline tracking efficiency is fold in

Signal/(Signal+Background) Vs. p_T



- at 6 GeV, roughly S/B is 0.1, and event rate is about 5×10^{-5}
 - if we consider maximum 100 kHz, it will give $5 \times 10^{-5} \times 100 \text{ kHz} = 5 \text{ Hz}$
 - signal rate $\sim 5 \text{ Hz} * 0.1 = 0.5 \text{ Hz}$
- there are many other real factor which increase online trigger rate
 - fake tracks
 - online PID rejection factor

➡ have to be studied with online emulator and emulator developing in progress

Additional Suppression by HLT

- Suppression of background tracks additionally by HLT
 - hadron rejection - use offline TRD pid method
 - conversion electrons, fake tracks - ITS, TPC track matching, pixel hit requirement
- ➔ available bandwidth to HLT and output rate to DAQ will be questions
- Other remark:
 - conversion electrons can be signal for the other physics

Outlook

- From offline analysis, high p_T electron trigger with TRD L1 looks promising but we need to check with online emulator

BACKUP

