# Trigger validation

- Electron Trigger without DC_Road : Doesn't distinguish between electrons and positrons
  - E_PCal > 60 MeV AND E_ECal > 300 MeV AND HTCC signal in the same sector
- Electron Trigger with DC_Roads
  - Same as Electron trigger AND An In-bending Road in the same sector
- Positron Trigger with DC_Roads
  - Same as Electron trigger AND An Out-bending Road in the same sector


- Electron without DC_Roads is validated using the random trigger run:
  - Offline events were reconstructed, and checked whether the trigger bit for the electron in the given sector is set
- Electron/Positron with DC_Roads is validated using a run with "Electron without DC_Roads" trigger:
  - Electrons/Positrons are reconstructed in offline, Made sure the "e- Without C_Road" bit is set, and then it is checked whether the "e-/e+ with DC_Road" bit is set fot the given sector.
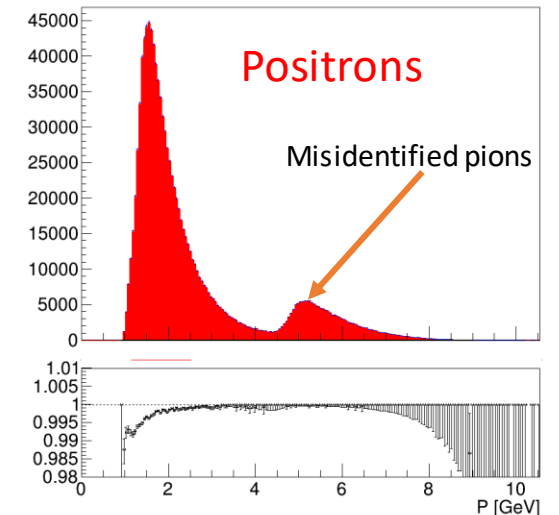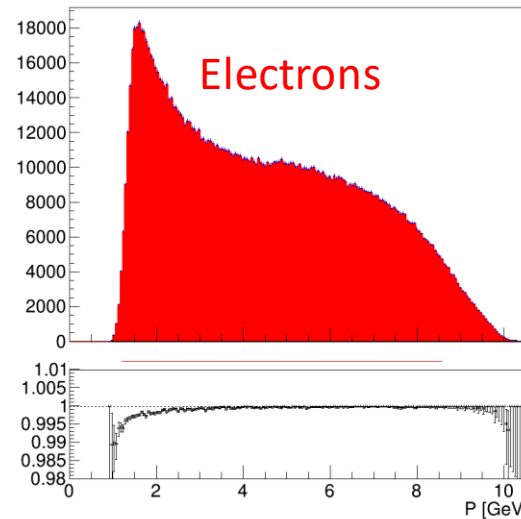
# Validation of e-/e+ With DC_roads

Run 16122
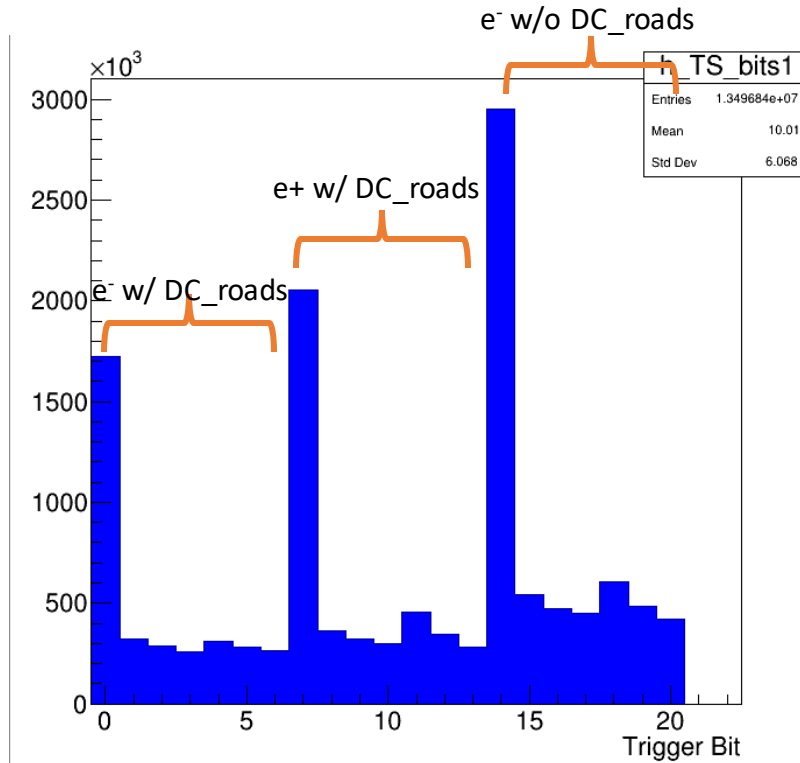


Selected e-(+) with following conditions
E_Cal > 300 MeV,
nphe > 2,
2000<=|Status|<4000,
NoDC_bit is set for the corresponding sector
PID = 11(-11)

Then it was checked, if the corresponding trigger bit is set?



Electrons



Positrons

Misidentified pions

The DC_Road efficiency is 99%+ across the whole momentum range
At smaller momenta (below 2 GeV), it gets lower, but still higher than 99%
Equally good for both: electrons and positrons

# Electron-trigger without DC_Roads: Using positrons



No cut on E_tot
E_Tot > 300 MeV
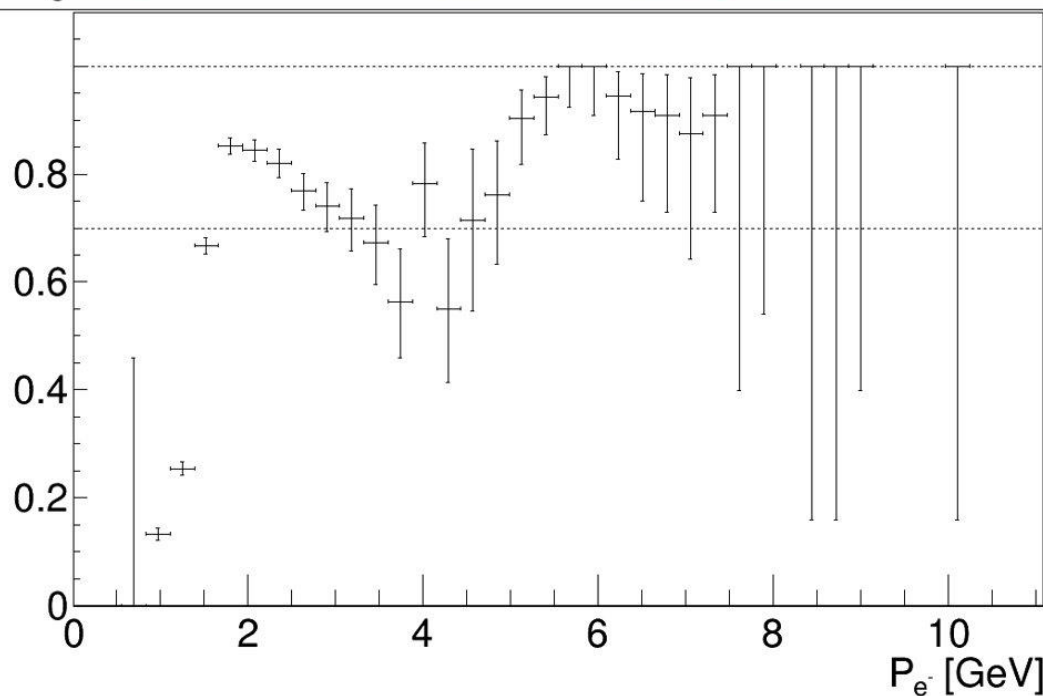No cut On E_Tot but e- trigger bit is set
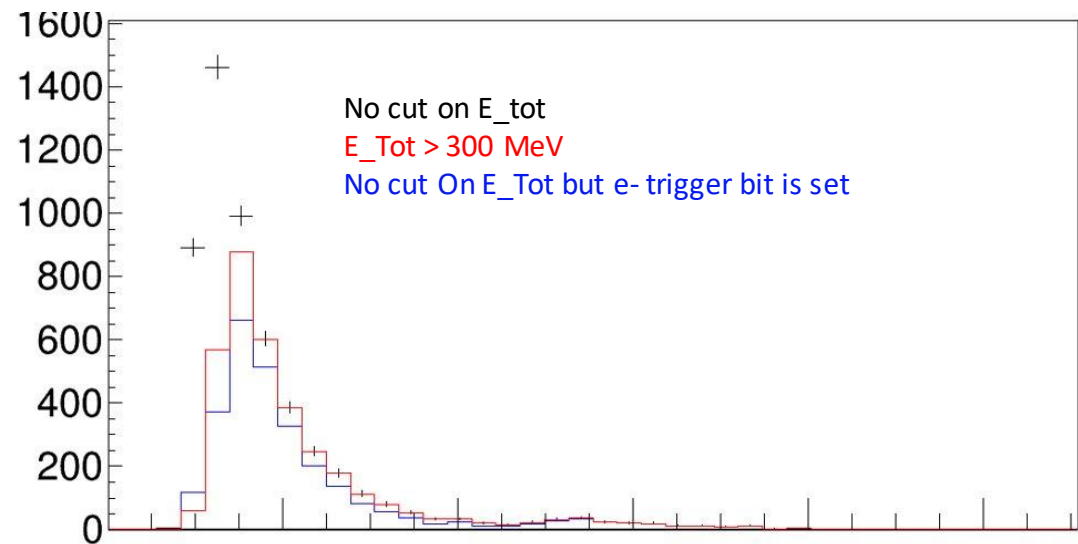
Runs: 16123, 16124 and 16125

Initial selection:
* Pid == -11
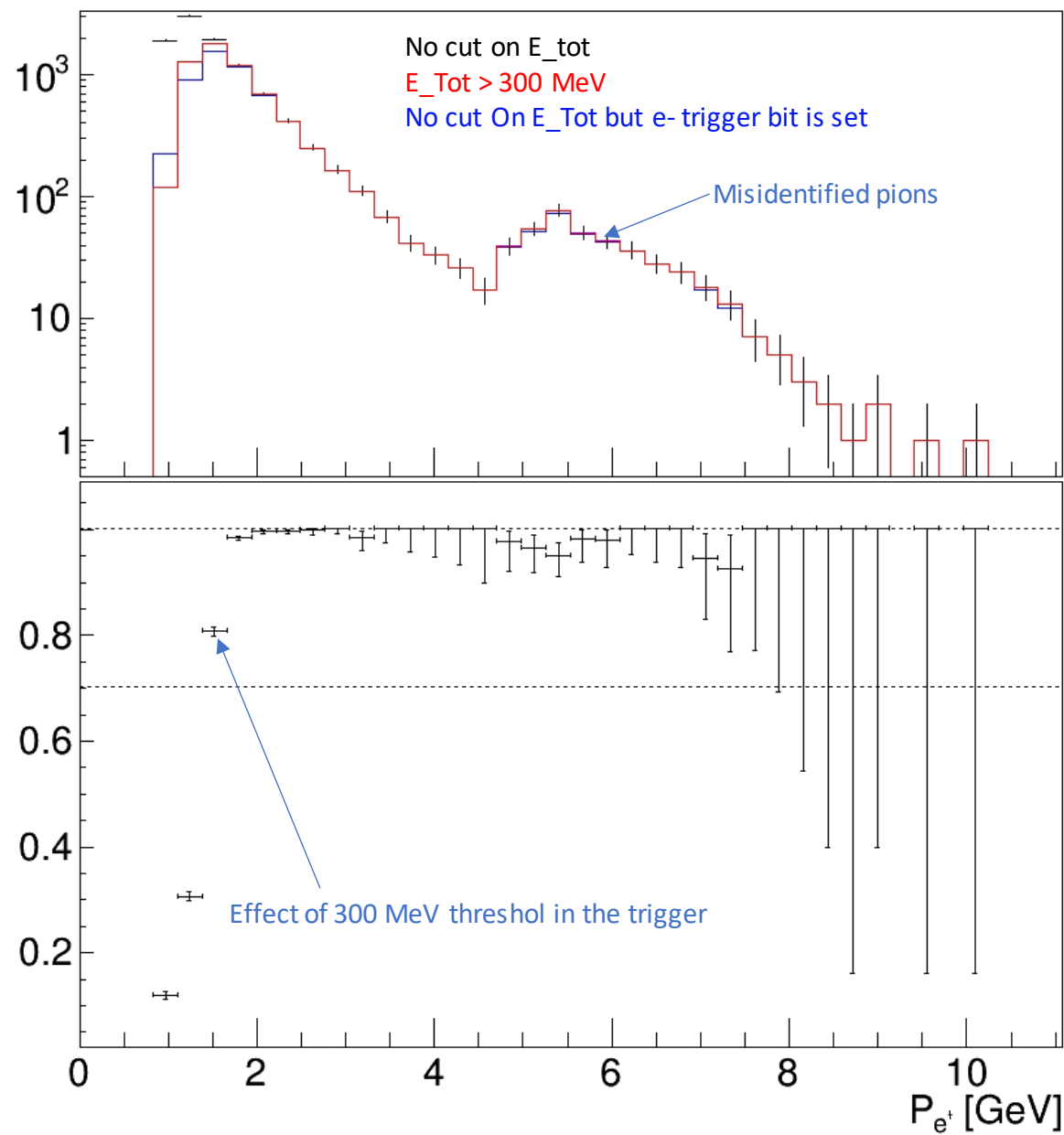* basic fiducial cuts
* 2000 <=|Status|< 4000

20% - 30% inefficiency in between 2GeV to 5 GeV.

Thanks to Ben!, who browsing those failed events, first noticed that HTCC sector is different from PCal/ECal sectors.

In the trigger all those should be in the same sector, so there is a good reason why the trigger bit is not set for those events.

# Requiring same sectors for HTCC,PCal, EC_in



No cut on E_tot
E_Tot > 300 MeV
No cut On E_Tot but e- trigger bit is set

Misidentified pions

Effect of 300 MeV threshol in the trigger

$P_{e^+}$ [GeV]

Same thing, but with an additional condition that HTCC sectot, PCal sector and EC_inner sector of the reconstructed electron should be the same.

At 1.75 GeV the efficiency is already very close to 100%

# Electron-trigger without DC_Roads: Using electrons



No cut on E_tot
E_Tot > 300 MeV
No cut On E_Tot but e- trigger bit is set
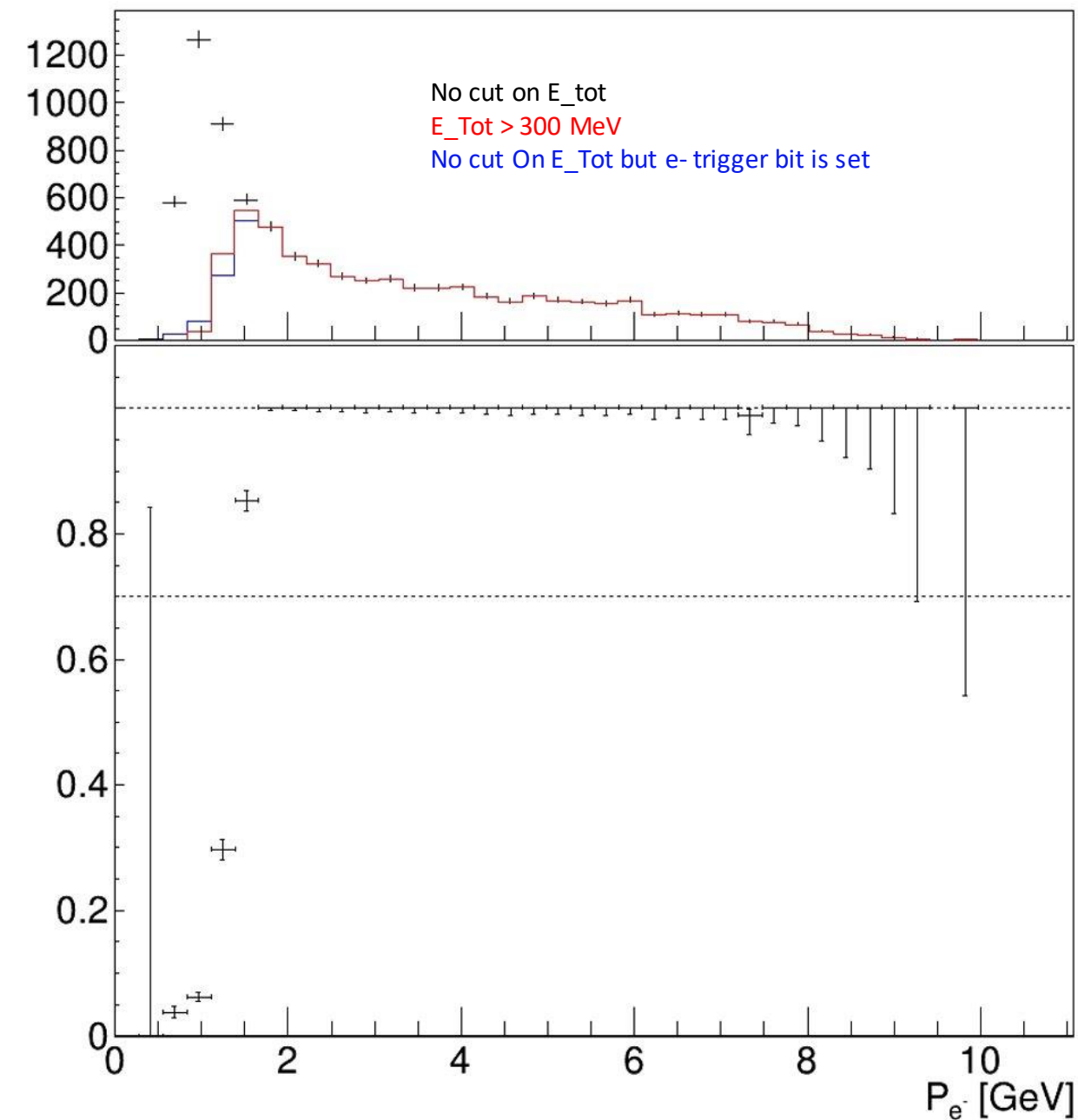
Initial selection:
* Pid == -11
* basic fiducial cuts
* 2000 <=|Status|< 4000
* HTCC, PCal and EC_in have the same sector