Measurement of electrons from heavy-flavor decays in p-p and Pb-Pb collisions with the ALICE EMCAL

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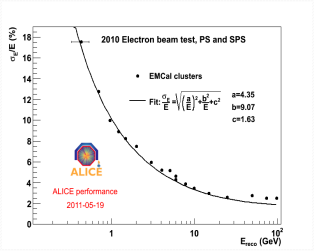
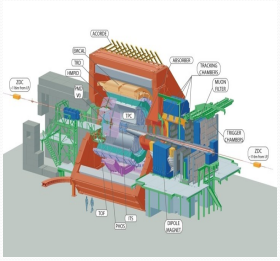
(1) Motivation

- Heavy flavor (charm and beauty) production is an important probe of partonic energy loss in hot and dense QCD
- Heavy flavor production has been studied by measuring electron decay from charm and beauty (heavy flavor decay electrons)
- High p_T electron measurement is very important to understand heavy flavor energy loss mechanism
- Strong suppression of heavy flavor electron production has been observed up to 10 GeV/c in Au+Au collisions at $\sqrt{s_{NN}}$ = 200 GeV at RHIC
- ALICE-EMCAL measures the high p_T heavy flavor decay electrons
  - fast trigger
  - good energy resolution up to 100 GeV

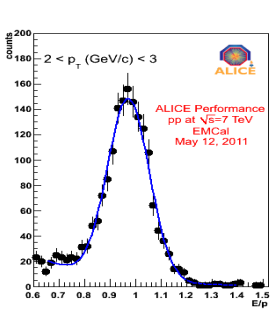


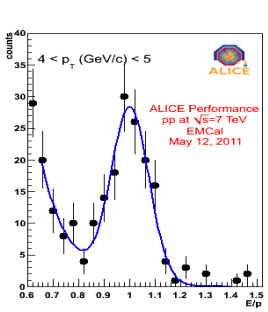
(2) p-p Analysis

- EMCal ; $|\eta|<0.7$ & $80<\phi<120$ (2010)
- Analyzed proton-proton collisions at 7 TeV (2010) , $\int Ldt = 1.35nb^{-1}$



- Electron identification
  - TPC ; measure momentum & dE/dx
  - EMCal ; measure energy
- Electrons deposit full energy in the EMCal
  -Energy & Momentum matching (E/p ~ 1)
- variation in E/p due to
  - EMCal response
  - bremsstrahlung in upstream material
  - E/p backgrounds : charged hadrons

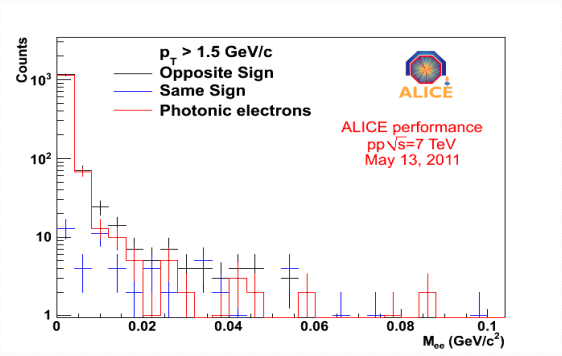




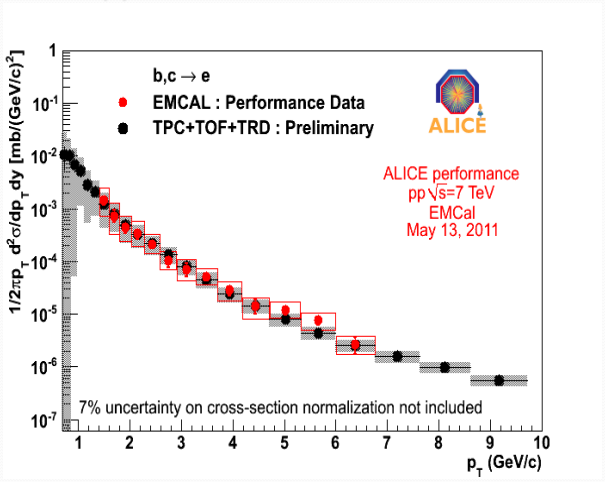
- Sources of observed electrons
  - Signal ; Heavy flavor decay electrons
    - semil-leptonic decay of charm and beauty
  - Backgrounds (Photonic electrons)
    - photon conversion, Dalitz decay
- Heavy flavor decay electrons can be obtained by statistically subtracting the photonic electron from inclusive electron yields

$$N_{e^{HF}} = N_e - N_{e^{\gamma}}$$

- Measurement of photonic electron yield
  - First electron candidate via TPC dE/dx & EMCal E/p
  - Second candidate via TPC dE/dx, opposite charge sign
  - Select invariant mass M_{ee} ~ 0
  - Combinatorial background via same sign pairs.



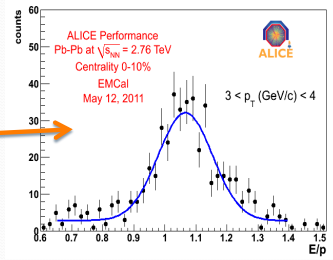
(3) Result

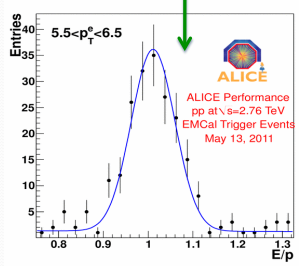


- Heavy flavor decay electron cross section measured with EMCal is consistent with TPC+TOF+TRD (Preliminary) result

(4) Summary & Outlook

- Measured heavy flavor decay electron production in proton-proton collisions at √s = 7 TeV by the ALICE-Electromagnetic Calorimeter
- Consistent with measurement via TPC+TOF+TRD
- Measuring electrons in Pb-Pb collisions at 2.76 TeV for the nuclear modification factor of heavy flavor decay electrons
- EMCal provides a fast trigger in 2011 => higher p_T measurement acceptance ; 80 < Φ< 180





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