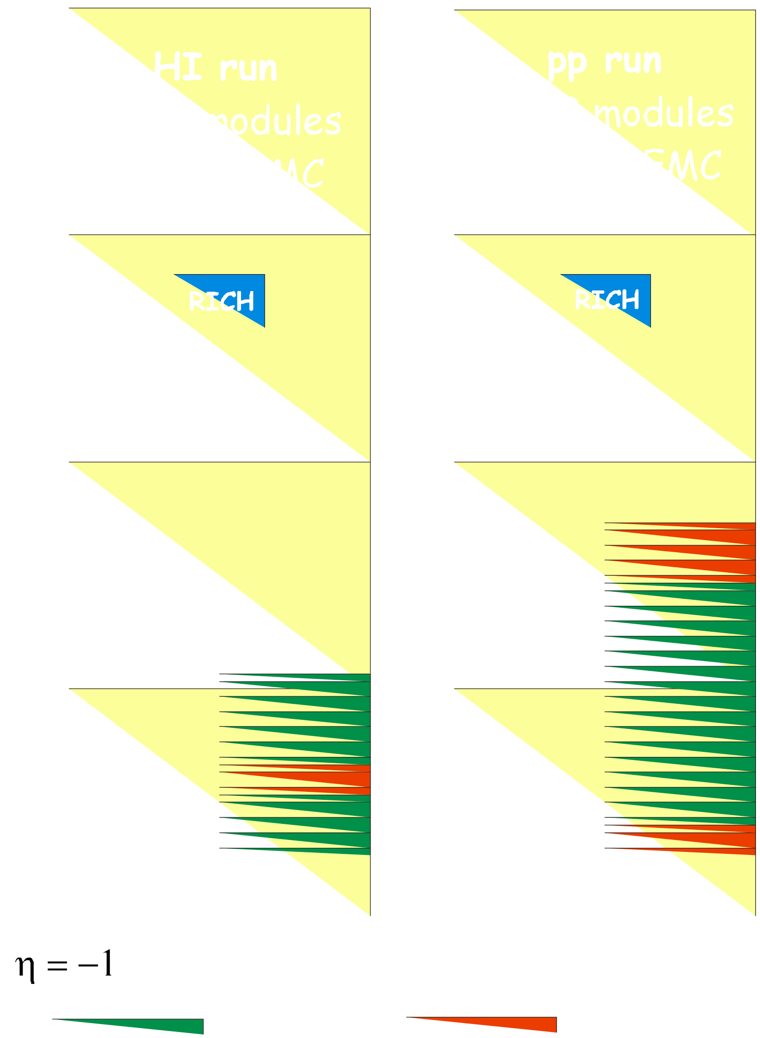
EMC analysis update

- Just to remember …
- What we have done
- What we still need to do
- Plans for the future

Just to remember …

- Heavy-ion run
  - 12 (10) modules instrumented
  - 480 (~400) towers
    - $(\Delta\eta, \Delta\phi) \sim (1.0, 1.2)$
  - No SMD most of time
    - Last week of HI only
- pp run
  - 22 (16) modules instrumented
  - 880 (~640) towers
    - $(\Delta\eta, \Delta\phi) \sim (1.0, 2.2)$
  - SMD
  - High-tower trigger



STAR
Alexandre A. P. Suaide
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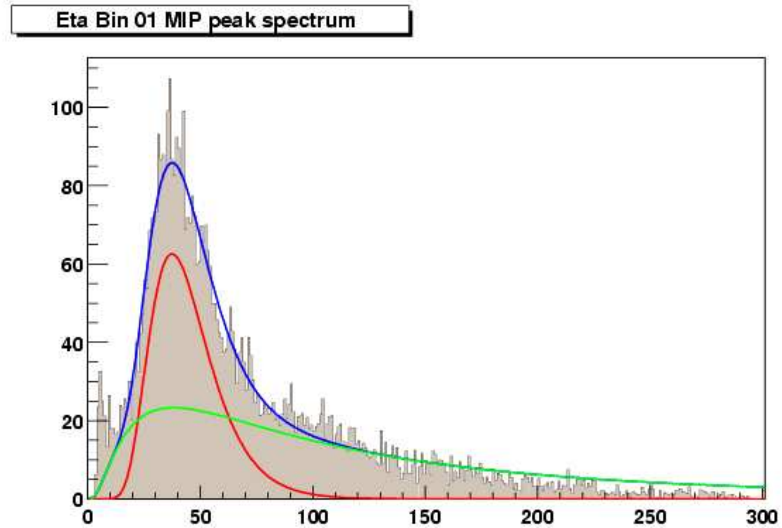
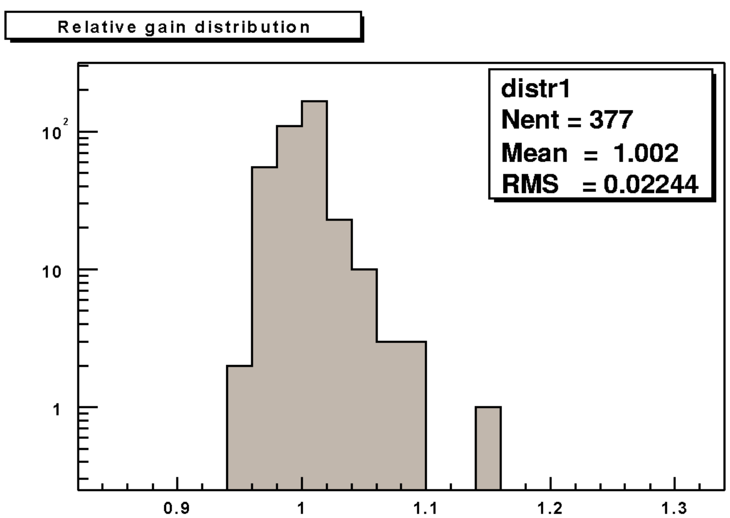
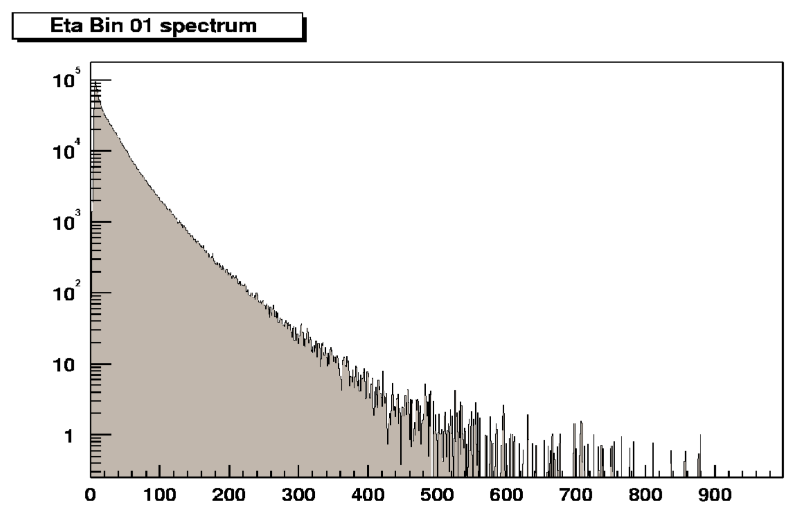
AuAu pre-calibration using MIP's

- AuAu data
  - Towers equalized within 5%
  - 200 k minibias data
- MIP candidates
  - p>1.5 GeV/c
  - Track isolated in a 3x3 patch



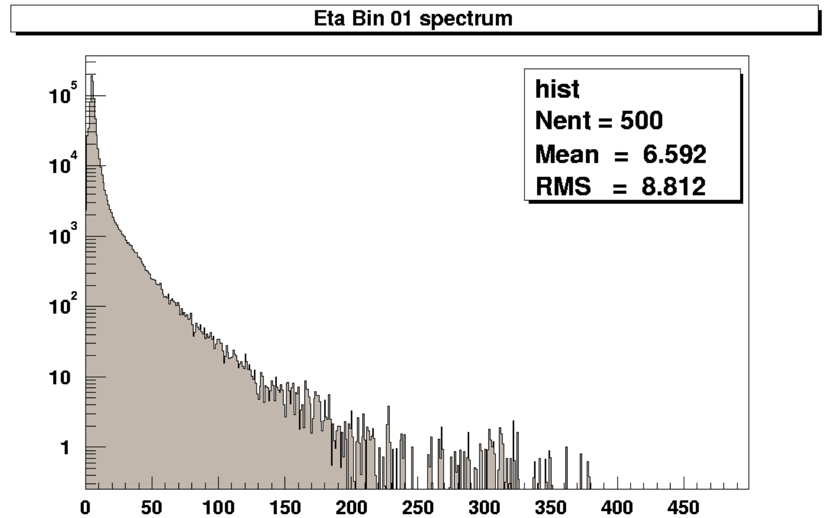


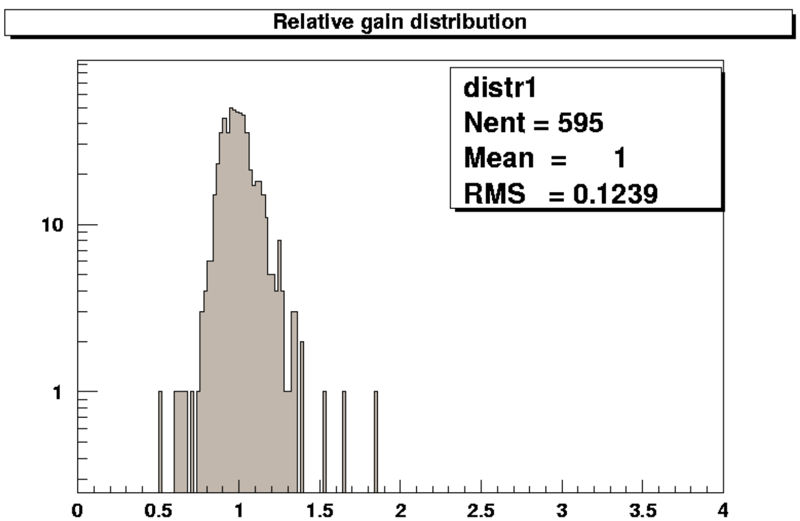


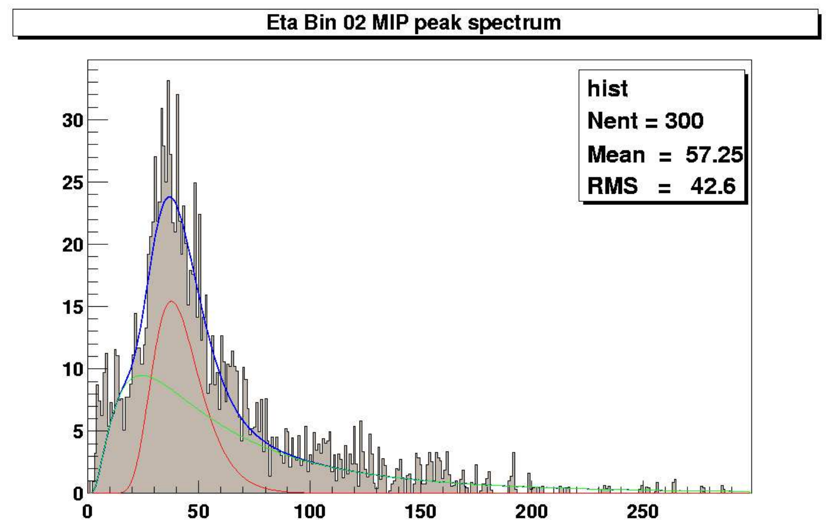
500 ADC ~ 4 GeV

pp pre-calibration using MIP's

- Main problem is statistics
  - 1.5 M pp minibias events
- Relative gain between towers
  - Larger variation than AuAu
    - New patch had different gain than previous one
    - Trigger issue







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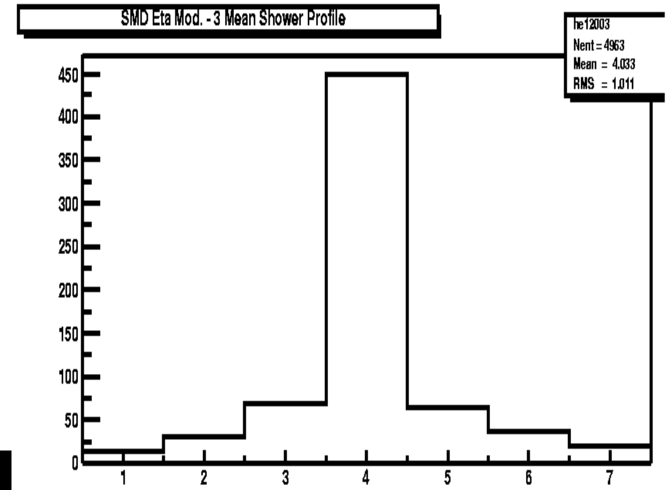
SMD – what is alive?

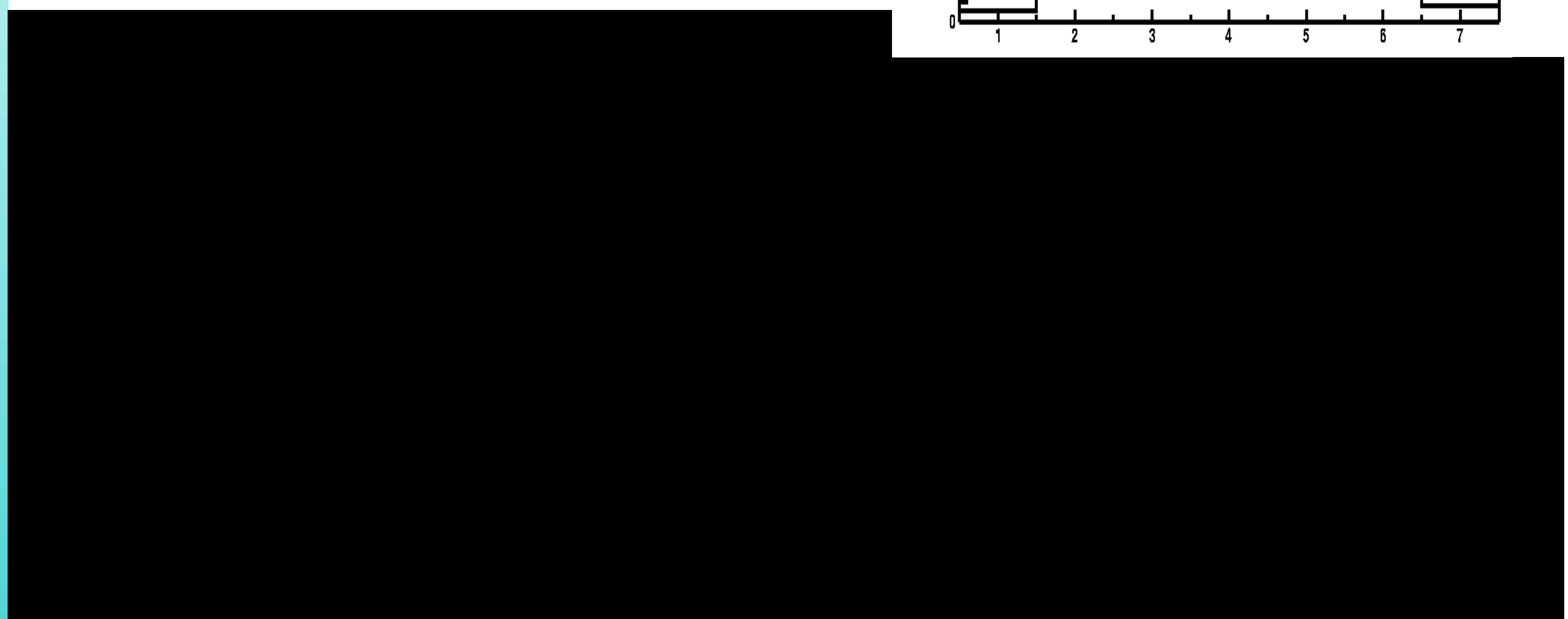
Steve and Oleg

- SMD-η
  - 3 ½ modules didn't work
- SMD-ϕ
  - 4 modules didn't work
- Noise problem for some events
  - Bump in the ADC spectrum
    - Stuck bit?
    - Only one run

SMD - clusters

- *SMD-η*
  - *Two widths because strip width changes at η=0.5*

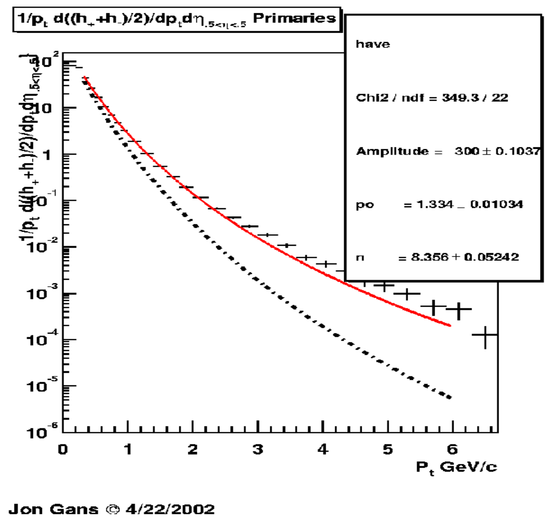


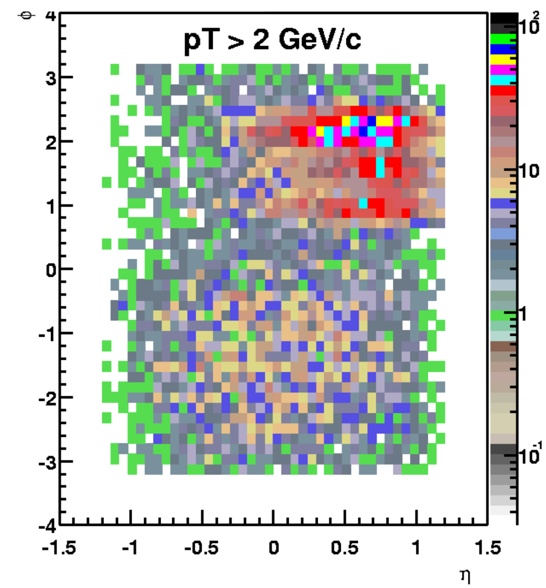


High tower trigger performance

Jon, Mirko and Steve

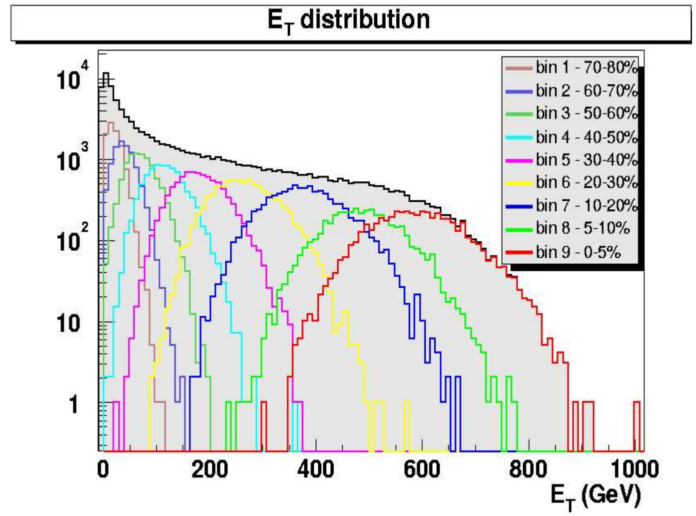
- Threshold set at 2 GeV (1-3 GeV)
  - Big enhancement at high p_t tracks (~30 at 6-7 GeV/c)
  - Enhancement at away side tracks (back-to-back jets?)
  - Trigger bias is being investigated

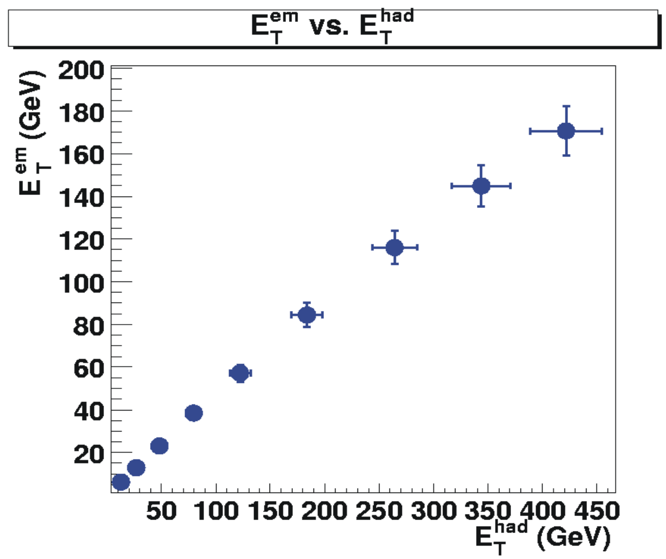


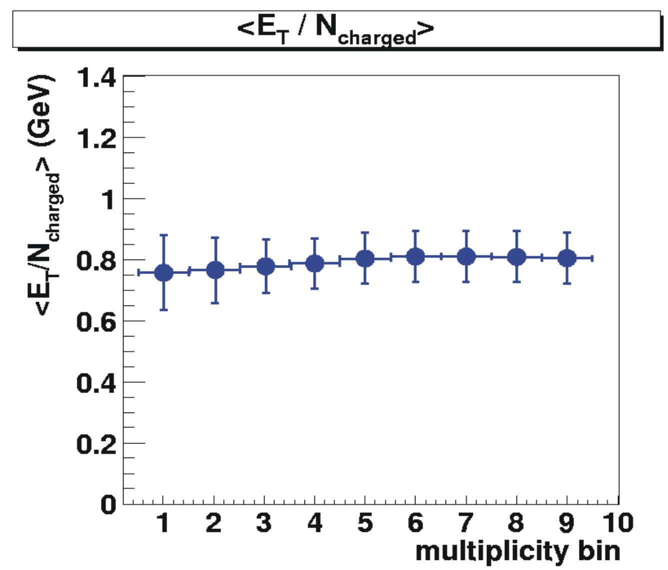


Physics going on… Transverse energy

- Transverse energy analysis
  - Electromagnetic transverse energy
    - Use TPC tracks to subtract hadronic energy deposited on EMC
  - Hadronic transverse energy from TPC
  - Understanding systematic errors
    - ~ 9% for hadronic and ~7% for EM
  - Draft before DNP?

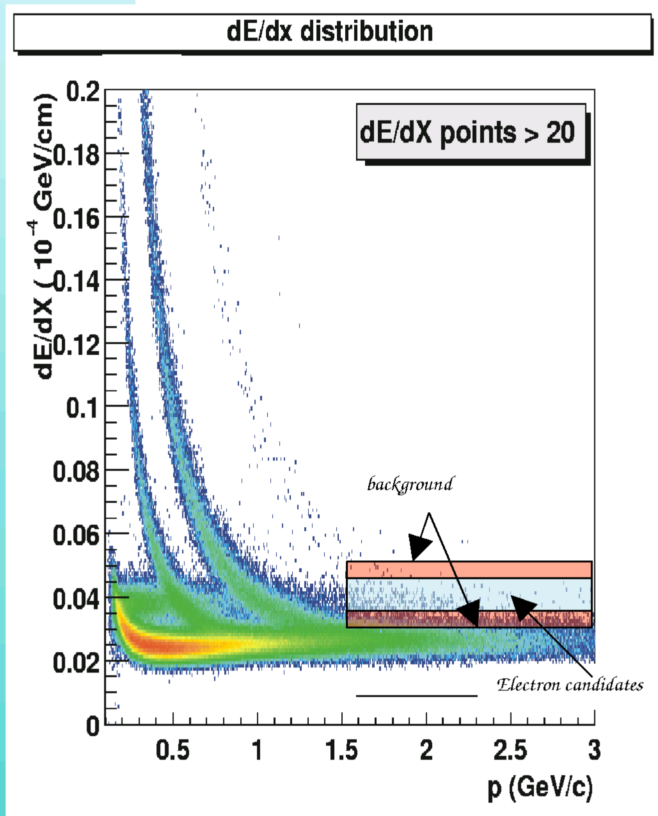


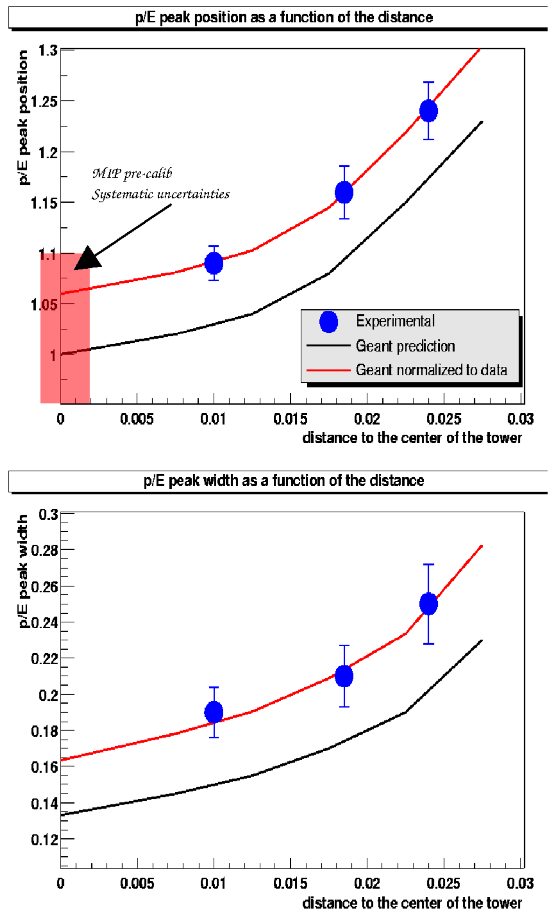


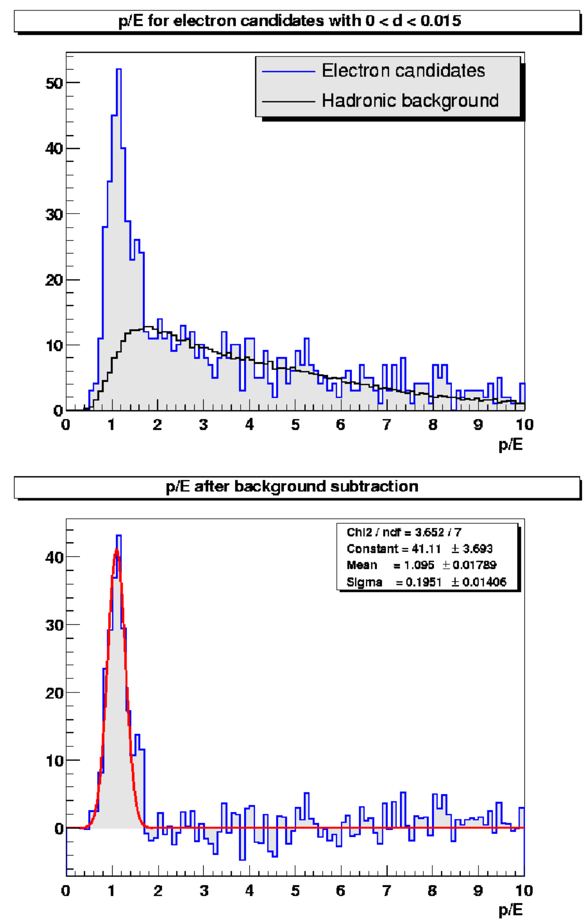


Electrons in AuAu

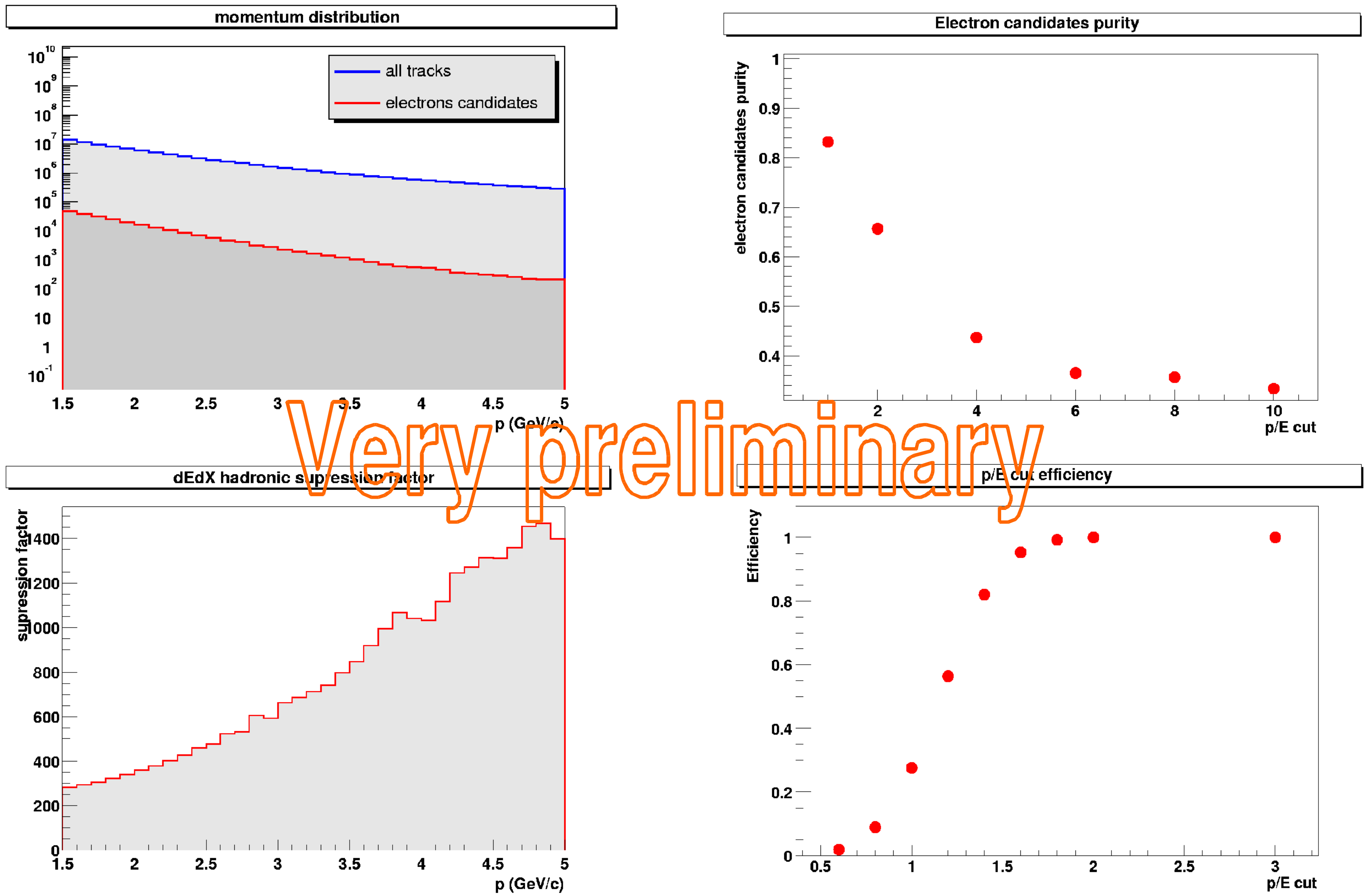
- ? Select electrons using TPC dE/dX
  - ? 1.5 GeV/c < p < 5 GeV/c
  - ? nPoints dE/dX > 20
  - ? Same isolation cuts as MIP







Electron/hadron suppression with TPC dE/dX and EMC towers



dE/dX efficiency still being investigated

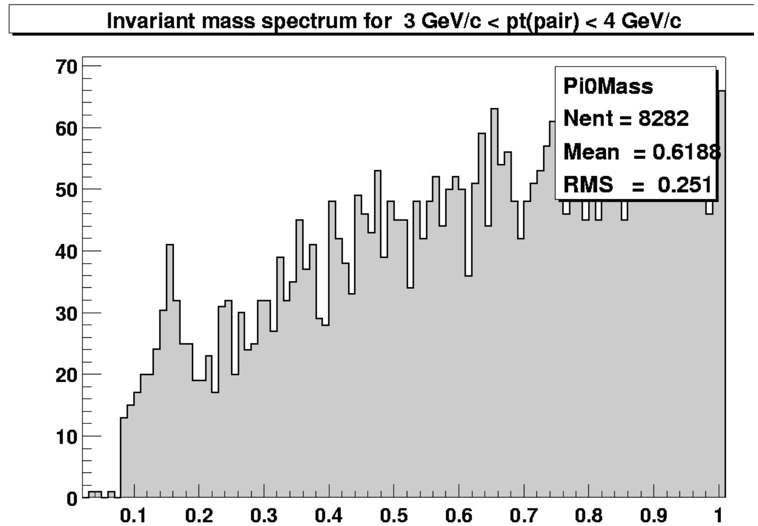
π^0 reconstruction

- π^0 reconstruction with towers only
  - No SMD during mostly of HI run
    - π^0 reconstruction more difficult
    - Lower cluster position resolution
    - Smaller p_t range
      - Position resolution of tower is limited for high-p_t π^0
    - 2 towers clusters
- π^0 reconstruction with pp data
  - SMD present
    - Still needs better understanding of uniformity and gain
  - High tower trigger
    - Improve statistics
  - Low EMC occupancy
    - Smaller background

π^0 reconstruction (invariant mass spectra)

Steve Trentalange
and **Dylan Thein**
for pp

- π^0 in AuAu events
  - No SMD
    - Large background
    - Limited momentum range
- π^0 in pp events
  - SMD present
  - Peak position is in right place within 1-3%
    - MIP pre-calibration works fine



π^0 spectrum

Steve Trentalange
and Dylan Thein

- High tower trigger
- A lot of corrections still to be done (trigger bias, efficiencies, etc)
- Only 10% of full EMC acceptance
- 160 k HT events analyzed
  - 20% HT statistics -> Can we go up to 8 GeV/c?

What we are doing in simulation field…

- Simulate real detector response (done)
  - Include pedestal noise
  - Include gain variation
- Embedding and association (going on)
  - Important for efficiencies
  - Preliminary embedding software version
    - Need to merge it with STAR embedding scheme
  - Initial version of association maker
    - Need to decide if we will merge it to StAssociationMaker or keep it as a separate maker

Plans after QM2002

- Micro DST's
  - Plan to merge common MuDST
    - Main issue: will we be able to have an StEvent object after read MuDST?
      - For multiple cluster thresholds
      - Recalibrate the data after production (done for pp data)
  - If StEvent condition can not be satisfied we can merge with muDST but we intend to keep EMC muDST
- Embedding (coming soon)
- Reformulate EMC database
  - Tables are too big -> large download time from DB
- Integrate to ITTF?
- Advance on electron identification tools and π^0 spectrum
- … and … prepare for next run (see next talk)

Final comments

- EMC had a very good run
  - Transverse energy just coming out
  - Electrons and π^0's can be identified
    - π^0 spectrum up to 8 GeV/c for pp?
    - π^0 peak is in right place for pp – MIP pre-calibration works very well
- EMC @ QM2002
  - EMC performance (Alex)
  - E_t (Marcia)
- Thanks to many people
  - Aleksei, Alex Stolpovsky, Jenn, Jon, Marcia, Mirko, Oleg, Steve, Subhasis…