Latest results from dE/dx

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Outlook

- CDR expectations for TPC dE/dx resolution
- Old /new calibration schemes
- AuAu 2002
- dAu 2003
  - Time of flight
  - Bichsel's calculations for P10
- Conclusions

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TPC dE/dx resolution

– STAR CDR (p. 4C-33)

- $\sigma(dE/dx)/(dE/dx) = 0.47\ N^{-0.46}(Ph)^{-0.32}$, P = 1atm
- σ_{Inner} = 14.3%, h = 1.15 cm, N = 12;
- σ_{Outer} = 7.7%, h = 1.95 cm, N = 32;
- σ = **6.8%** for 76 cm track in TPC

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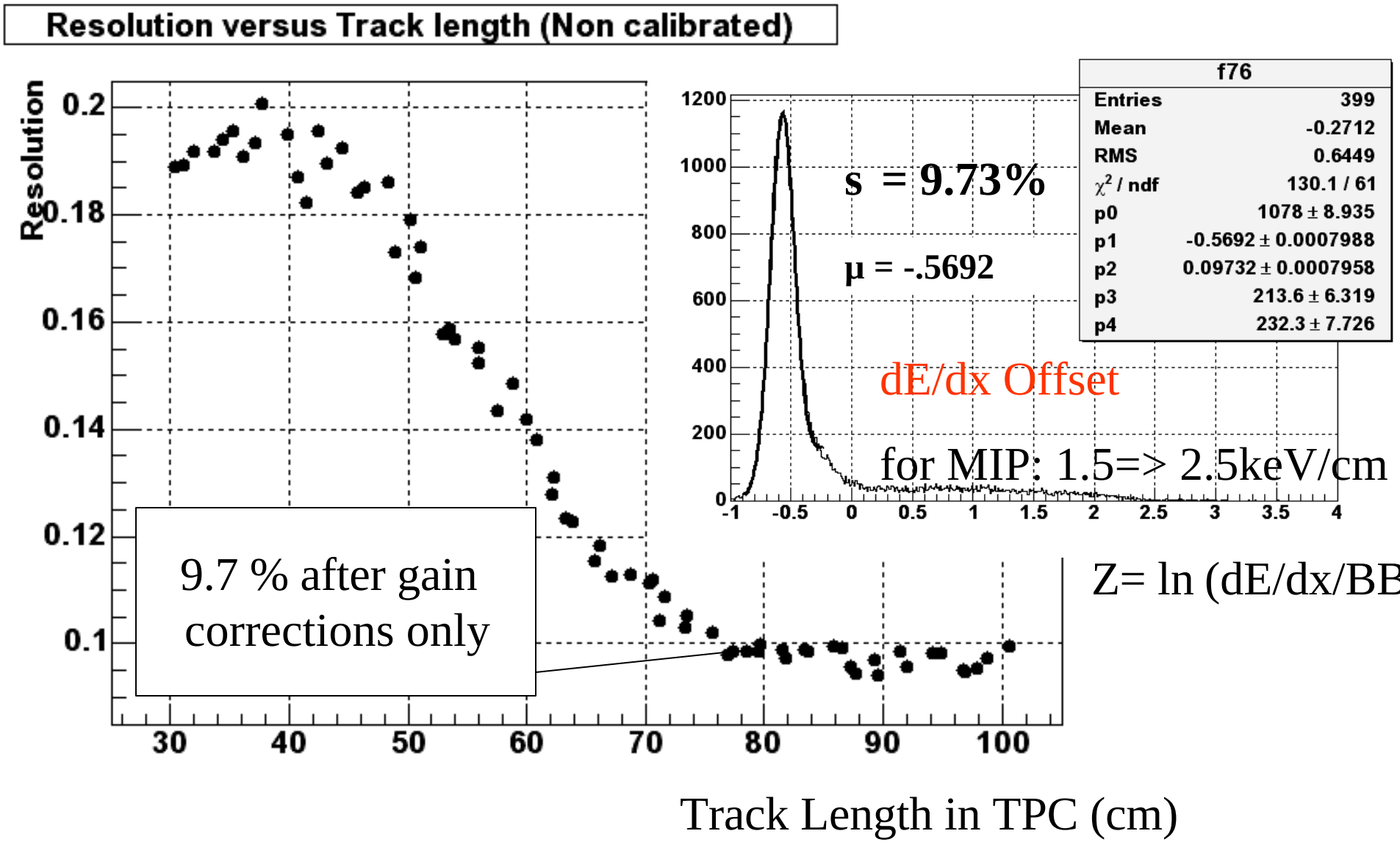
dAu data



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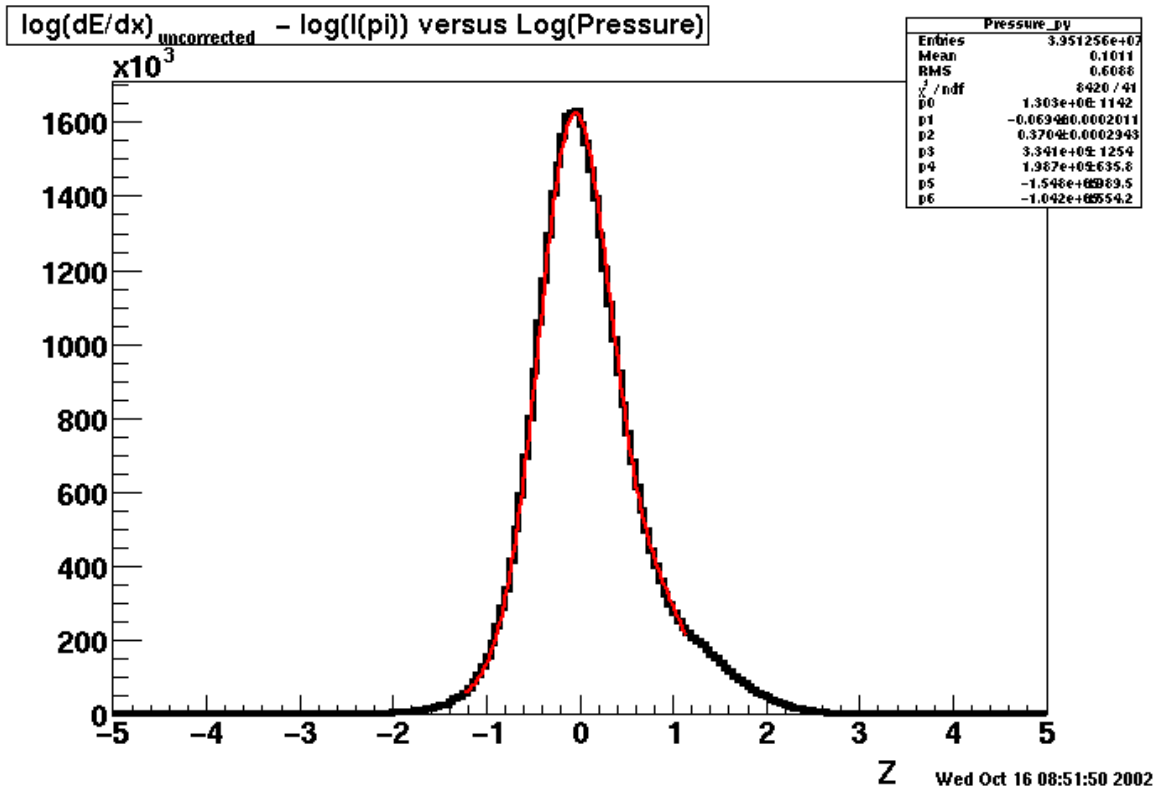
What does calibration means?

- **For good clusters (used in fit, no overlaps)**
- **For good global tracks (No. fit points = 30, Track length in TPC > 40 cm)**
- **Most probable value of Z =log[$(dE/dx)_{measured}/(dE/dx)_{predicted\ for\ p}$] should not depend on anything (except ß?) i.e.**

• fit Z-distribution with Gauss(μ,s) + pol3 in ±3s range (we have ~80% p).

•μ should not depend on

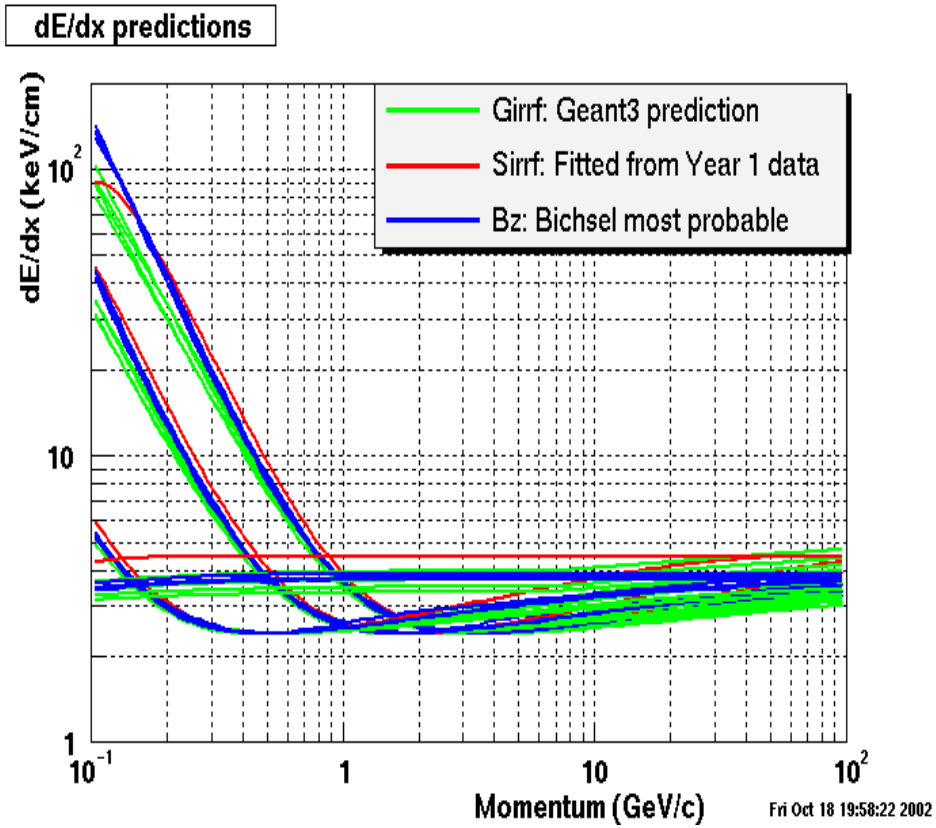
- **•Time, Pressure**
- **•Sector, row**
- **•Drift distance**



What does prediction mean ?

- Predictions:
  - **Girrf (BetheBloch): GEANT3 was used for very first dE/dx calibration**
  - **Sirrf : parameterization of Year 1 data, and**
  - **Bichsel calculations for Ar:**

$(dE/dx)_{Bichsel} = f(ß?,dX)$



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Old calibration scheme (StdEdxMaker)

- The old dE/dx calibration scheme
  - was based on dst_point and global track tables (StdEdxMaker has to be before StEventMaker in the chain),
  - for all reconstructed tracks (no momentum restriction),
  - Sirrf prediction.
- Last calibration in this scheme was done in March, 2002, for AuAu data:
  - s(dE/dx)/(dE/dx) = 8.2% for 76 cm track
  - I was not happy that ~1.4% is still missing with respect to CDR

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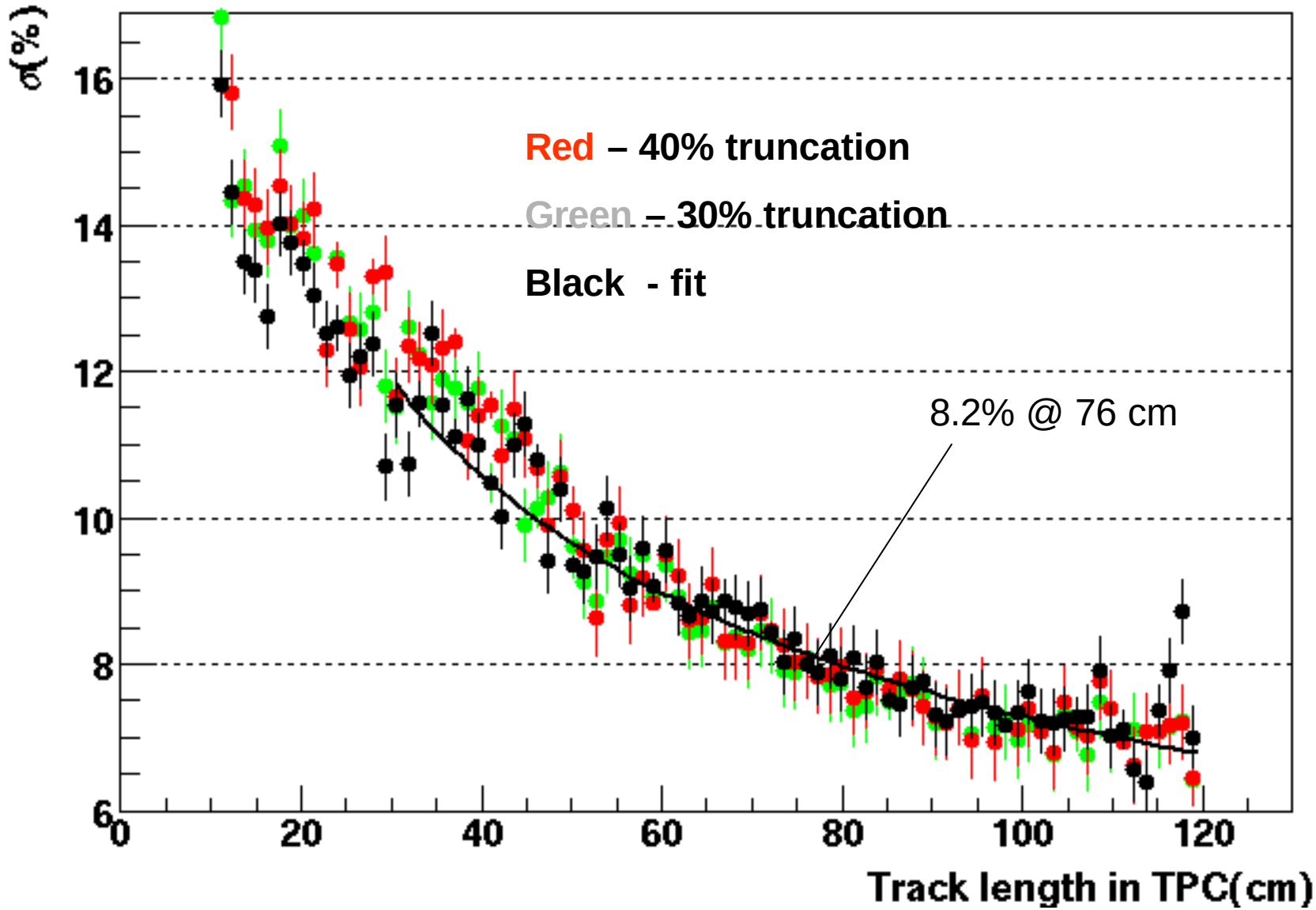
dE/dx resolution, March 2002

Tue Oct 15 20:26:41 2002



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New calibration (StdEdxY2Maker)

- Calibration is based on StEvent (StTpcHit and StTrack, after StEventMaker)
- Calibration is based on tracks within [0.4, 0.5] GeV/c interval (~MIP for pions: ß?= p/m = 4) only.
- As prediction it was used Bichsel's calculation with dX dependence

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Y2 Calibration

dE/dx corrections: table names

- R "ADC" nonlinearity => "TpcAdcCorrection"
- Z Drift distance =>"TpcZCorrection"
- account O_2 =>"TpcDriftDistOxygen
- Pressure: => "tpcPressure"

All time dependence is accounted via above corrections for Pressure and Oxygen contamination

- SecRow => "TpcSecRowB"

  has to be redone after Fabrice's pulser corrections
- dX correction => "TpcdXCorrection"
- TPC track length => "TpcLengthCorrection"

  has to be redone after Fabrice's pulser corrections

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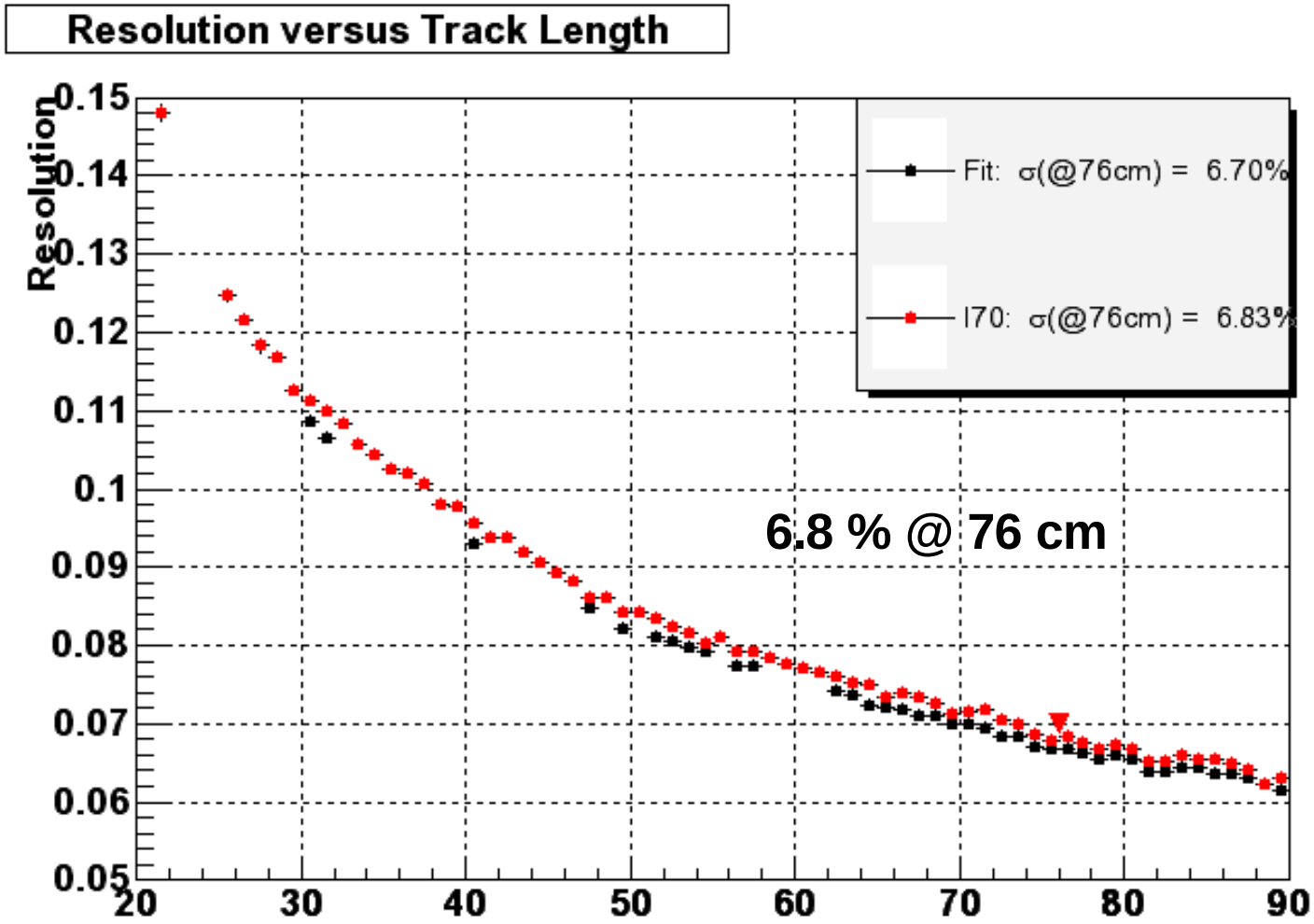
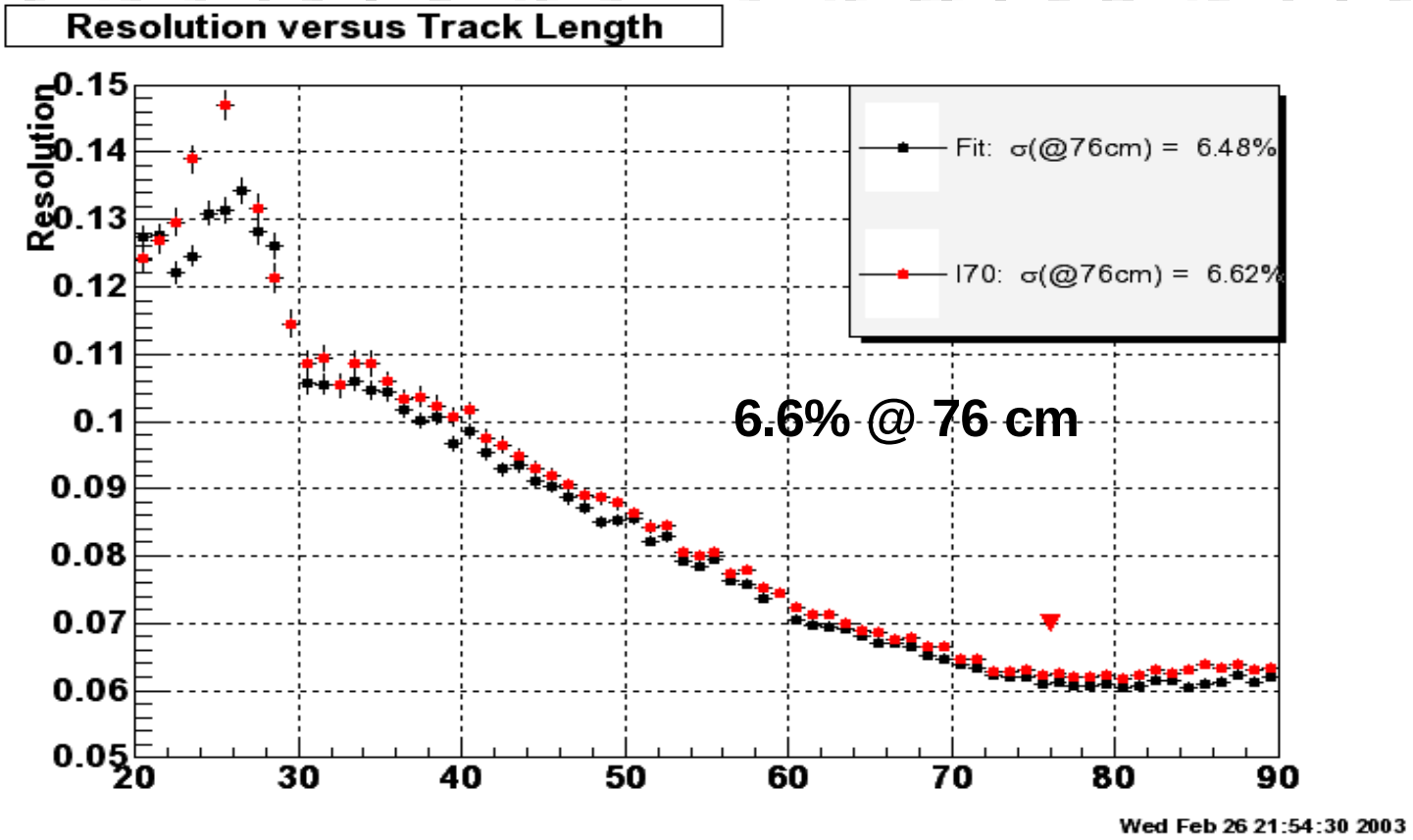
New calibration for Y2 data



dAu data with Y2 calibration

Calibration for dAu has not been done yet



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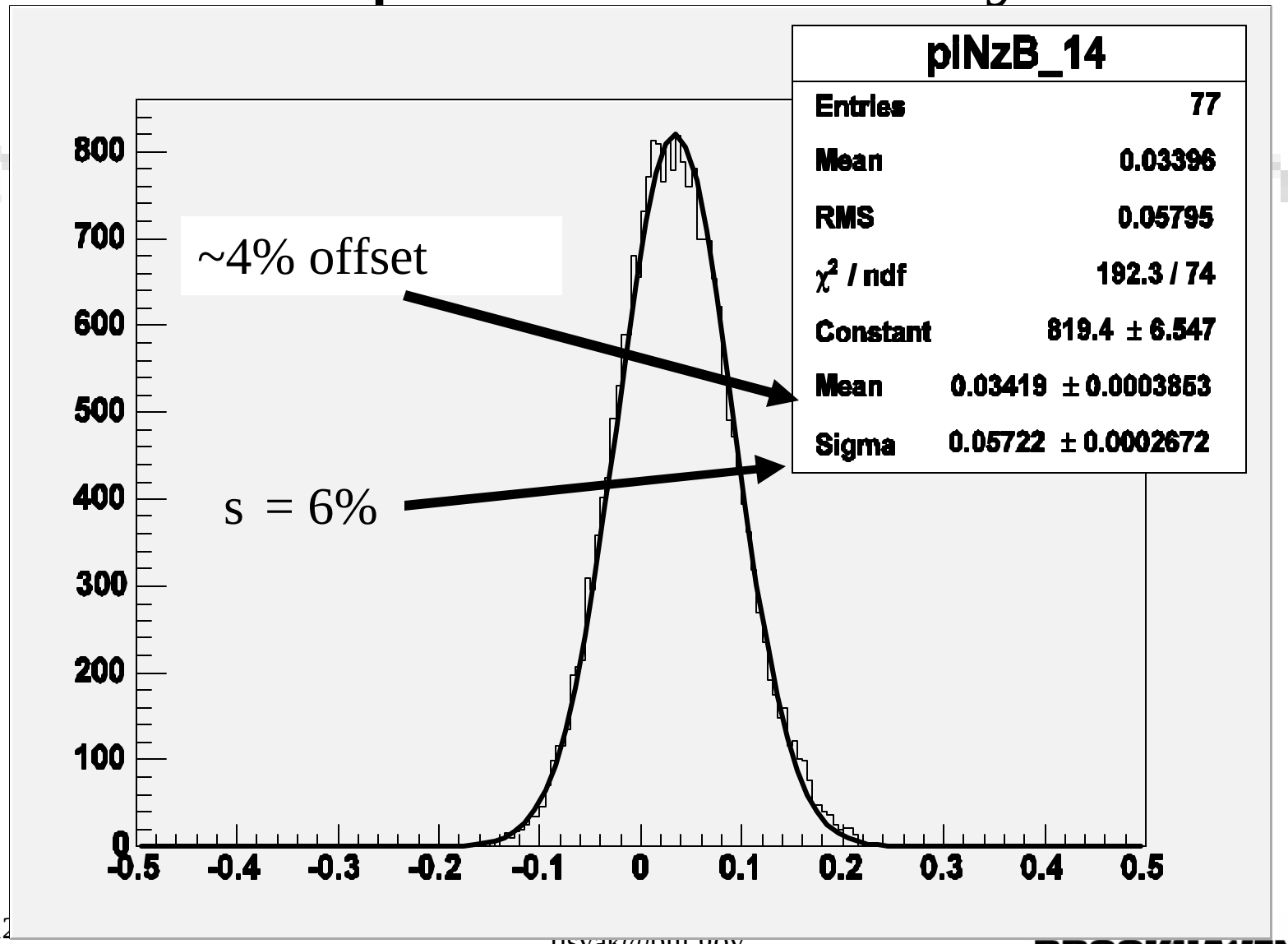
dE/dx for pions selected by ToF



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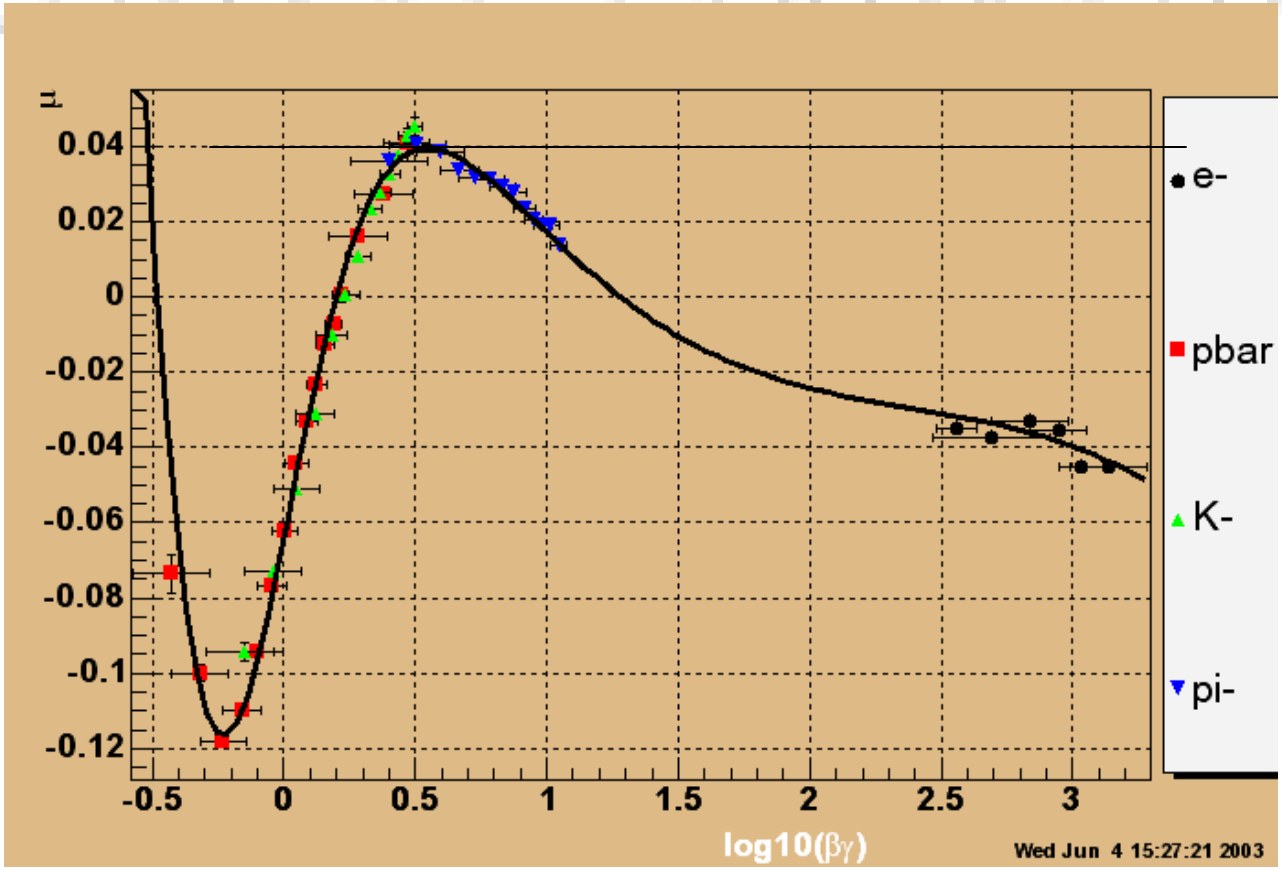
Systematic in dE/dx versus ß?

Thanks ToF group (Lijuan Ruan)



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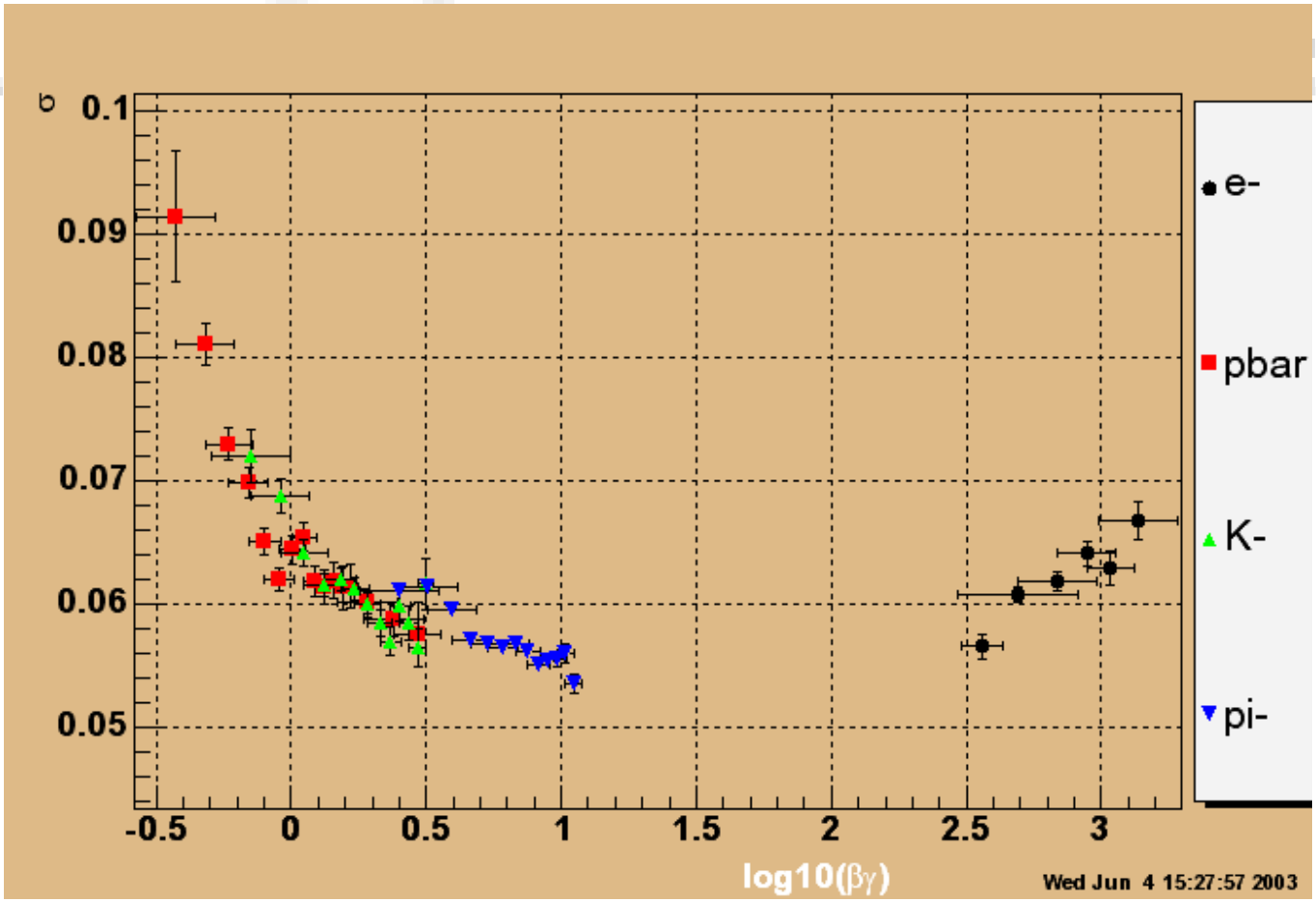
Resolution depends on ß?



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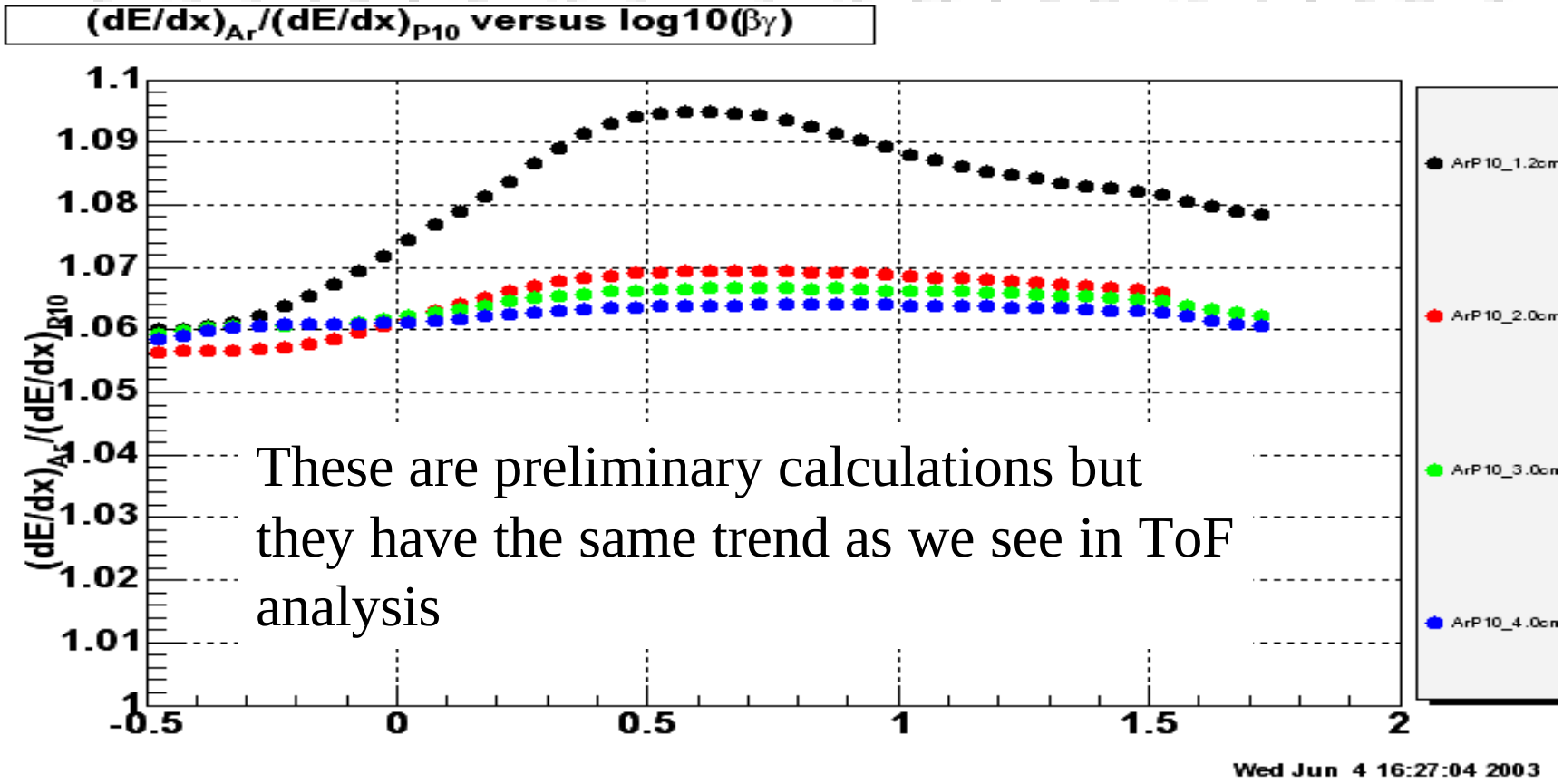
Bichsel's Ar/P10 calculations for different dX



These are preliminary calculations but they have the same trend as we see in ToF analysis

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Conclusions

- New calibration scheme allows to reach resolution 6.8% which has been expected in STAR CDR
- For dAu production has been used AuAu calibration from Y2002.
  - Resolution is quite good (6.6%), but
  - there is offset in dE/dx ~ 4% which has been accounted on the level of MuDST reproduction (P03ia).
- A new component is data with ToF information. This information provides calibration sample for dE/dx.
  - It has been observed ~5% variation versus ß? with respect to H.Bichsel calculations for Ar
  - H.Bichsel calculations for P10 shows the same trend
- Next step is to calibrate Bichsel's model using ToF sample in order to do this we need to have ToF in the standard chain.

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