Identical charged pion femtoscopy correlations for 7.7 and 11.5 GeV with vHLLE+UrQMD

L. Malinina (SINP MSU-JINR),
A. Romanova (MSU), G.Romanenko, K. Mikhaylov (ITEP-JINR)

04.06.2020

Details of Analysis ππ 7.7 & 11.5 GeV

- **centrality bins:**

	7.7 GeV	11.5 GeV
3.3fm -- 0-5%	2 000 000 ev	1 000 000 ev
4.7fm – 5-10%	2 000 000 ev	1 000 000 ev
6.6fm –10-20%	2 000 000 ev	1 000 000 ev

- **8 k_T bins for pions[GeV/c]:** [0.15,0.25], [0.25,0.35], [0.35,0.45], [0.45,0.55], [0.55,0.65], [0.65,0.75],[0.75,0.85],[0.85,0.95] GeV/c

Monte Carlo: vHLLE+UrQMD
Hydro: /zfs/store7.hydra.local/pbatyuk/mcDst/vHLLE_UrQMD/AuAu/

- **Event selection**

  - At least one particle must be reconstructed as a pion (Kch)

- **Single track cuts**
  $|\eta| < 1.0$ and $0.15 < p_T < 2.8$ GeV/c

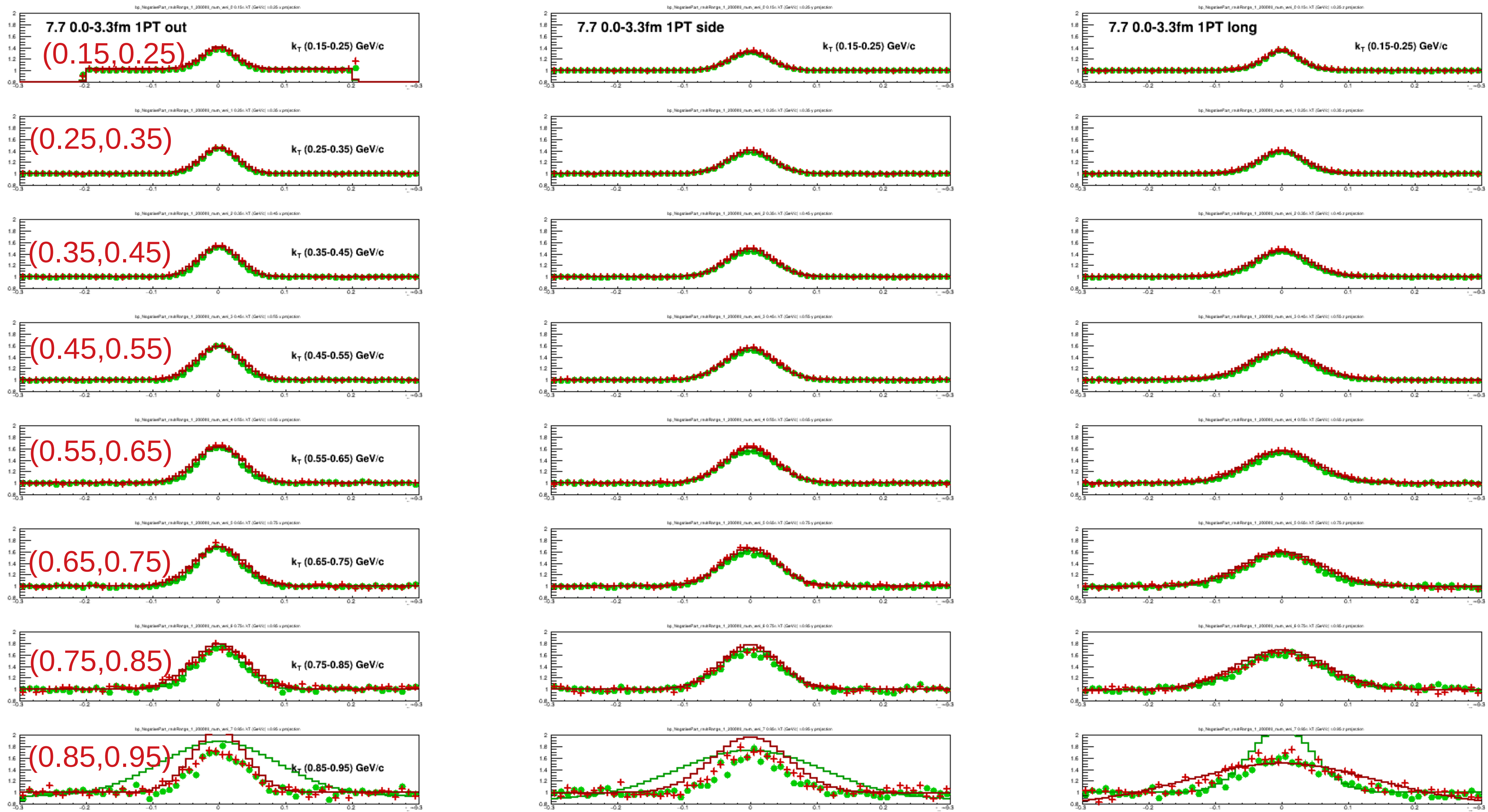
- **QS weights only**

- **Fitting procedures:**

$$C(q_{out}, q_{side}, q_{long}) = 1 + \lambda \exp(-R_{out}^2 q_{out}^2 - R_{side}^2 q_{side}^2 - R_{long}^2 q_{long}^2)$$

$$C(q_{inv}) = 1 + \lambda \exp(-R^2 q_{inv}^2)$$

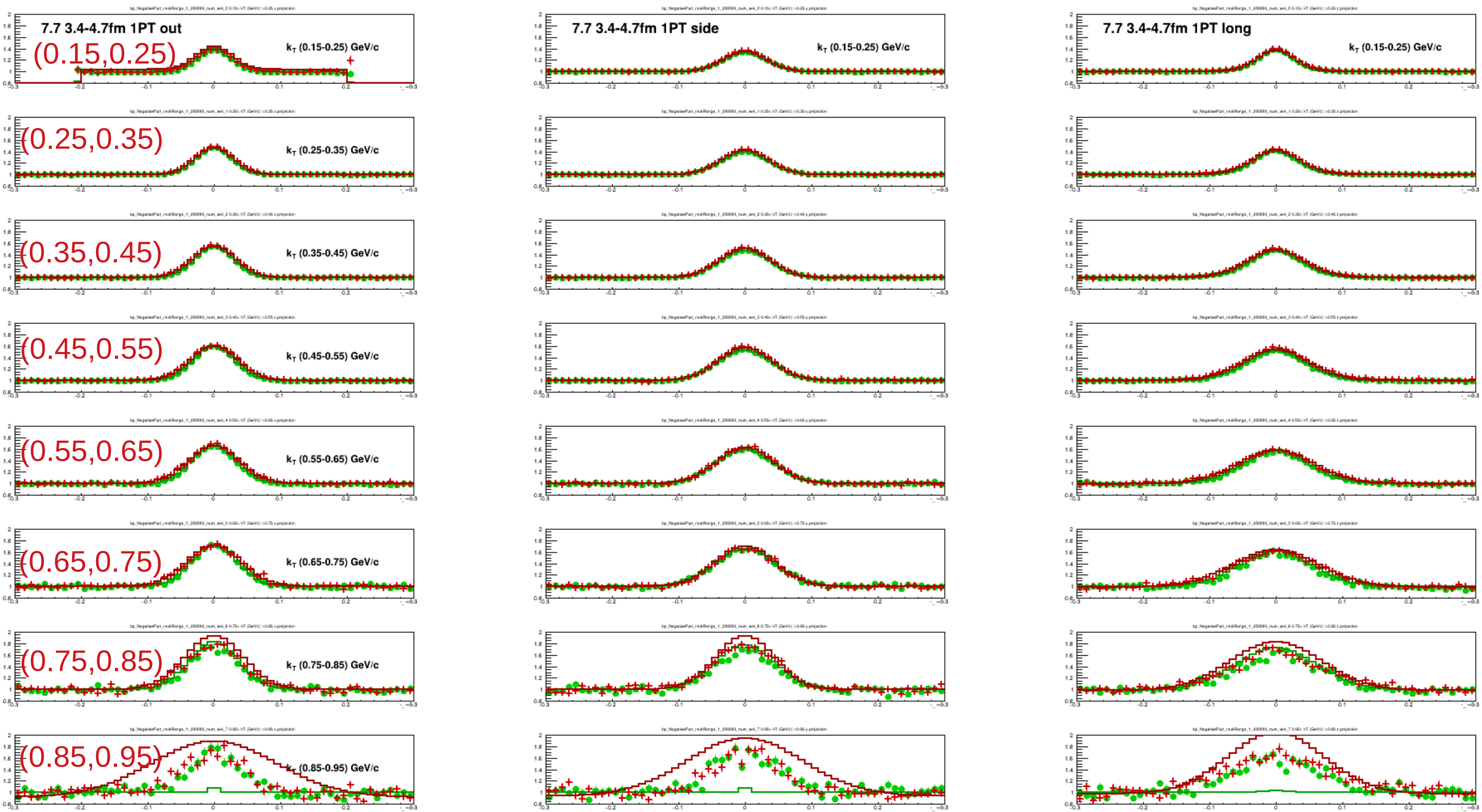
3D CF pions, sqrt(sNN) = 7.7 GeV, 3.3fm -- 0-5%



8 k_T bins for pions[GeV/c]: [0.15,0.95] GeV/c, 2 10^6 MB events

Reasonable fit, Only at last bin [0.85,0.95] GeV/c statistics is not enough

3D CF pions, sqrt(sNN) = 7.7 GeV, 4.7 fm -- 5-10%

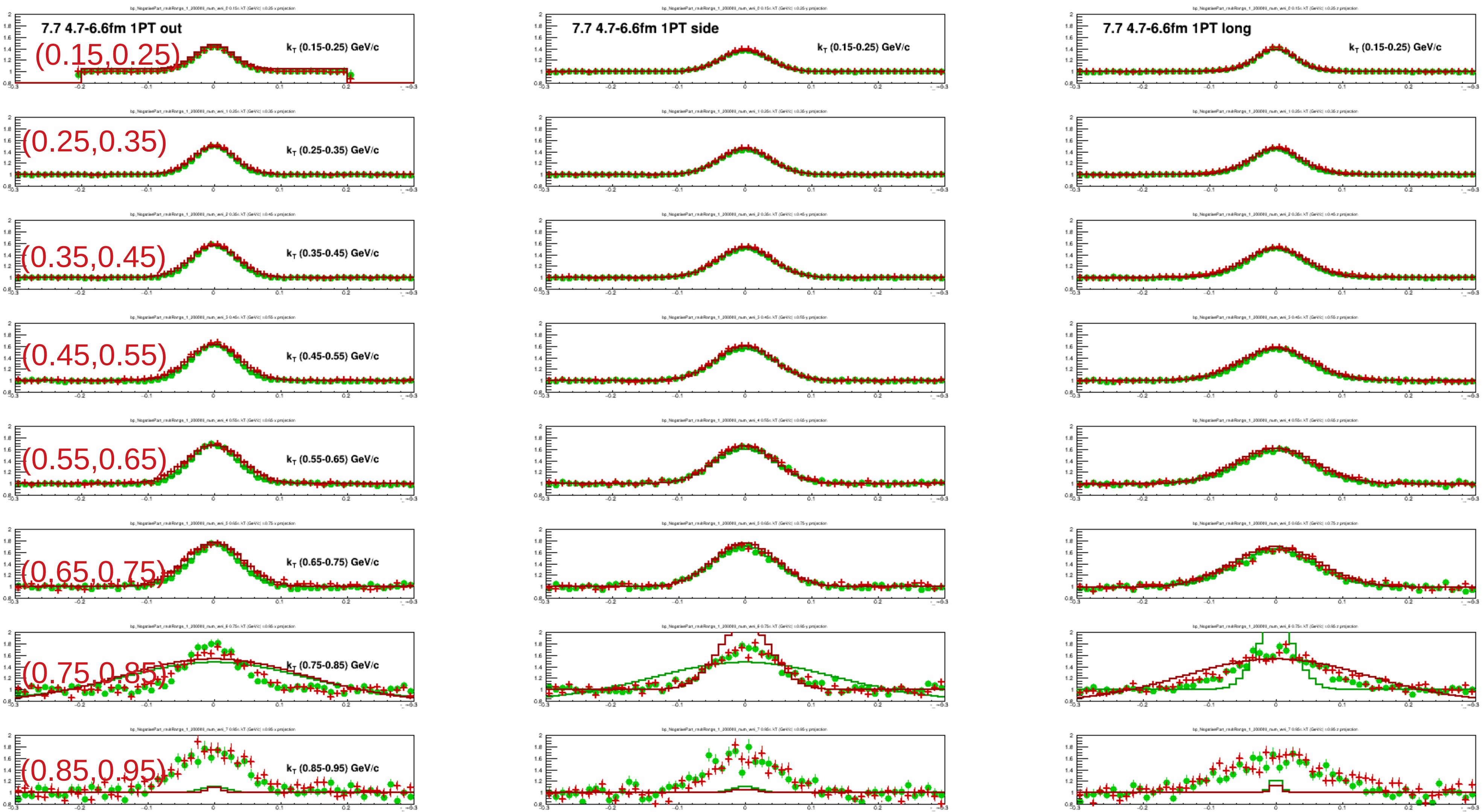


8 k_T bins for pions[GeV/c]: [0.15,0.95] GeV/c, 2 10^6 MB events

Reasonable fit,

Only at last bin [0.85,0.95] GeV/c statistics is not enough

3D CF pions, sqrt(sNN) = 7.7 GeV, 6.6 fm -- 10-20%



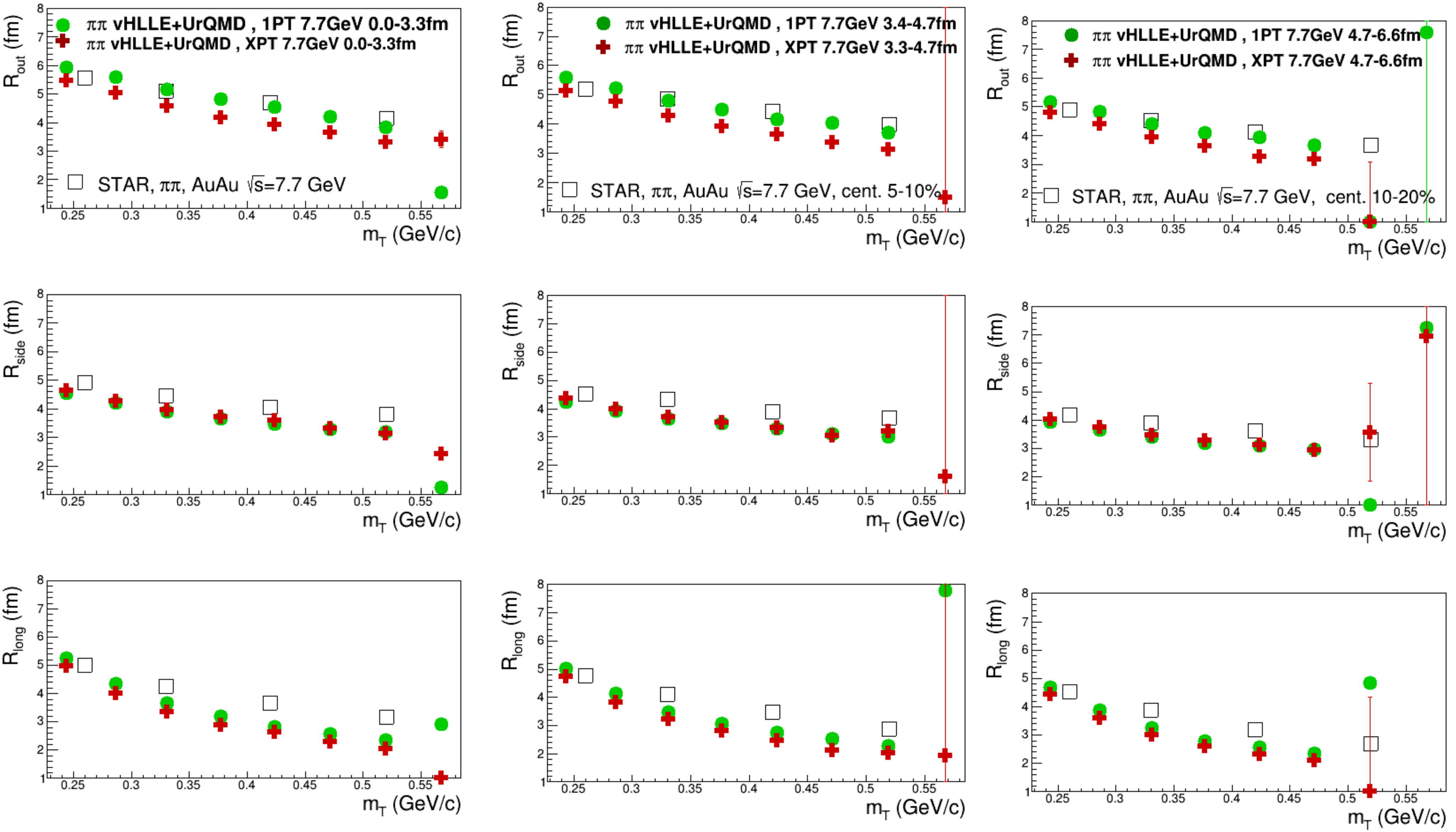
8 k_T bins for pions[GeV/c]: [0.15,0.95] GeV/c, 2 10^6 MB events

Reasonable fit,

at last 2 bins [0.75,0.85], [0.85,0.95] GeV/c statistics is not enough

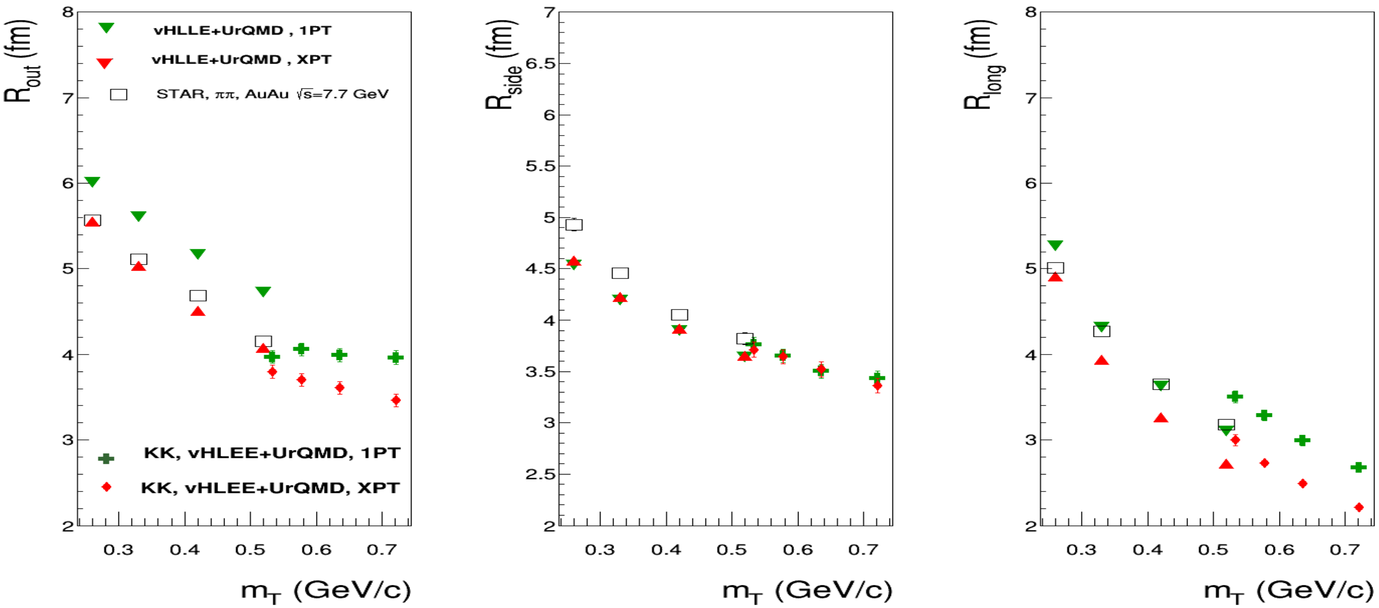
3D pion R(mT), sqrt(sNN) = 7.7 GeV

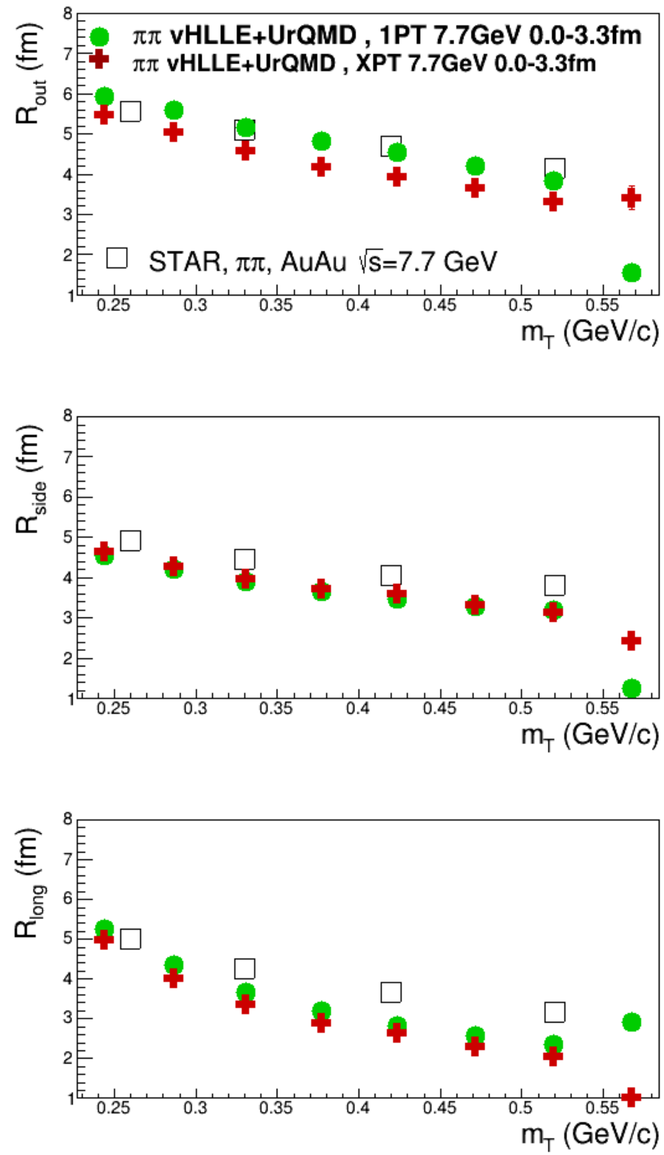
0-5% 5-10% 10-20%



Old results (WPCF2019) Pions & Kaon radii versus m_T with vHLLE+UrQMD

- **AuAu , sqrt(sNN) = 7.7 GeV/cm, 0-5%**

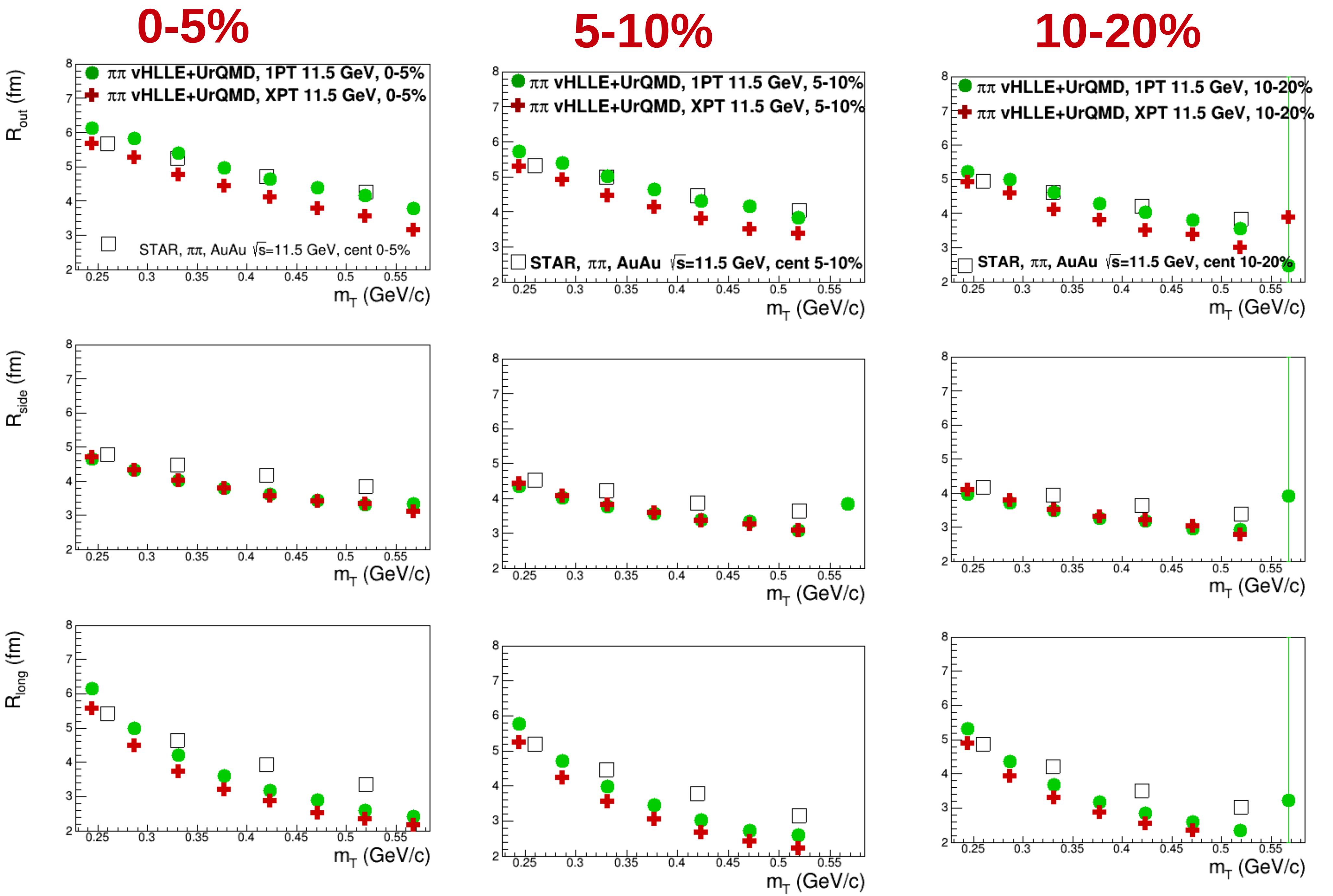




- Old results are close to the new ones, some small difference in Rlong;

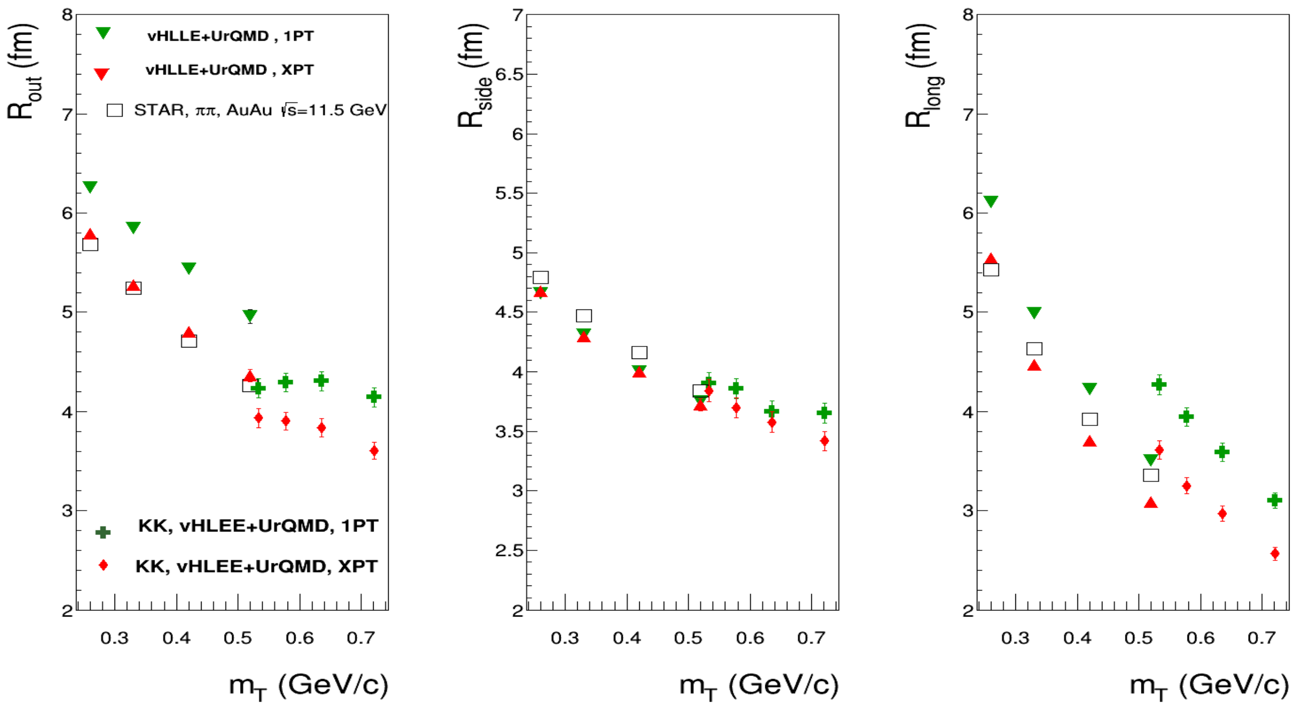
(scales in the figures are different)

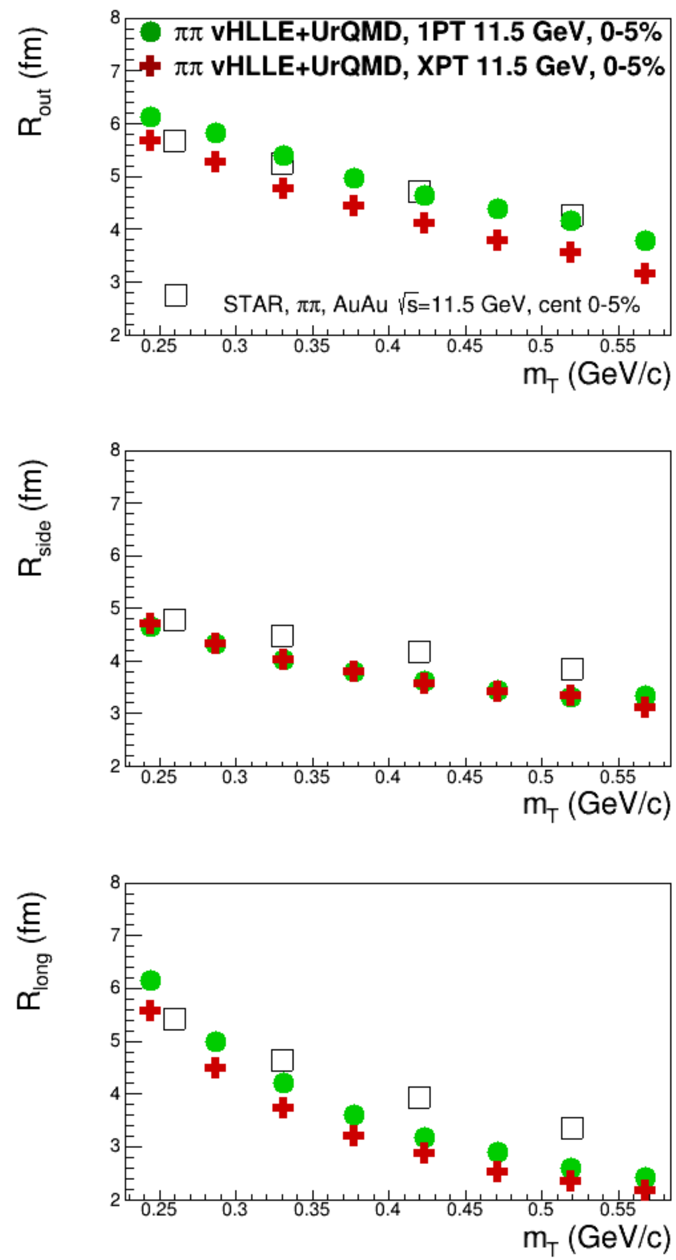
3D pion R(mT), sqrt(sNN) = 11.5 GeV



Old results (WPCF2019) Pions & Kaon radii versus m_T with vHLLE+UrQMD

- **AuAu , sqrt(sNN) = 11.5 GeV/c, 0-5%**

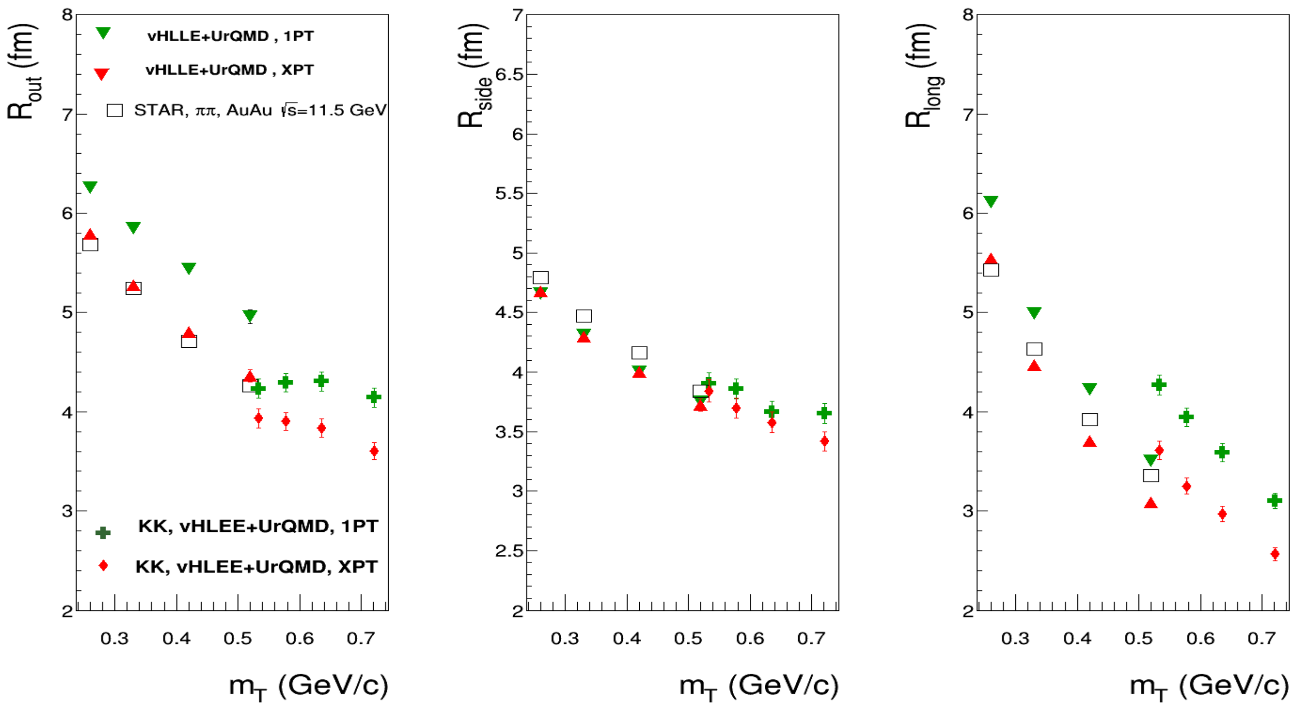


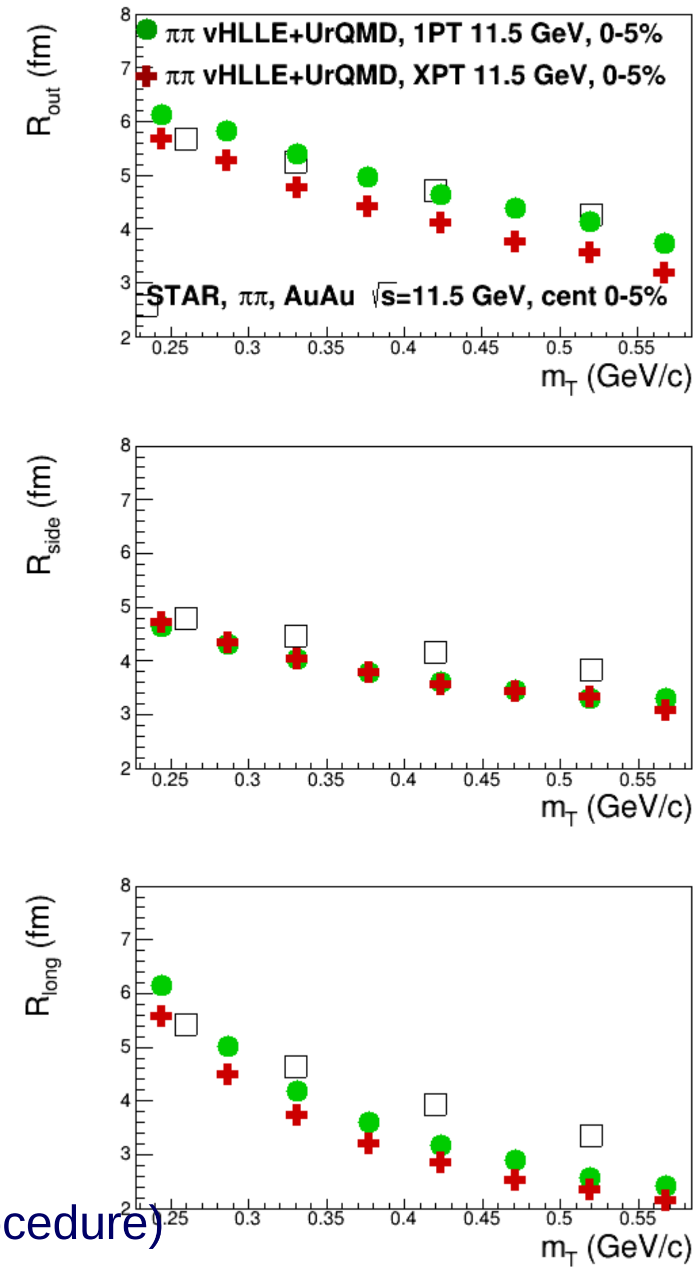


- Old results are slightly different than the new ones
- Old results "pure weights" CF=N(qinv, wQS)/N(qinv, 1)
  New results mixing from different events D(qinv) is used
  CF=N(qinv, wQS)/D(qinv),
- For old data: randomization procedure for pairs (in Yura's co
  some order) (for the new data ?)
- No cuts on momenta for the old results

Old results (WPCF2019) Pions & Kaon radii versus m_T with vHLLE+UrQMD

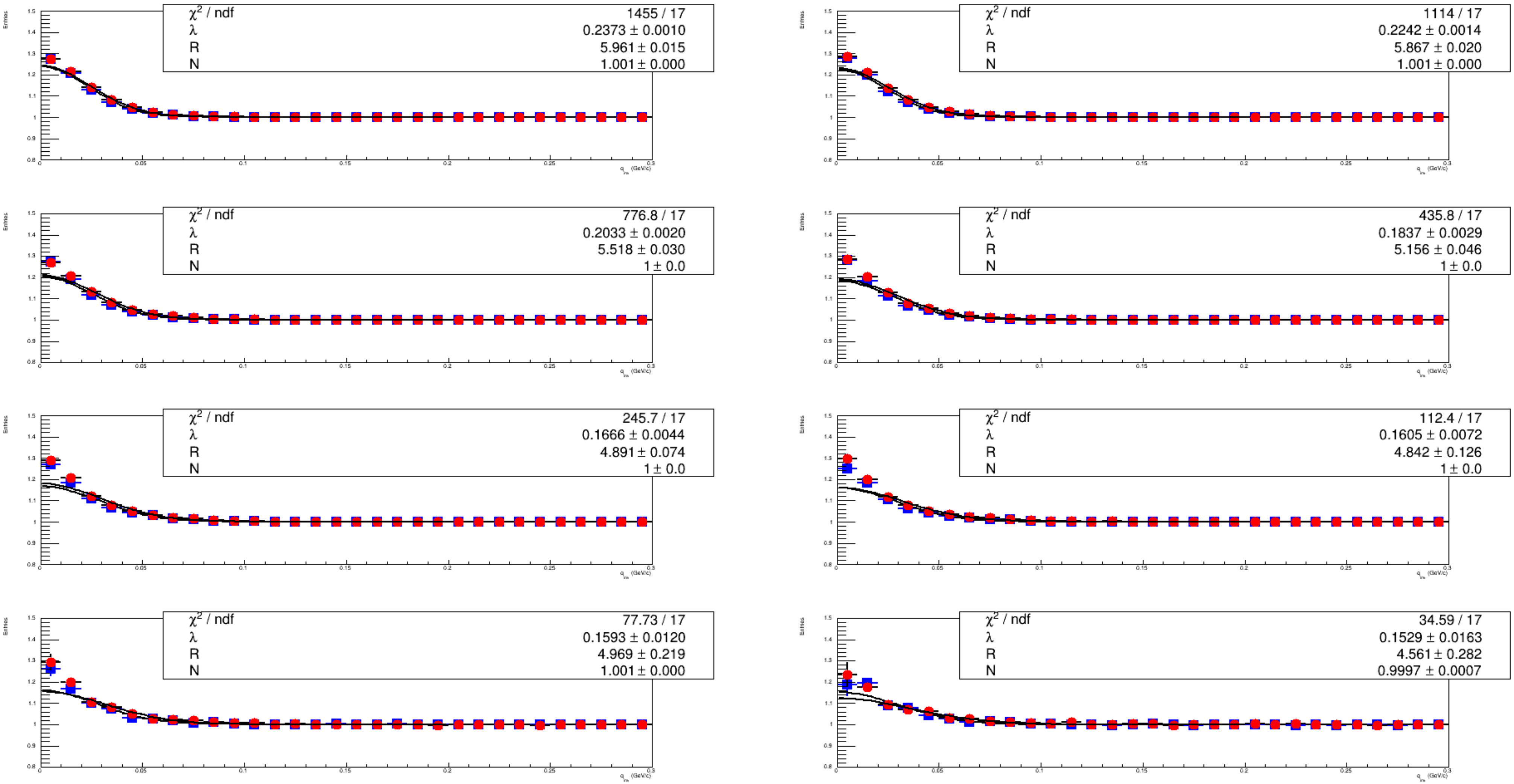
- **AuAu , sqrt(sNN) = 11.5 GeV/c, 0-5%**





- "pure weights" :
  CF=N(qinv, wQS)/N(qinv, 1)
- New results with mixed denominator and "pure weights" coincides, as it should be
- Randomization procedure (?), no cut on momenta (in old procedure)

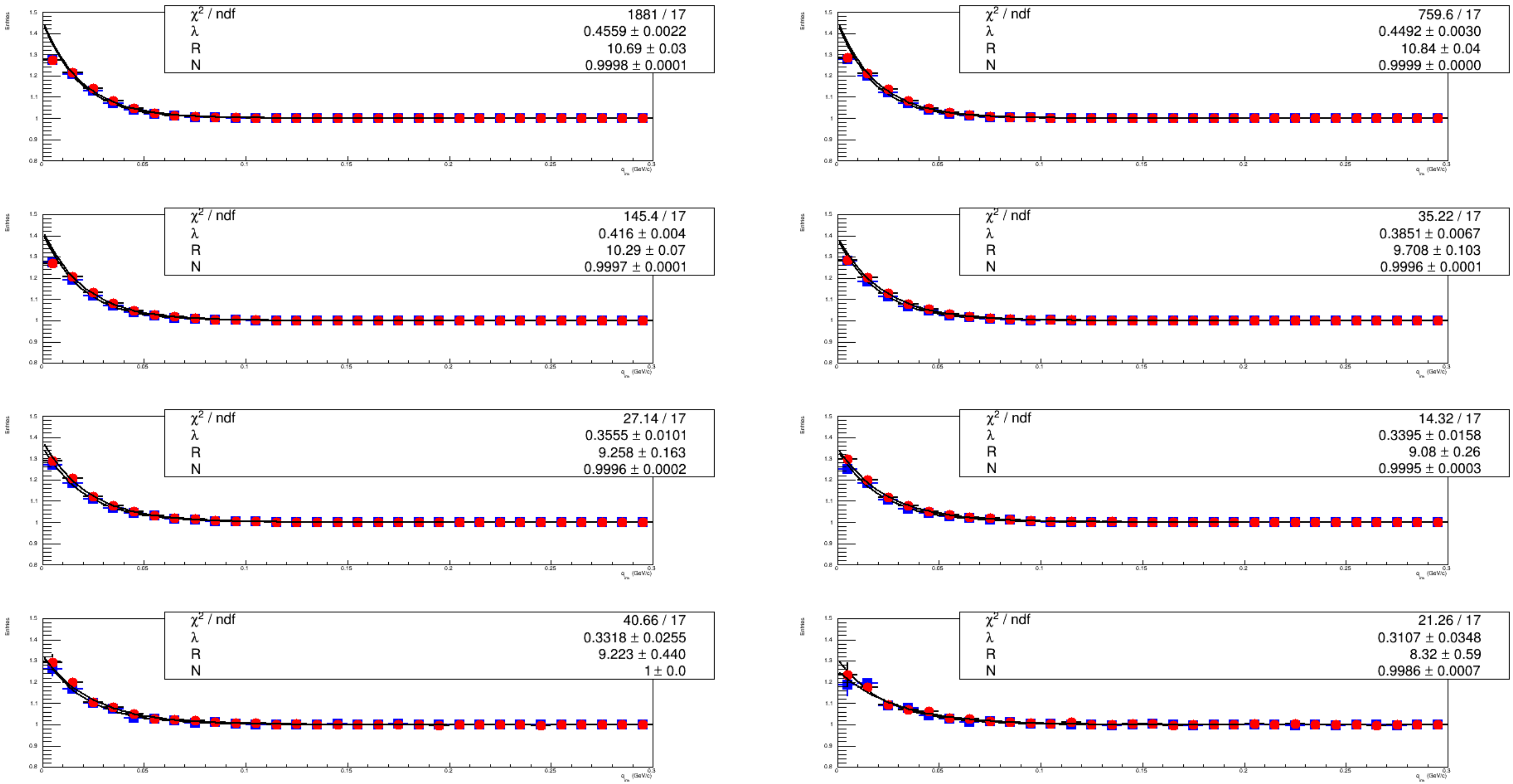
1D CF pions, sqrt(sNN) = 11.5 GeV, 3.3fm -- 0-5%, Gaussian fit



8 k_T bins for pions[GeV/c]: [0.15,0.95] GeV/c, 2 10^6 MB events

Gaussian fit,

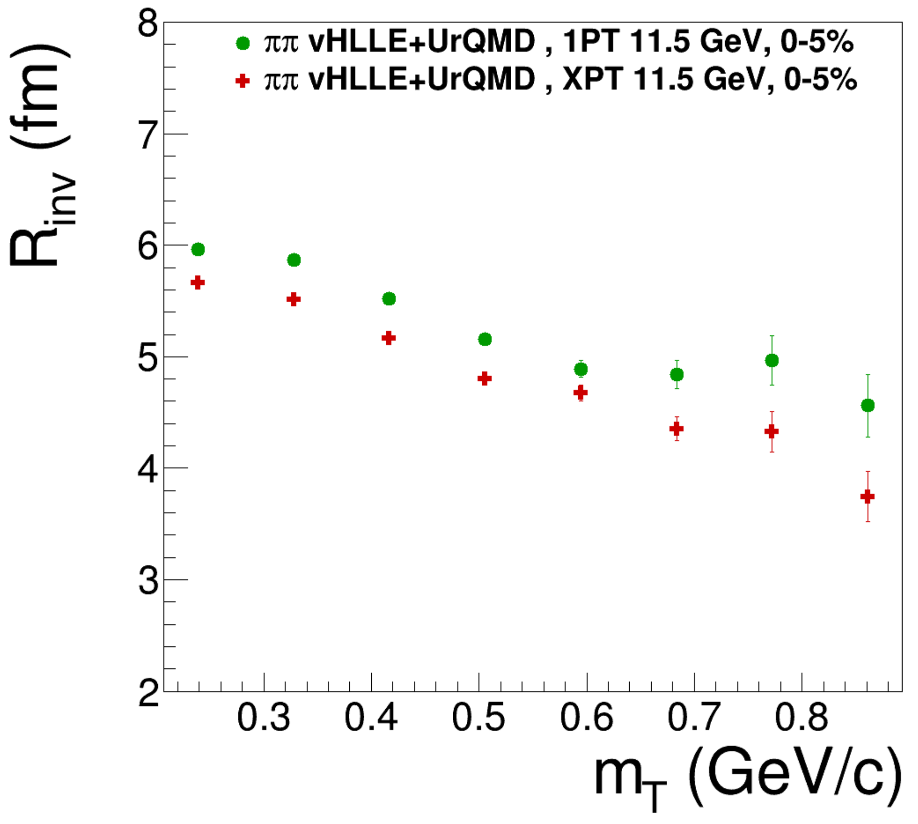
1D CF pions, sqrt(sNN) = 11.5 GeV, 3.3fm -- 0-5%, Exponential fit

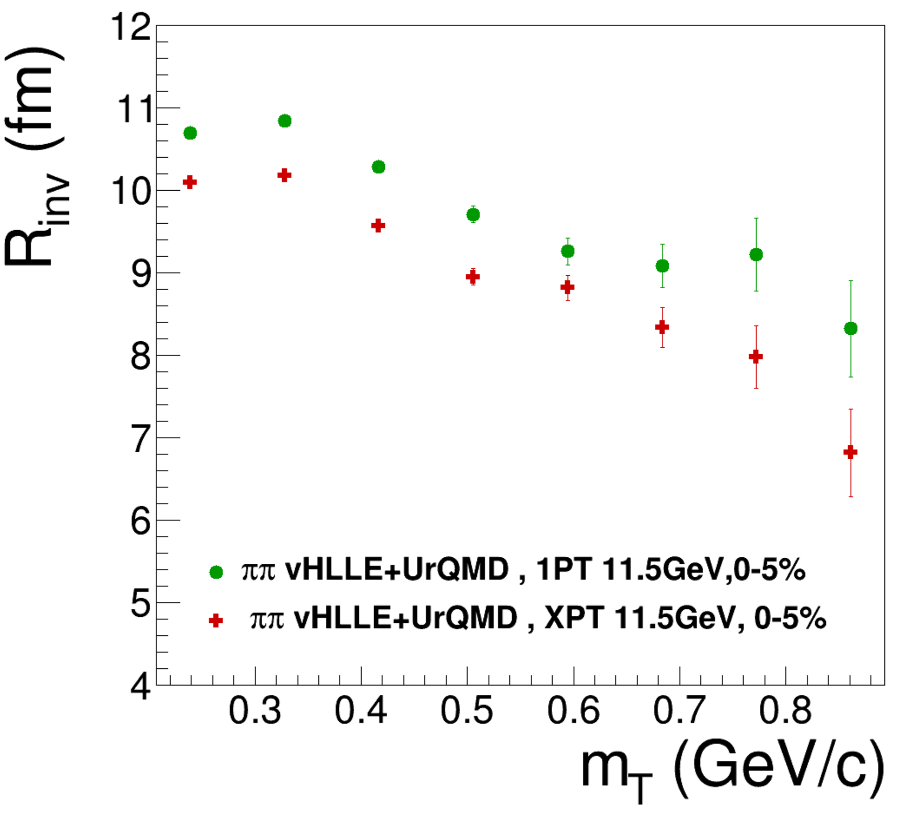


8 k_T bins for pions[GeV/c]: [0.15,0.95] GeV/c, 2 10^6 MB events

Exponential can be used instead

1D pion R(mT), sqrt(sNN) = 11.5 GeV, 0-5%





If we will have no enough statistics….
The difference between radii for 1PT and XPT is seen in Rinv(mT).
Exponential fit is more convenient for pions.

Backup