Transverse momentum fluctuations – energy dependence
(first results)

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What are we looking for?

- Enhanced dynamical fluctuations for systems close to the phase transition
- Exotic, unexpected, interesting effects
Plan

- Data sets
- Event and track selection criteria
- How to select forward-rapidity region?
- Acceptance plots for different energies
- Common acceptance for forward-rapidity
- Two-particle correlation plots and $\Phi_{pT}$ for forward-rapidity
- Common acceptance for mid-rapidity
- Two-particle correlation plots for mid-rapidity
- What next?
Data sets

• 30 AGeV, STD+, 02J, 7.2% central
• 40 AGeV, STD-, 00C, 7.2% central
• 80 AGeV, STD+, 01E, 7.2% central
• 158 AGeV, STD+, 00B, 7.2% central,
  Eveto < 10868 GeV , run.number > 1398 (10%)
Event and track selection criteria

- Cut on x, y, z position of the fitted vertex
- \( \text{n.trk.fit/n.trk.out} > 0.25 \)
- \( z.\text{first} < 200 \text{ cm} \)
- \( |bxl| < 2 \text{ cm}, |byl| < 1 \text{ cm} \)
- \( n.m.p > 30, \ n.p/n.m.p > 0.5 \)
- \( 0.005 < p_T < 1.5 \text{ GeV/c} \)
How to select forward-rapidity?

- $Z = Y^*/Y^*$ (beam)
- The same region for all energies: $Z \in (0.375; 0.890)$
$p_T$ versus $\phi$ for 158 AGeV
(gray background – forward-rapidity)
$p_T$ versus $\phi$ for 80 AGeV

(gray background – forward-rapidity)
$p_T \text{ versus } \phi \text{ for 40 AGeV}$

(gray background – forward-rapidity)
$p_T$ versus $\phi$ for 30 AGeV
(gray background – forward-rapidity)
Common acceptance for forward-rapidity region

30 AGeV

40 AGeV

80 AGeV

158 AGeV
Two-particle correlation plot
(example for 30 AGeV)

- Forward-rapidity only
  Z: (0.375 ; 0.890)
Two-particle correlation plots – comparison for forward-rapidity (the same scale)

- BE correlations
- No significant energy dependence for forward-rapidity
$\Phi_{pT}$ for forward-rapidity

- No stability checks → statistical errors only
- No TTR corrections
- Probably no energy dependence for forward-rapidity
Common acceptance for mid-rapidity region \( Z \in (-0.2; 0.3) \)

- **30 AGeV**
  - \(-0.2 < Z < -0.1\)
  - \(-0.1 < Z < 0.0\)
  - \(0.0 < Z < 0.1\)
  - \(0.1 < Z < 0.2\)
  - \(0.2 < Z < 0.3\)

- **40 AGeV**
  - \(-0.2 < Z < -0.1\)
  - \(-0.1 < Z < 0.0\)
  - \(0.0 < Z < 0.1\)
  - \(0.1 < Z < 0.2\)
  - \(0.2 < Z < 0.3\)

- **80 AGeV**
  - \(-0.2 < Z < -0.1\)
  - \(-0.1 < Z < 0.0\)
  - \(0.0 < Z < 0.1\)
  - \(0.1 < Z < 0.2\)
  - \(0.2 < Z < 0.3\)

- **158 AGeV**
  - \(-0.2 < Z < -0.1\)
  - \(-0.1 < Z < 0.0\)
  - \(0.0 < Z < 0.1\)
  - \(0.1 < Z < 0.2\)
  - \(0.2 < Z < 0.3\)
Two-particle correlation plots – comparison for mid-rapidity
(the same scale)

- BE correlations
- No significant energy dependence for mid-rapidity
Conclusions

No significant dynamical fluctuations for mid-rapidity and forward-rapidity regions

No significant energy dependence

the reason: limited geometrical acceptance?
Common acceptance may be better (wider) in $Y^*$
What next?

- $\Phi_{p_T}$ corrections (TTR) and systematic error estimates
- $M(p_T)$ distributions – for data and mixed events
- The same for 20 AGeV