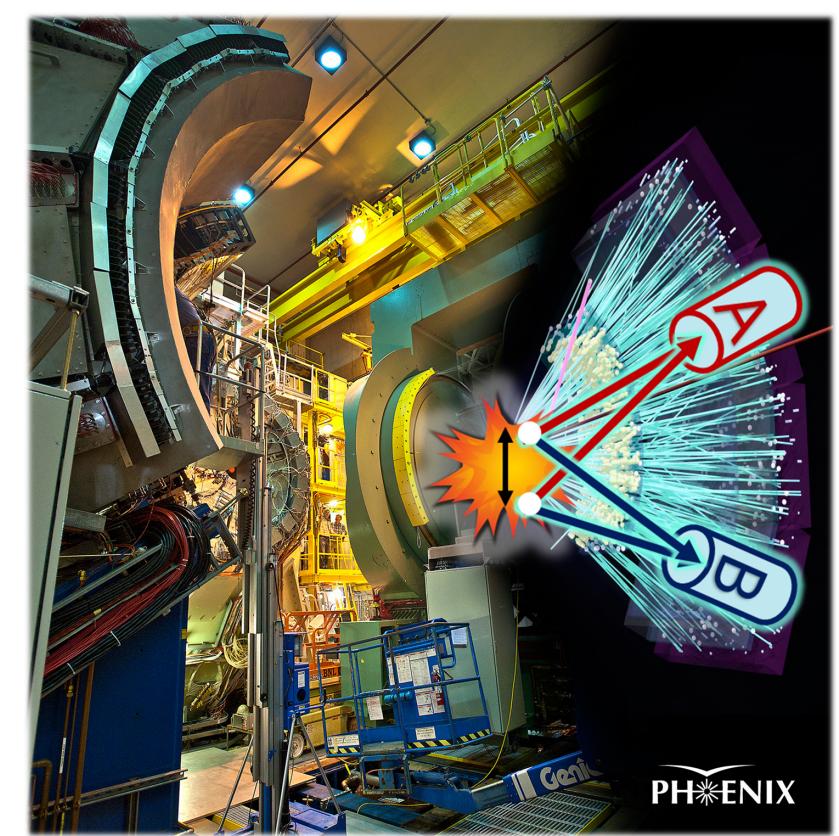




# PHENIX results on centrality and collision energy dependent Levy analysis of HBT correlation functions

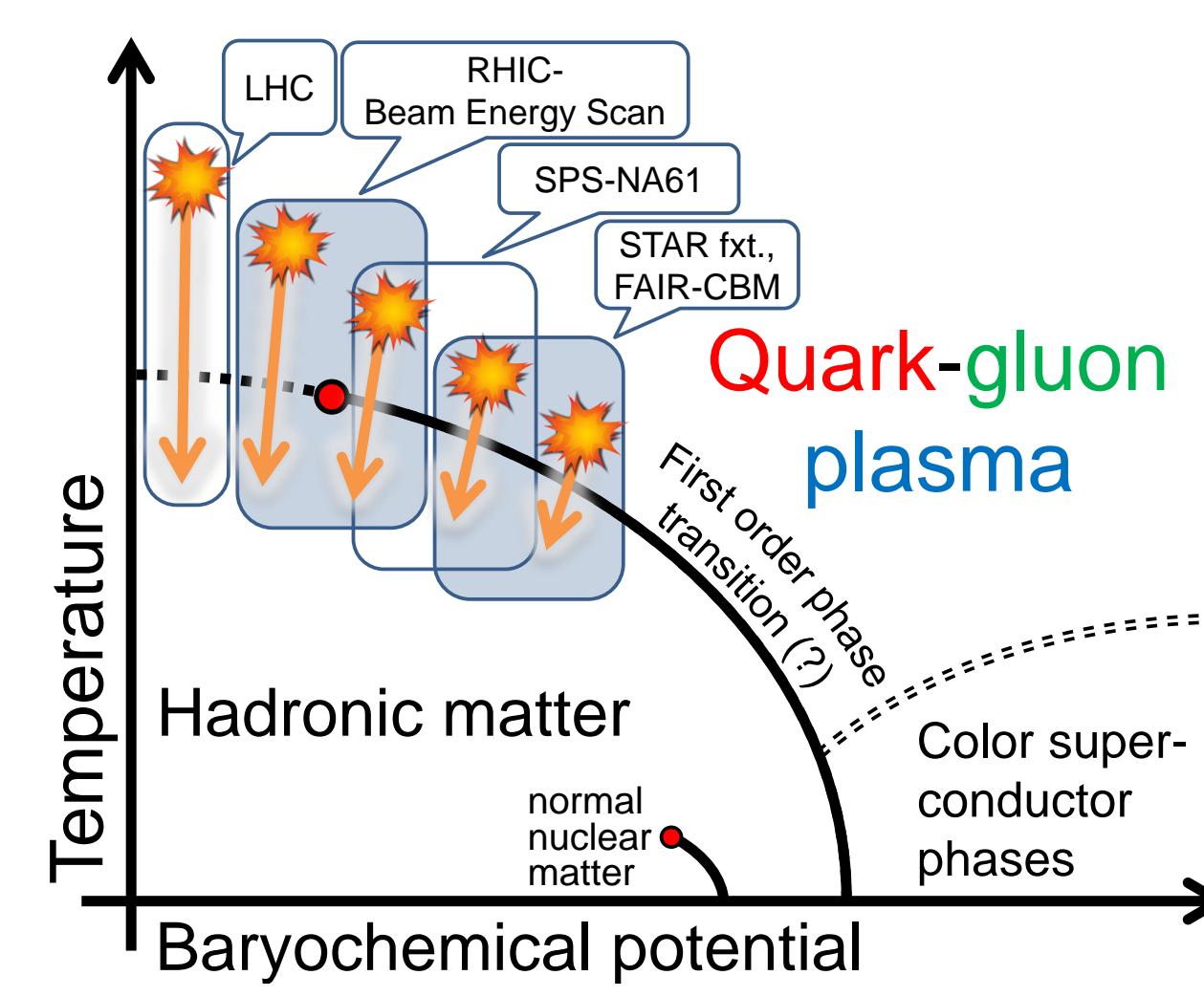
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## Femtoscopy and the RHIC-BES



- Momentum corr. of identical bosons
- It provides info about space-time geometry of the source
- Levy-type corr. func.:

$$C_2(Q) = 1 + \lambda \cdot e^{-(RQ)^\alpha} \begin{cases} \alpha = 1 : \text{Expo.} \\ \alpha = 2 : \text{Gaussian} \end{cases}$$



- RHIC BES with Au+Au coll.: 200, 62, 39, 27, 19, 15, 7.7 GeV
- $\mu_B$  : 20-400 MeV,  $T_{ch}$  : 170-140 MeV

## What to look for on this poster

### Correlation strength $\lambda$

- Intercept of the corr. func.
- Core-Halo model:  $\lambda = \frac{N_C^2}{(N_C + N_H)^2}$

### Levy scale parameter $R$

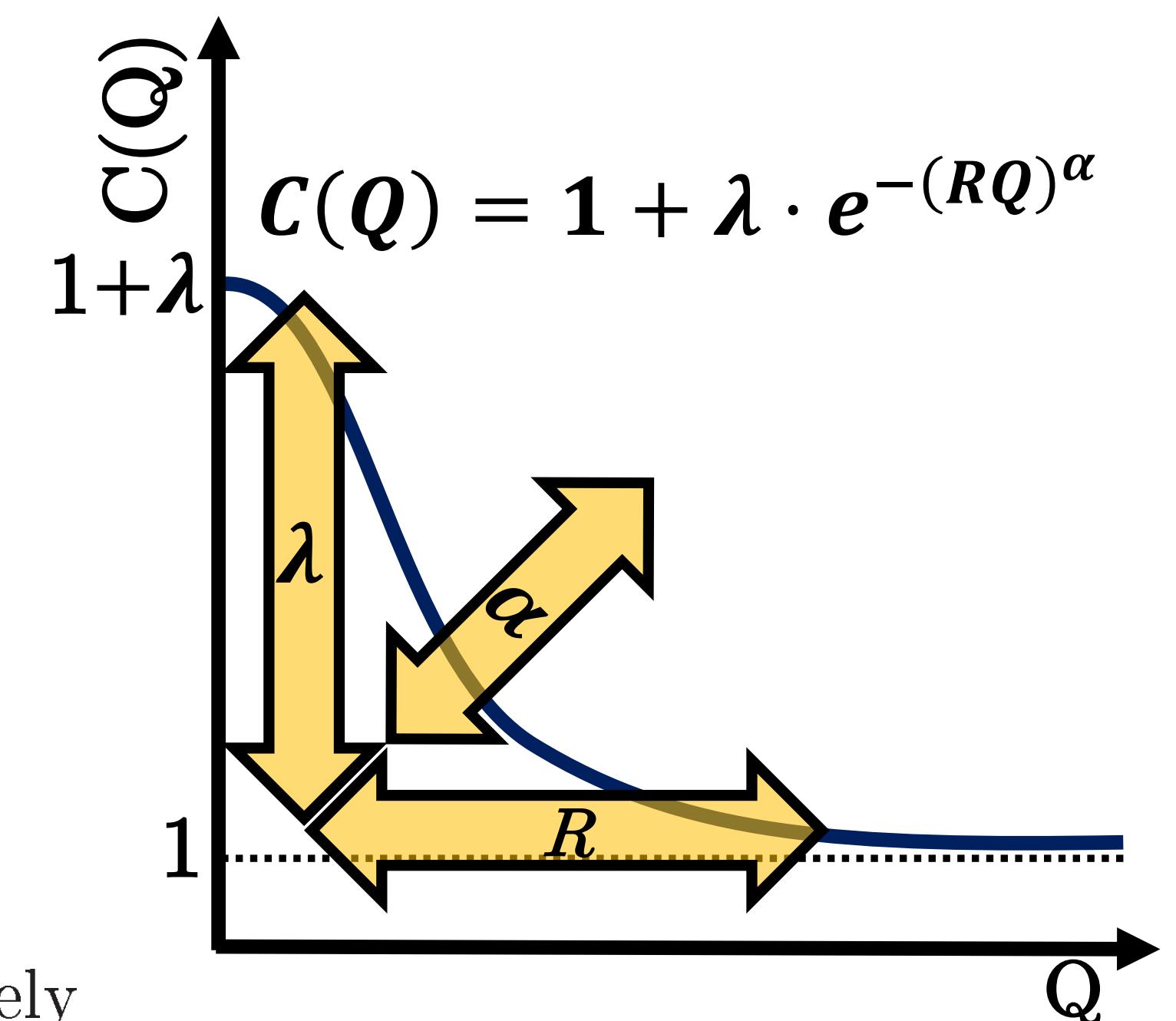
- Physical size of the source
- Usually decreases with  $m_T$

### Levy exponent $\alpha$

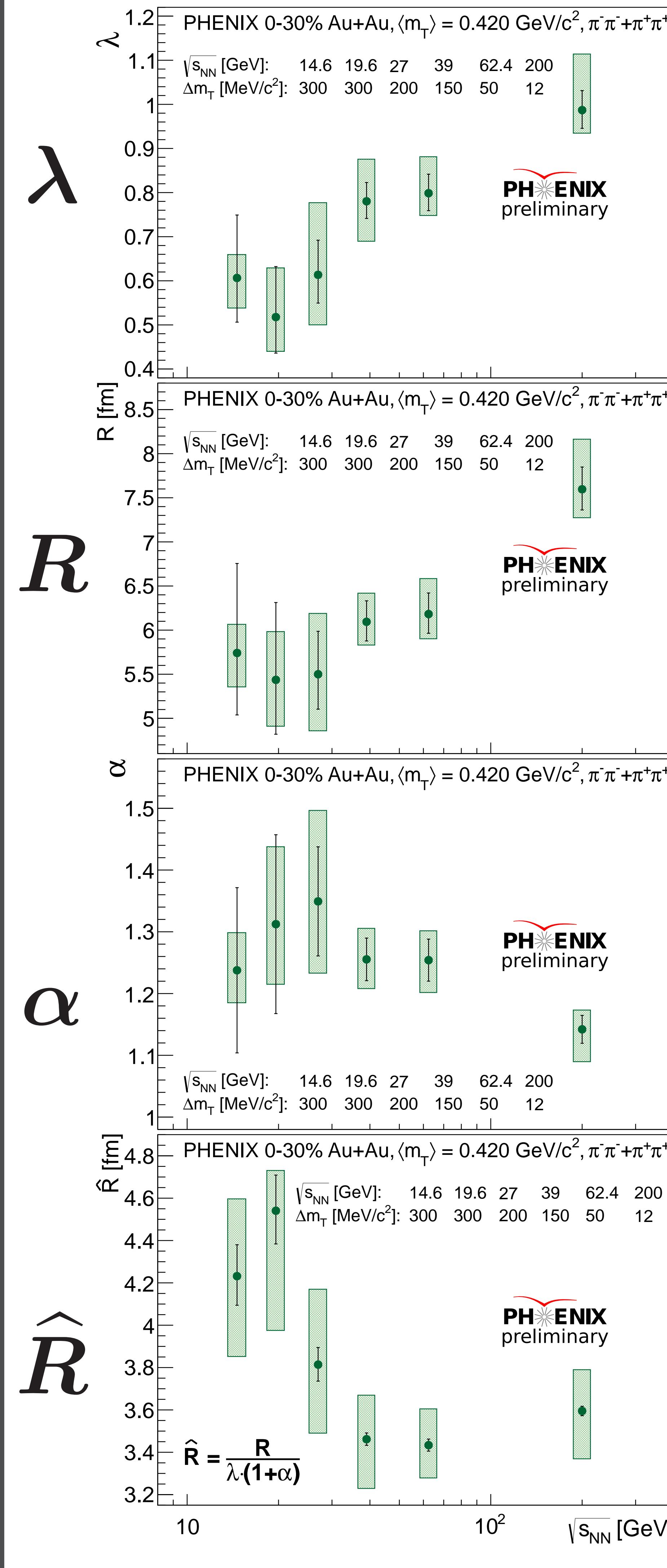
- Connected to critical exponent  $\eta$
- Could be a good signal of CEP

$$\hat{R} = R / (\lambda(1 + \alpha))$$

- It can be determined more precisely
- Less correlated with other parameters

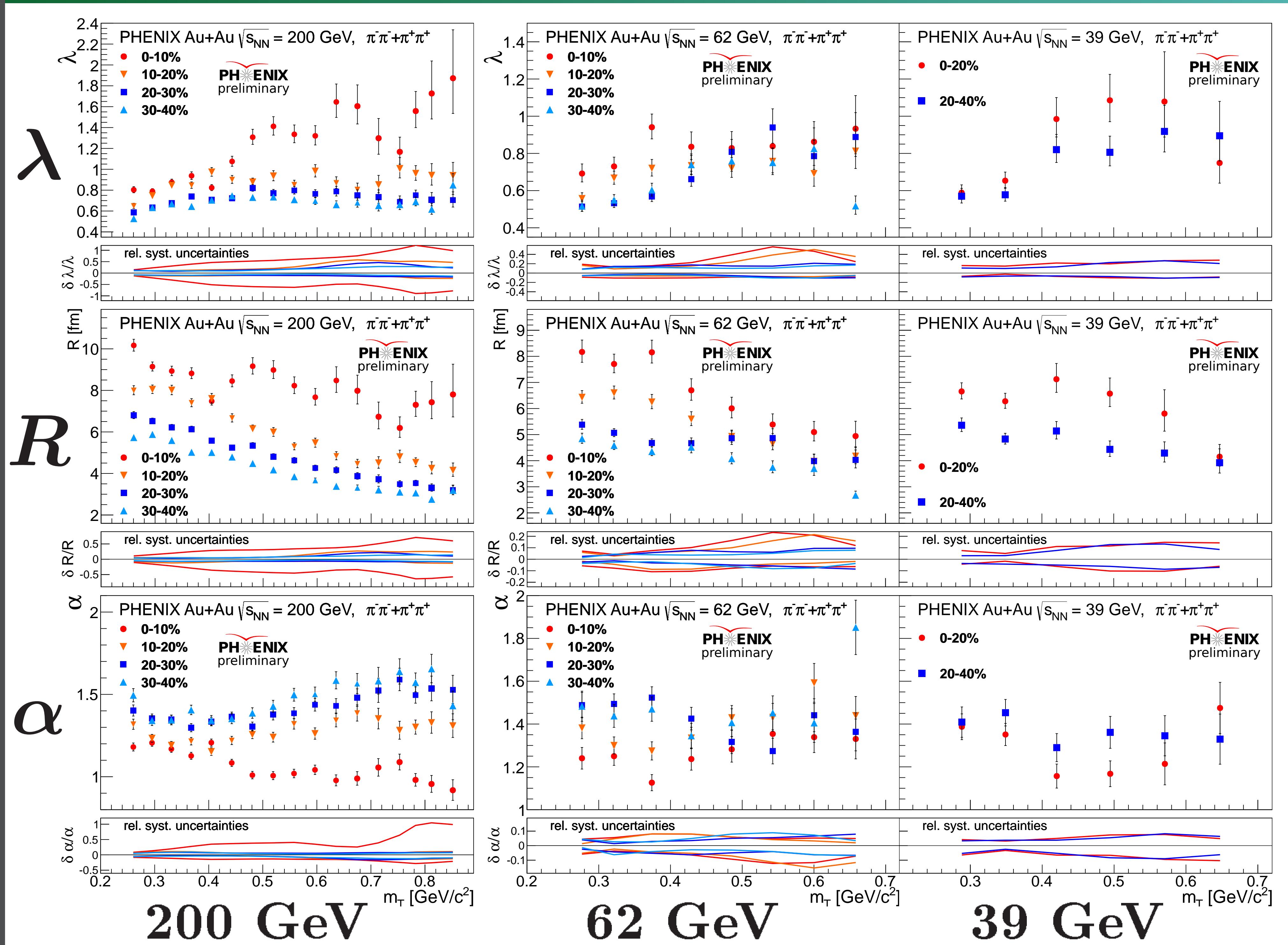


## Excitation functions



- Weak non-monotonicity vs.  $\sqrt{s_{NN}}$  is seen
- $\alpha$  is far from hydro (2) and CEP (0.5) limit
- Effect of  $m_T$  bin widths important in case of the systematic uncertainties

## Centrality and $m_T$ dependence of the Levy parameters



- Levy scale  $R$  has strong, geometrical-type centrality dependence
- Low  $m_T$  decrease in  $\lambda$  is present in all cases
- Levy exponent  $\alpha$  has weak  $m_T$  dependence

## Summary

- Levy fits work well at all energy, centrality and  $m_T$  ranges
- Excitation function of the Levy parameters show weak non-monotonicity
- Levy exponent is far from the conjectured value at CEP (0.5)
  - More detailed investigation needed, may have to change the interpretation
- More details about the related analyses:
  - PHENIX Coll., A. Adare et al., arXiv:1709.05649 (accepted by Phys.Rev.C)
  - D. Kincses for the PHENIX Collaboration, Universe 2018, 4(1), 11
  - S. Lökös for the PHENIX Collaboration, Universe 2018, 4(2), 31

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