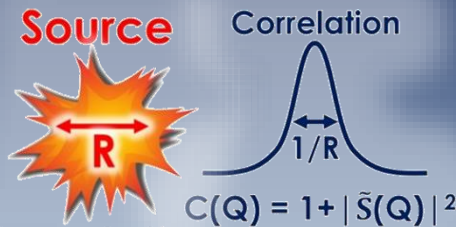


# Event-by-event investigation of the two-particle source function in heavy-ion collisions with EPOS



December 5-9, 2022  
Budapest, Hungary



- Experiments: measuring  $C(Q)$  mom. corr. to gain information about  $D(r)$  pair source
- **Event generators:  $D(r)$  directly available!**
- Experimental indications – power-law component in pion pair-source – Lévy shape?

$$C(Q, K) = \frac{\int D(r, K) |\psi_Q(r)|^2 dr}{\int D(r, K) dr}$$

$$\mathcal{L}(\alpha, R; r) = \frac{1}{(2\pi)^3} \int d^3q e^{iqr} e^{-\frac{1}{2}|qR|^\alpha}$$

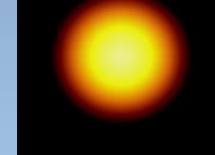
relative pair momentum

average pair momentum

relative coordinate

Pair wave func., contains FSI

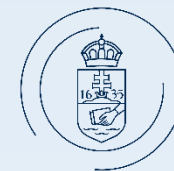
Gaussian ( $\alpha=2$ )



Lévy ( $\alpha < 2$ )

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**ELTE**  
EÖTVÖS LORÁND  
UNIVERSITY



# Appearance of Lévy-type sources in heavy-ion collisions (Au+Au @ 200 GeV)

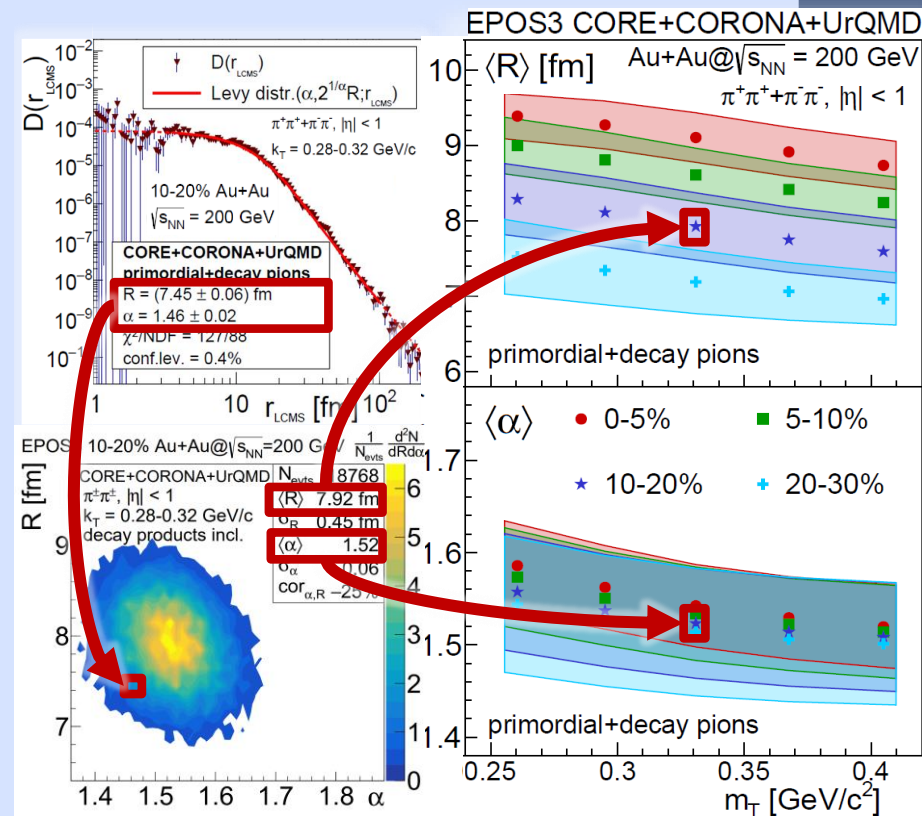
## Possible (competing) reasons for the appearance of Lévy-type sources:

1. (Jet fragmentation)
2. (Proximity of the critical endpoint)
3. **Event averaging (different shapes)?**
4. **Resonance decays?**
5. **Anomalous diffusion?**

## EPOS 200 GeV Au+Au collisions: Event-by-event non-Gaussianity!!!

- Single-event Lévy fits → good description
- power-law tail strongly affected by rescattering, decays;  $2 > \alpha_{EPOS} > \alpha_{exp}$
- Lévy shape not from event averaging!

*D. Kincses, M. Stefaniak, M. Csanád, Entropy 24 (2022) 3, 308*





# Appearance of Lévy-type sources in heavy-ion collisions (Pb+Pb @ 2.76 TeV)

## • Brand new results for EPOS Pb+Pb @ 2.76 TeV

arXiv:2212.02980

- $m_T$  dependence of Lévy source parameters
- Effect of resonance decays
- Particle species dependence
- New scaling behavior observed
- Check out the poster for more details!

