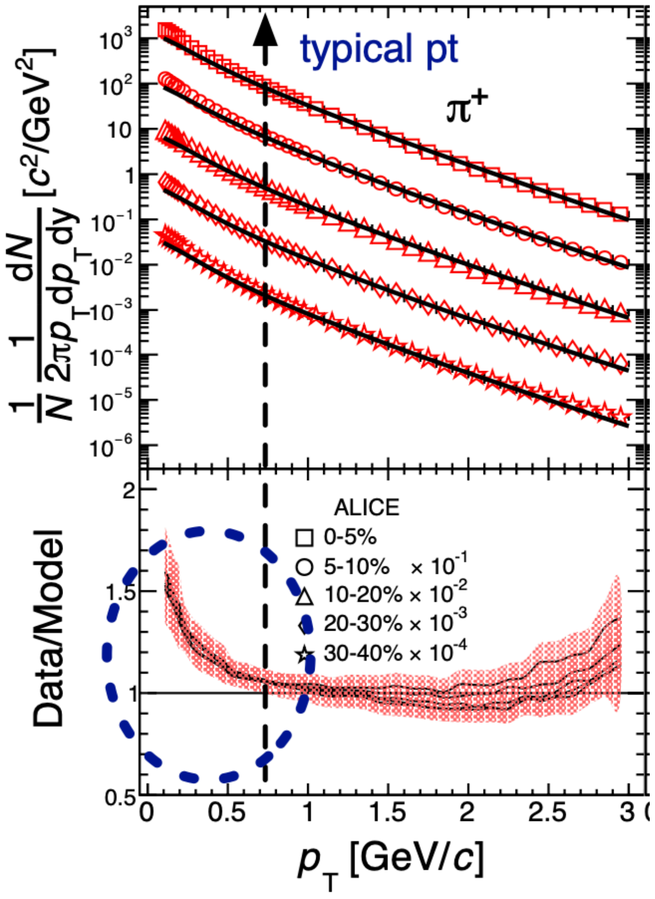
EXCESS SOFT PIONS

1909.10485



Soft pion excess hints to missing physics

Two mechanisms for excess production.

- Superfluidity of pions at low $p_\perp$

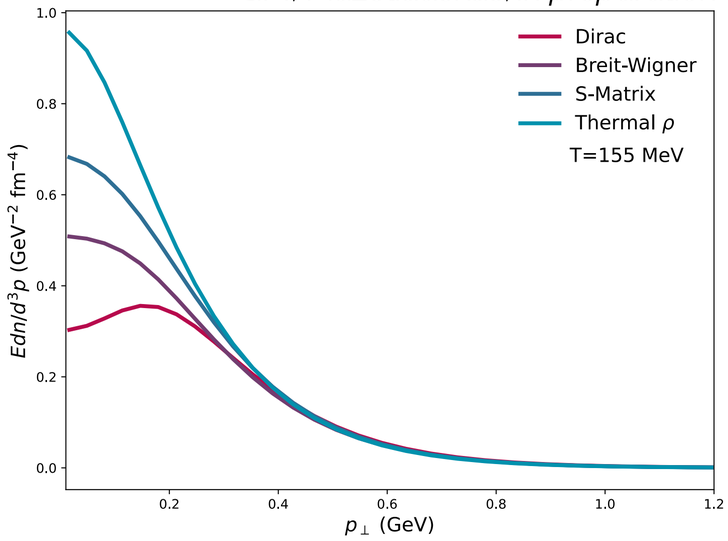
  Chiral modes modify the dispersion relation of the Goldstone modes which enhances the yield at Cooper-Frye.

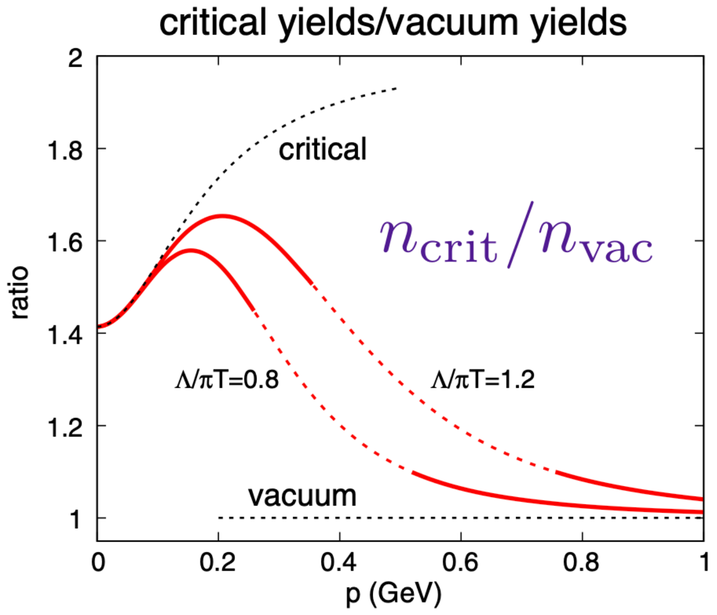
- Thermal Spectral functions

  As CF is crossed, the system is supposed to be in thermal equilibrium, which changes the properties of the spectral func. for particles, specially resonances.

  Dileptons-Chiral restoration

GM, Mazeliauskas, *in preparation*



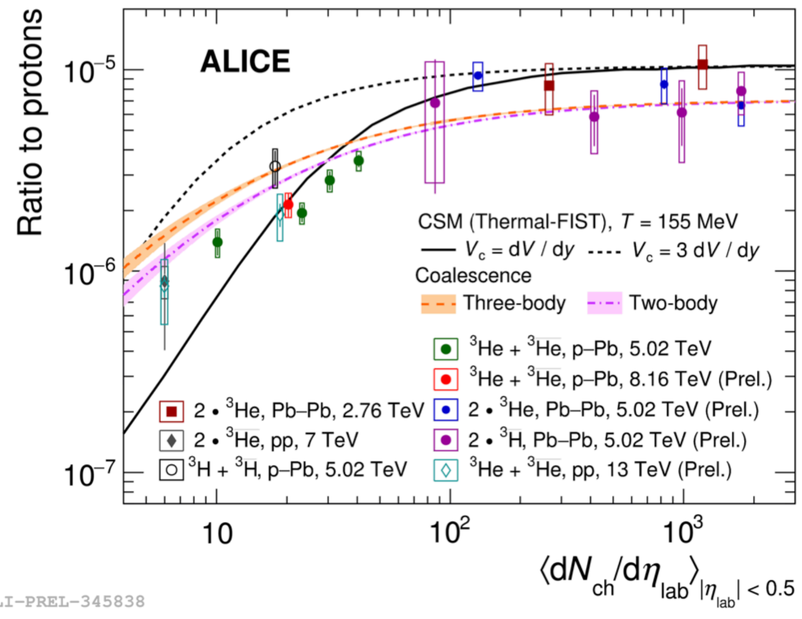


LIGHT NUCLEI...

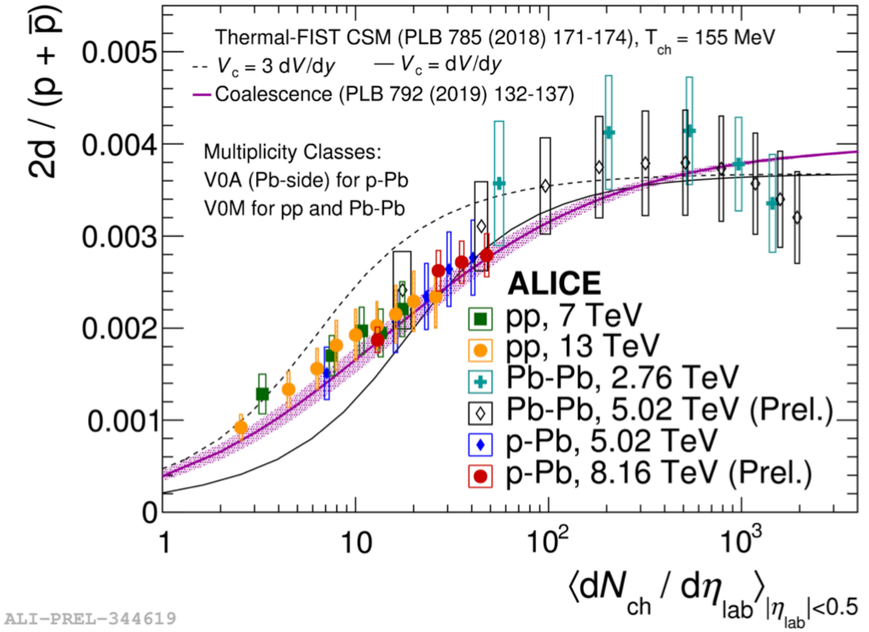
...IS A DEEPER PROBLEM THAN YOU MAY THINK

Light nuclei is a *smoothie* of problems. Freeze-out meets formation time, meets dynamical open systems

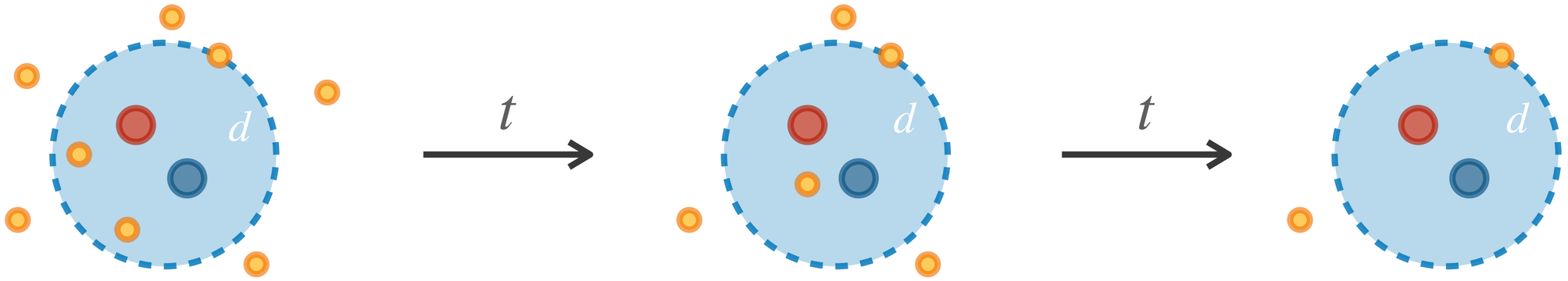
Open quantum system, with variable dense-dilute transition. A complex, but similar version of heavy-quark evolution.



ALI-PREL-345838



ALI-PREL-344619



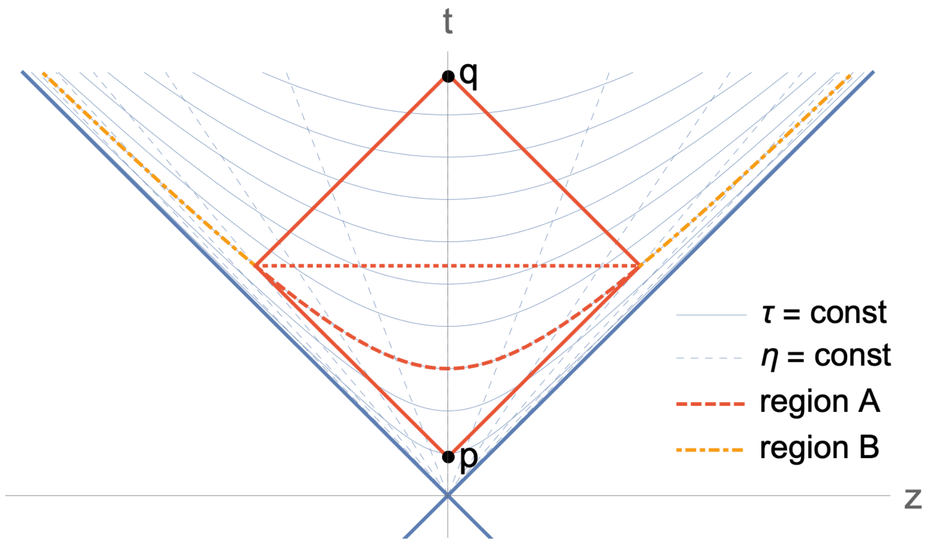
ENTANGLEMENT

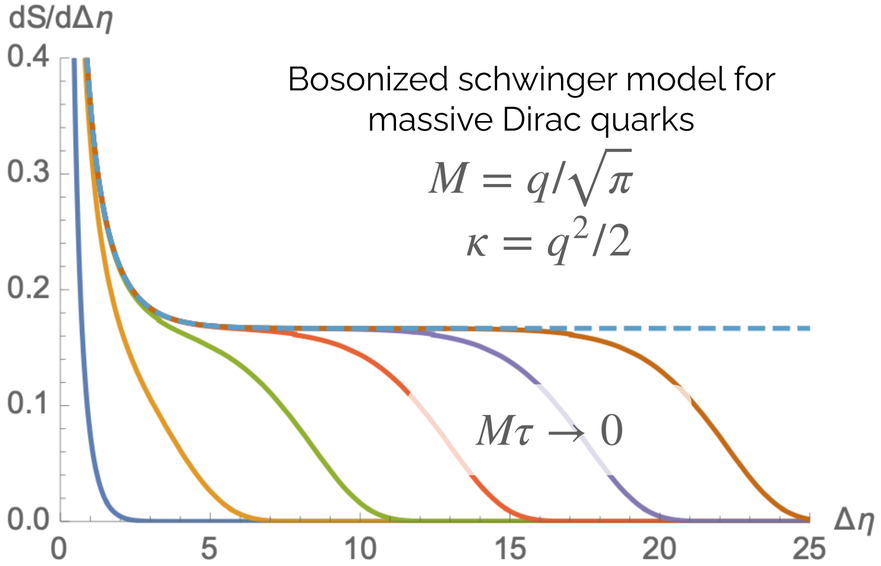
...IS THERMAL EQUILIBRIUM REALLY THERE?

Horizon phenomena in QFT?

- Information outside light-cone creates effective bath.
- Features an instantaneous thermal excitation spectrum from a pure state.

Is this the case of small systems? Are we measuring entanglement entropy instead of a thermalised Quark-Gluon Plasma droplet? ***





*** Also: are these two actually mutually exclusive??

Berges, Floerchinger, Venugopalan, JHEP 1804, 145 (2018)

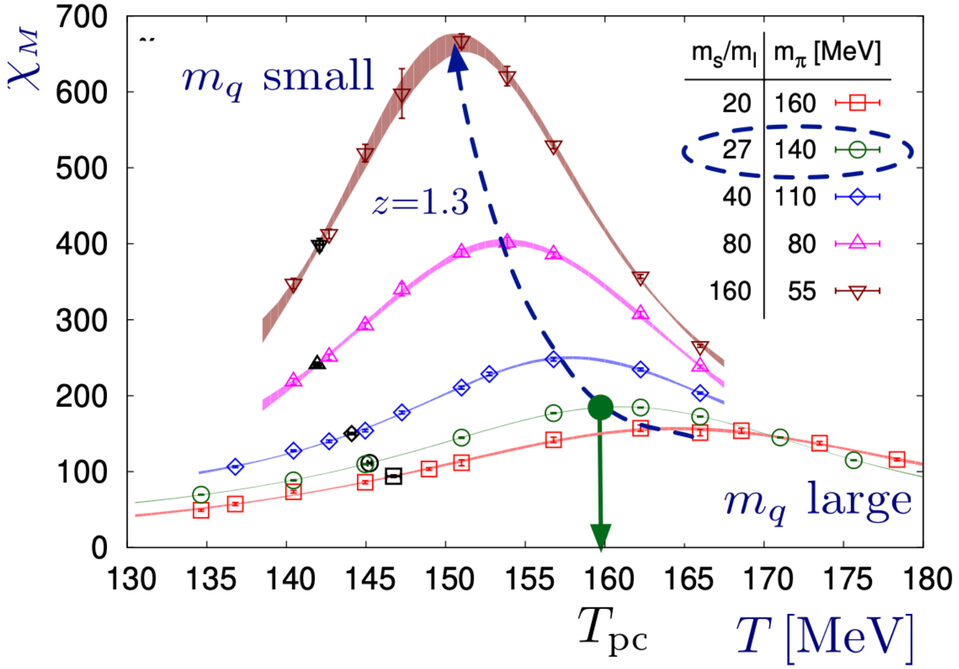
BACKUP

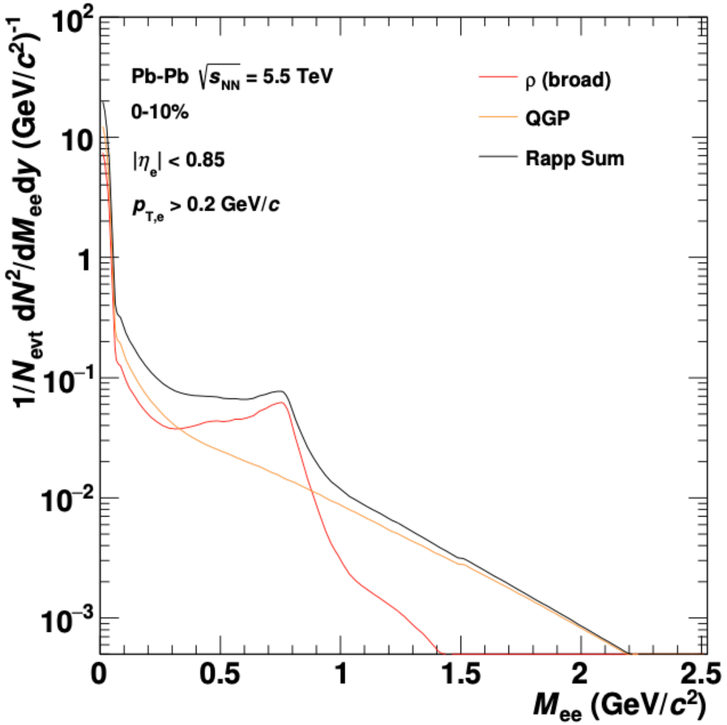
CHIRAL RESTORATION

O(4) fluctuations, $\sigma \sim \bar{u}u + \bar{d}d$

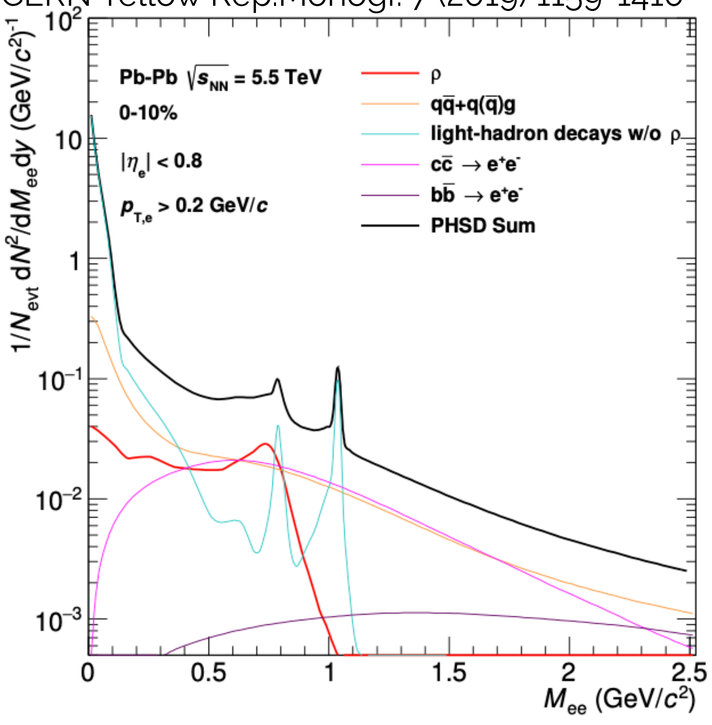
$$\chi_M \sim m_q^{1/\delta - 1} f_\chi(z)$$

$$z = z_0 \frac{T - T_c}{T_c} m_q^{1/\beta\delta}$$

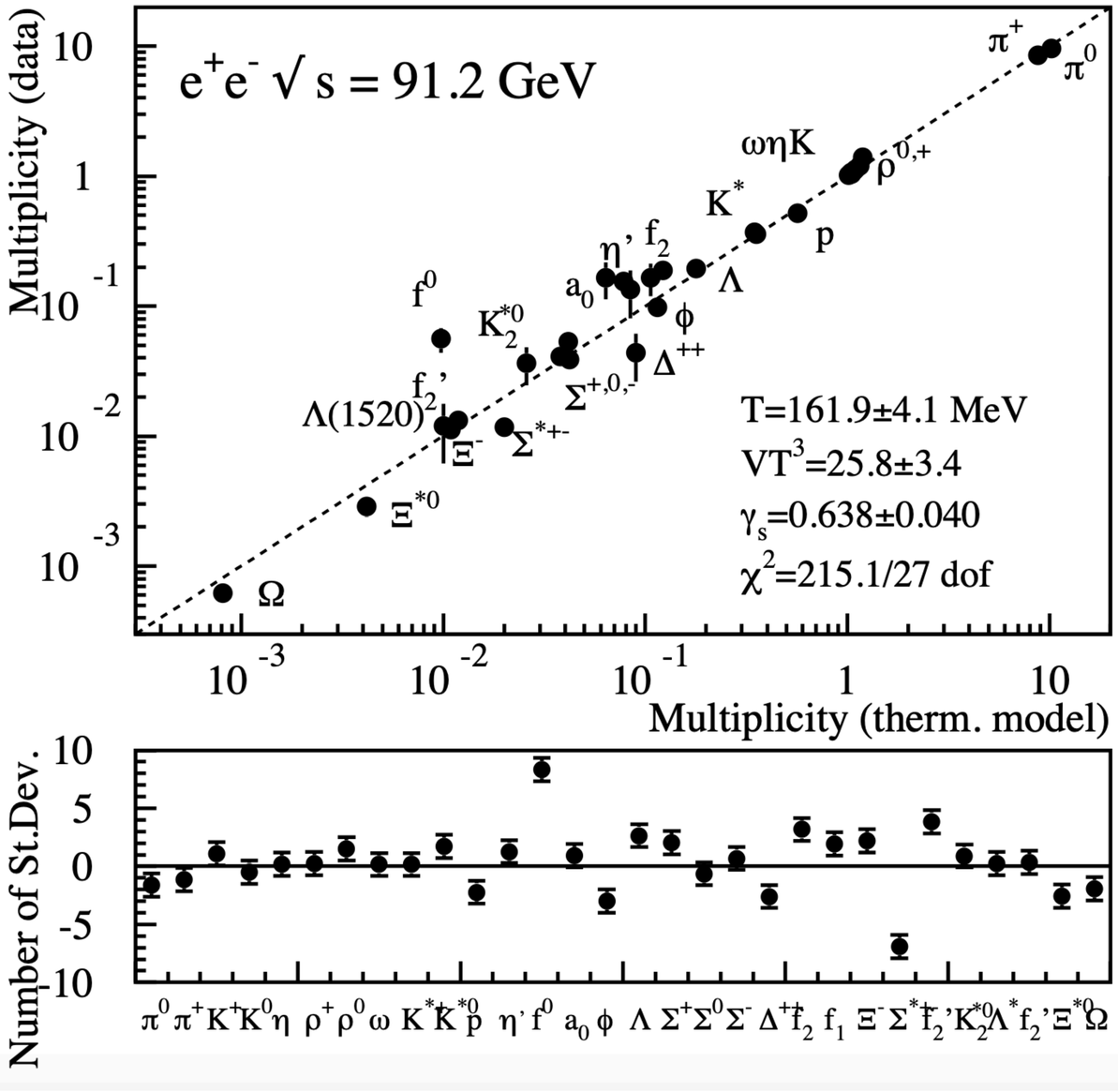




CERN Yellow Rep.Monogr. 7 (2019) 1159-1410



Evidence of chiral restoration in the melting of spectral function through ρ


e+e- √s = 91.2 GeV
Multiplicity (data)
Multiplicity (therm. model)
Number of St.Dev.
T=161.9±4.1 MeV
VT3=25.8±3.4
γs=0.638±0.040
χ2=215.1/27 dof
π+
π0
ωηK
ρ0,+
K*
p
η, f2
Λ
a0
f0
K*02
φ
Δ++
f2'
Σ+,0,-
Λ(1520)
Ξ-
Σ*+-
Ξ*0
Ω
π0 π+ K+K0 η ρ+ρ0 ω K*K*0 p η' f0 a0 φ Λ Σ+Σ0Σ- Δ++f2 f1 Ξ- Σ*+- f2' K*02Λ* f2' Ξ*0 Ω