

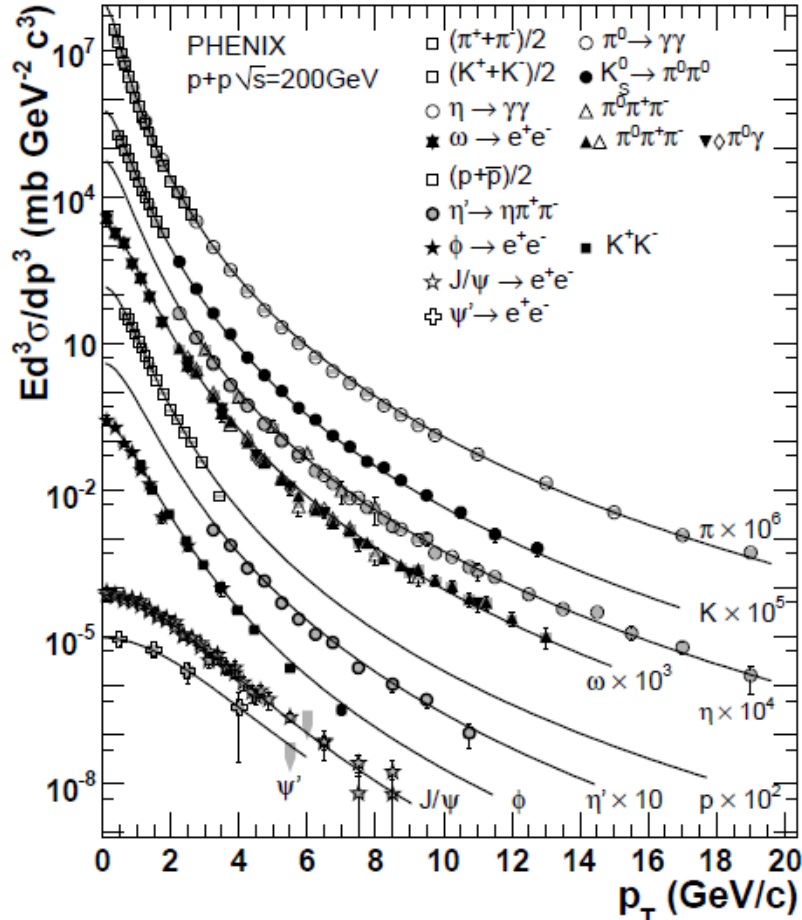
Fitting PHENIX identified hadron production spectra to Tsallis function in p+p and d+Au collisions at 200 GeV

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Production spectra, p+p @ 200 GeV

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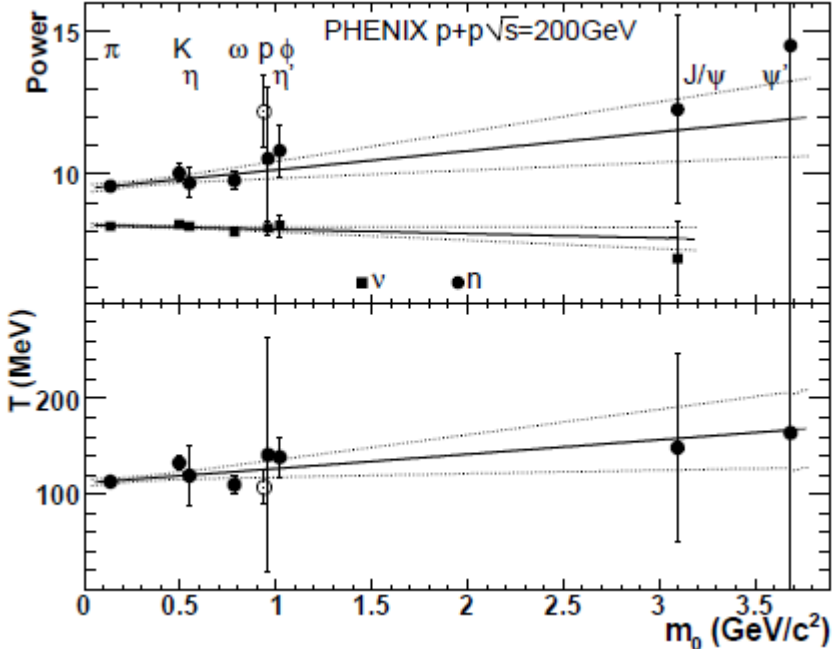


$$E \frac{d^3\sigma}{dp^3} = \frac{1}{2\pi} \frac{d\sigma}{dy} \frac{(n-1)(n-2)}{(nT + m_0(n-1))(nT + m_0)} \times \left(\frac{nT + m_T}{nT + m_0} \right)^{-n}$$

	$d\sigma/dy$ (mb, μb)	T (MeV)	$n = -1/(1-q)$
π	$43.5 \pm 2.0 \pm 1.9$	$112.7 \pm 2.9 \pm 1.1$	$9.57 \pm 0.11 \pm 0.03$
K	$4.0 \pm 0.1 \pm 0.5$	$132.7 \pm 3.8 \pm 7.2$	$10.04 \pm 0.16 \pm 0.27$
η	$5.1 \pm 1.1 \pm 3.9$	$119 \pm 10 \pm 30$	$9.68 \pm 0.18 \pm 0.49$
ω	$4.3 \pm 0.3 \pm 0.4$	$109.7 \pm 6.9 \pm 6.7$	$9.78 \pm 0.24 \pm 0.18$
η'	$0.80 \pm 1.5 \pm 0.7$	$141 \pm 107 \pm 61$	$10.5 \pm 2.2 \pm 1.2$
ϕ	$0.41 \pm 0.02 \pm 0.03$	$139 \pm 16 \pm 15$	$10.82 \pm 0.71 \pm 0.56$
J/ψ	$0.73 \pm 0.01 \pm 0.05$	$149 \pm 56 \pm 82$	$12.3 \pm 1.6 \pm 2.9$
ψ'	$0.13 \pm 0.03 \pm 0.02$	$164 \pm 10^3 \pm 10^2$	$14 \pm 12 \pm 6$
p	$1.63 \pm 0.05 \pm 0.11$	$107 \pm 13 \pm 12$	$12.2 \pm 1.0 \pm 0.7$

- ❖ Wide variety of hadrons, shown charge averaged
- ❖ ToF + different decay modes → good agreement

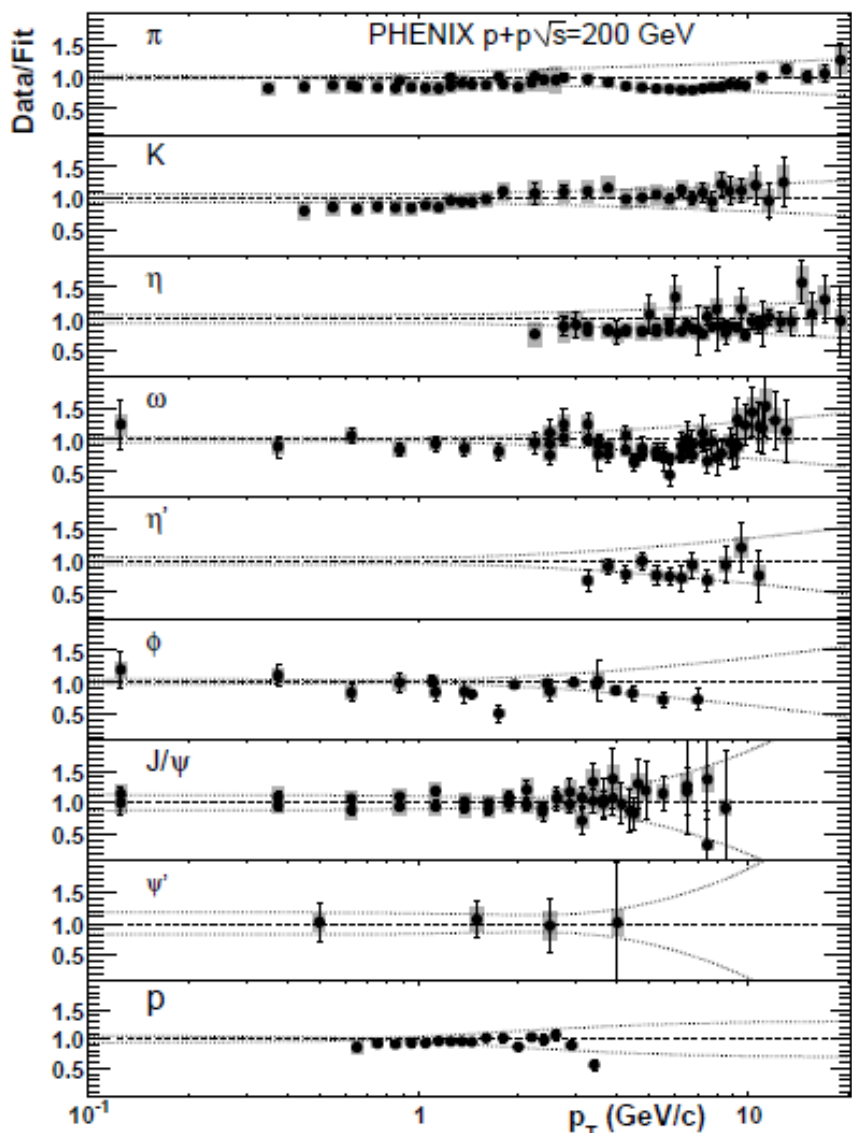
Closer look at fit parameters, p+p @ 200 GeV



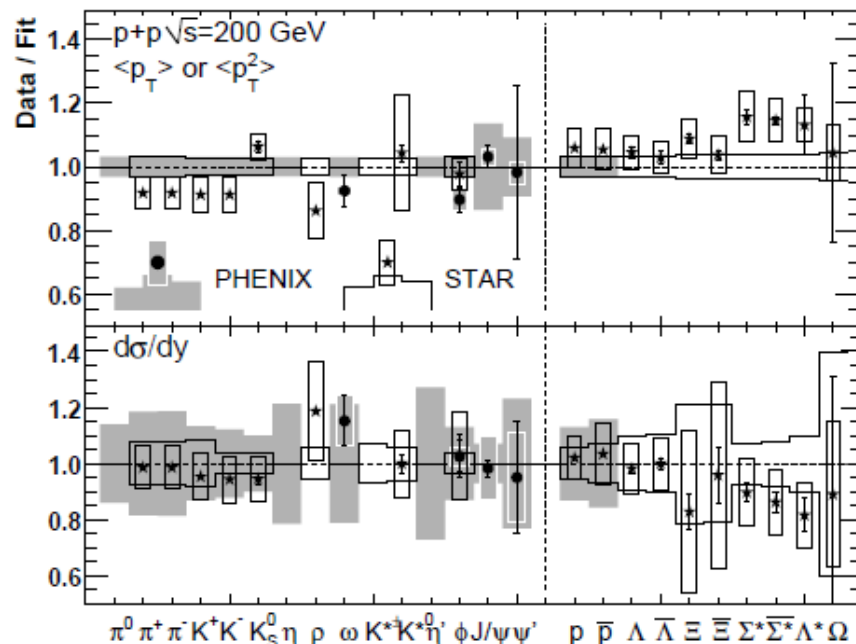
	Fit	Prob.
ν	8.154 ± 0.039	0.75
ν	$(8.22 \pm 0.07) - (0.15 \pm 0.14)m_0[\text{GeV}/c^2]$	0.79
n	9.656 ± 0.097	0.69
n	$(9.48 \pm 0.14) + (0.66 \pm 0.39)m_0[\text{GeV}/c^2]$	0.94
T (MeV)	115.3 ± 2.8	0.43
T (MeV)	$(111.5 \pm 4.0) + (15 \pm 12)m_0[\text{GeV}/c^2]$	0.51

- ❖ Power law fits give similar values of power index ν for all hadrons
- ❖ Observe \sim linear dependence of Tsallis fit parameters on hadron mass
- ❖ Indication of separation between mesons & baryons

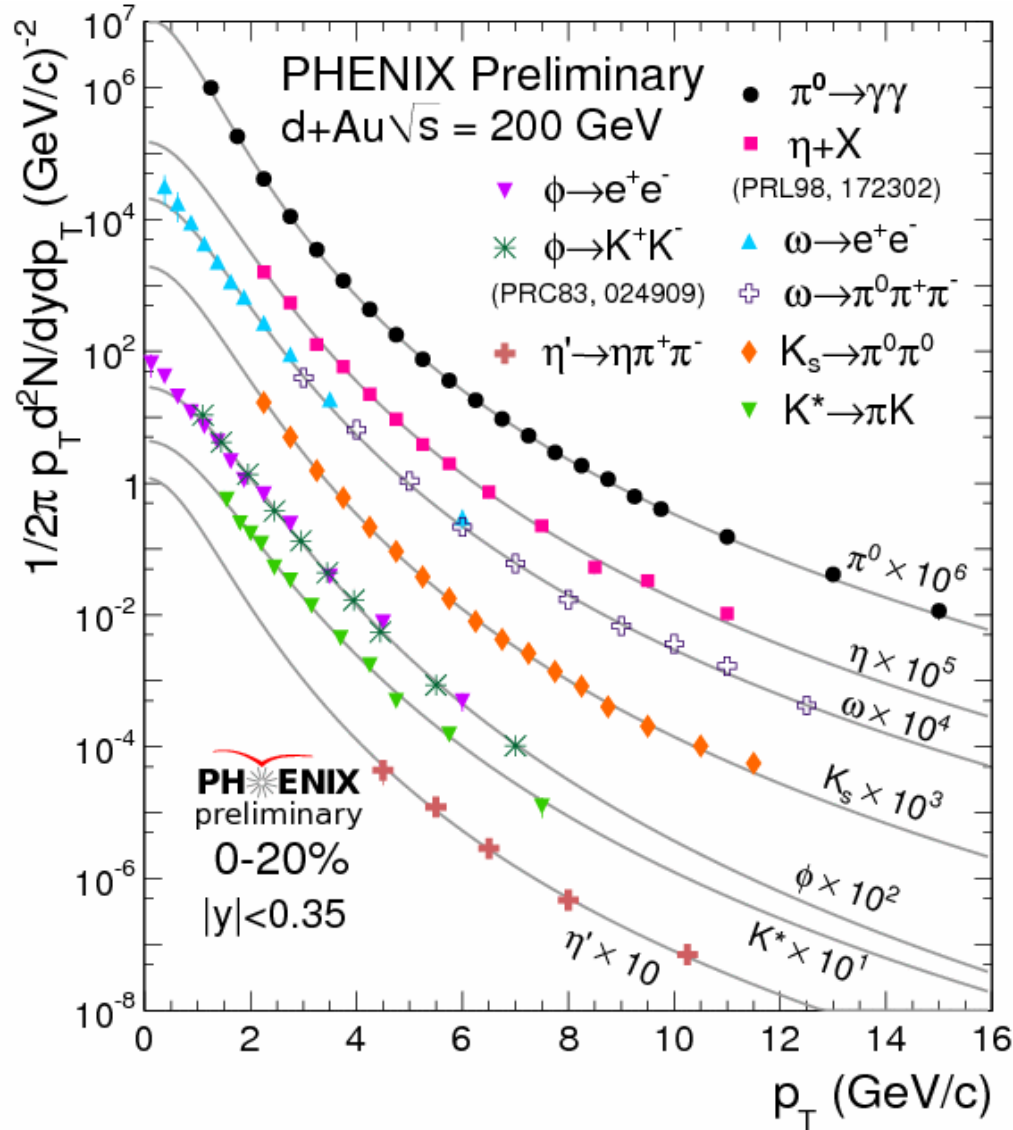
Fits to Tsallis with fixed n & T , p+p @ 200 GeV



- ❖ Ratio of experimental points to Tsallis fits with fixed parameters n & T
- ❖ Still observe reasonable agreement with data
- ❖ Constrained fits can be used for estimation of spectral shapes for hadrons measured in a limited p_T range



Production spectra, d+Au @ 200 GeV



- ❖ Wide variety of hadrons
- ❖ Production spectra can be described with Tsallis function
- ❖ ToF + heavy hadrons can be added
- ❖ Potential for similar analysis of fit parameters