PHY397K - NUCLEAR PHYSICS - 7

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Spring 2015, Unique numbers: 57115
RLM 5.116, TTH 12:30 - 2:00 pm

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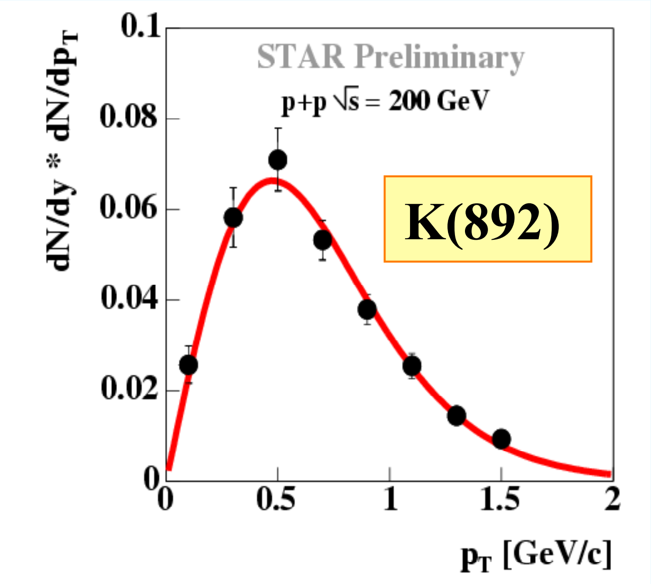
Transverse momentum distribution

Resonance p_T Spectra in p+p at 200 GeV at mid Rapidity



$m_T = (m^2 + p_T^2)^{1/2}$
transverse mass (Note: requires knowledge of mass)

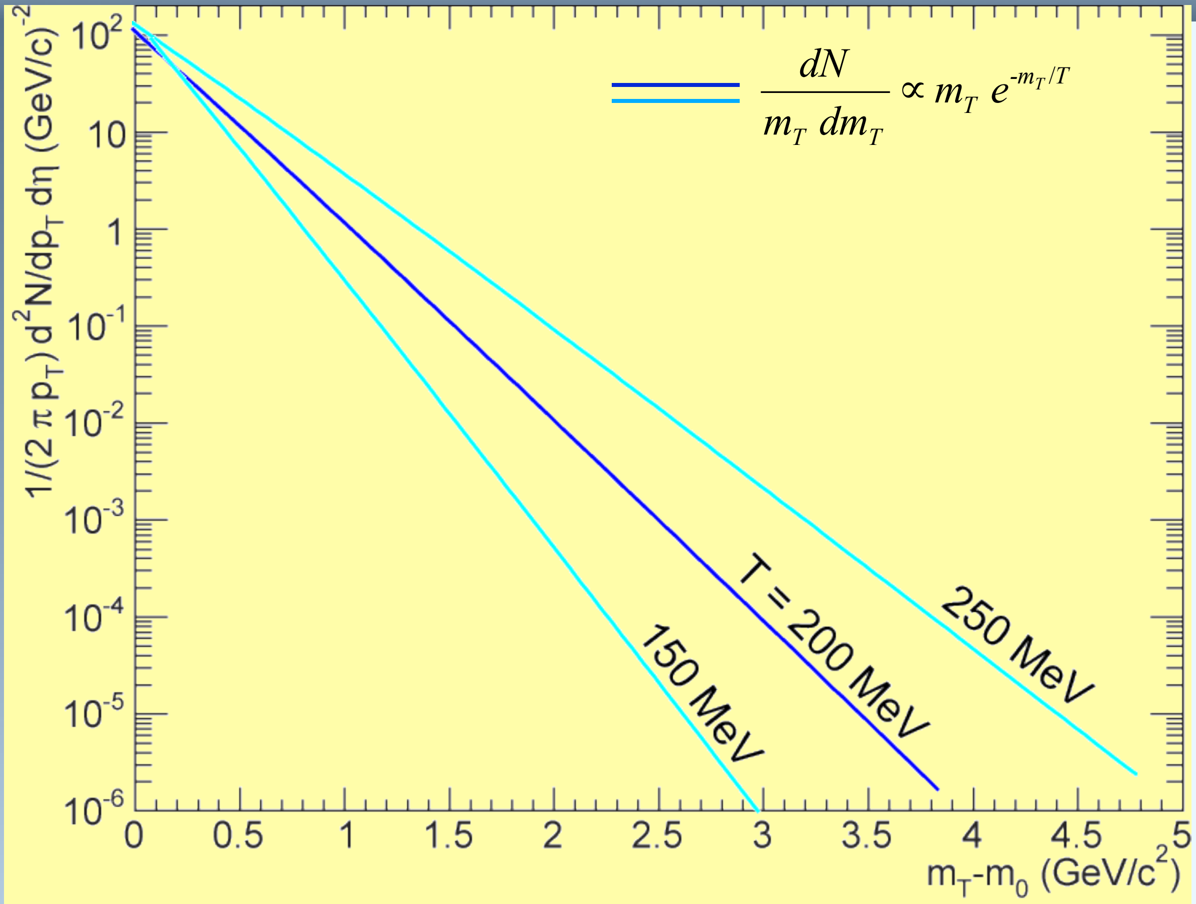
$$\frac{dN}{m_T\, dm_T} \propto m_T\, e^{-m_T/T}$$

"Boltzmann"

$$\frac{dN}{m_T\, dm_T} = \frac{dN}{p_T\, dp_T}$$

	p_T-coverage (yield)	$\langle p_T \rangle$ (integrated)
K(892)	95%	680 ± 30 ± 30 MeV

“Thermal” Spectra (flow aside)



Describes many spectra well over several orders of magnitude with almost uniform slope 1/T

- usually fails at low-p_T (⇒ flow)
- most certainly will fail at high-p_T (⇒ power-law)

Accelerators: Relativistic heavy ion collisions

Beschleuniger	Ort	HI-Perioden	Max. Energie	Projektile	Experimente
Bevalac	LBNL, Berkeley	1984 - 1993	< 2 *A*GeV	C, Ca, Nb, Ni, Au, ...	Plastic Ball, Streamer Chamber, EOS, DLS
Synchro-Phasotron	JINR, Dubna	1974 - 1985	> 100 *A*MeV		
AGS	BNL, Brookhaven	1986 - 1994	14.5/11.5 *A*GeV	Si, Au	E802, ..., E917
SPS	CERN, Geneva	1986 →	200/158 *A*GeV	O, S, In, Pb	NA34,... , WA80,...
SIS	GSI, Darmstadt	1992 →	2 *A*GeV	Kr, Au	FOPI, KAOS, HADES
RHIC	BNL, Brookhaven	2000 →	$\sqrt{s_{NN}}$ = 200 GeV	Cu,Au	STAR, PHENIX, BRAHMS, PHOBOS
LHC	CERN, Geneva	2009 →	$\sqrt{s_{NN}}$ = 5.5 TeV	O, Ar, Pb	ALICE, CMS, ATLAS
SIS100/300	GSI, Darmstadt	2019 →	30/45 *A*GeV	Au	HADES, CBM
Nuklotron	JINR, Dubna	2017 →	6 *A*GeV	Au	
NICA	JINR, Dubna	2017 →	$\sqrt{s_{NN}}$ = 4 – 11 GeV	Au	MPD

Rapidity ↔ Pseudo Rapidity