E_T distributions and Wounded Nucleon Models

• Extreme-independent collision models of B+A collisions allow the effect of Nuclear Geometry and Dynamics to be separated.

• Nuclear Geometry is represented as the relative probability per interaction w_n for a given number of total participants (WNM), projectile participants (WPNM), wounded projectile quarks (AQM), or other fundamental element of particle production.

• The dynamics of the elementary underlying process is taken from the data **e.g. the measured E_T distribution for a p-p collision represents 2 wounded nucleons, or 1 N-N collision, or 1 wounded projectile nucleon**, $f_1(E_T)$

• The B+A collision is represented as the result of multiple **independent** elementary collision processes, i.e. the E_T distribution $f_n(E_T)$ for n wounded-nucleons is just the n-th convolution of $f_1(E_T)$—sound familiar?

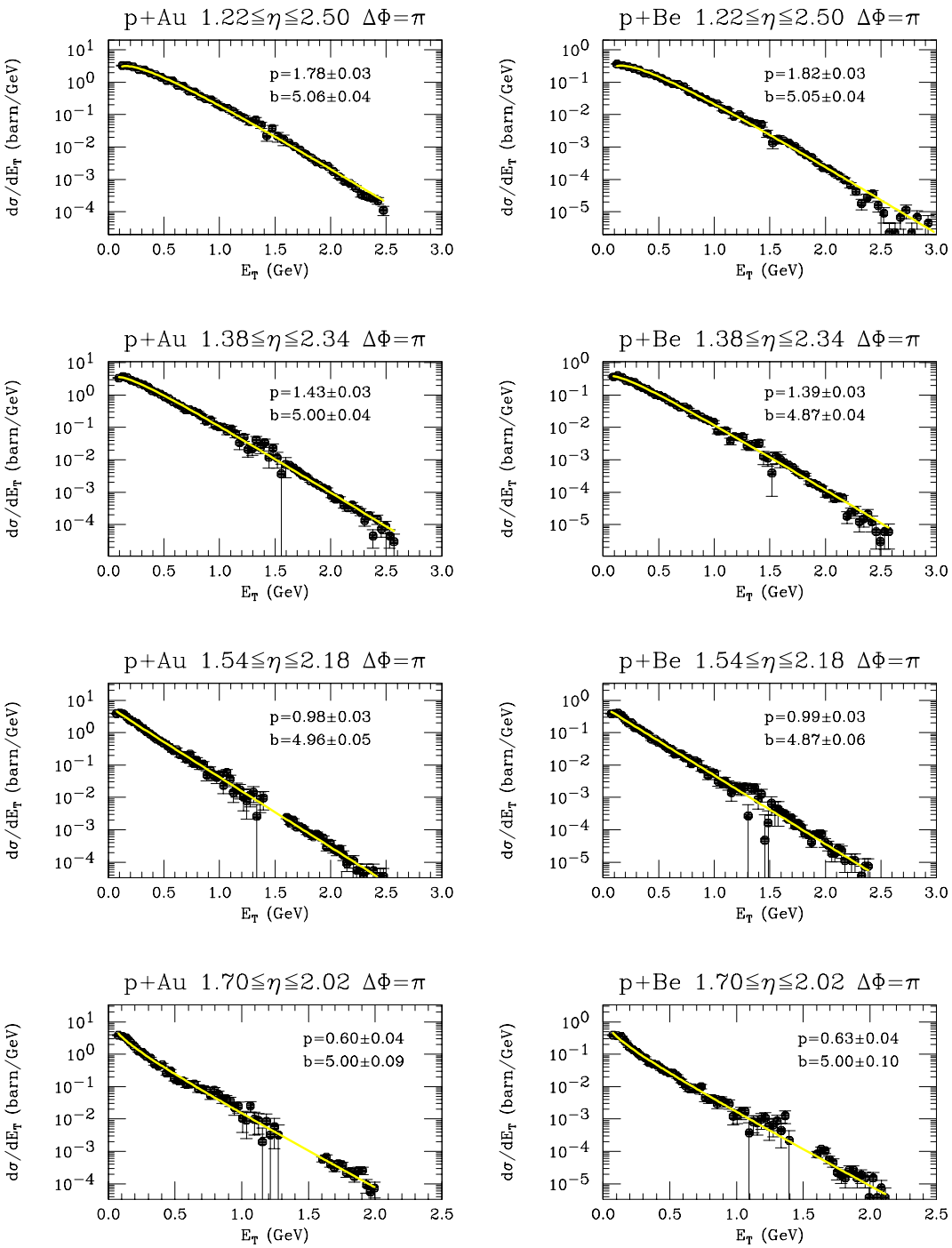
•The WNM calculation for a B+A reaction is given by the sum:

$$\left(\frac{d\sigma}{dE_T}\right)_{\rm WNM} = \sigma_{BA} \sum_{n=1}^{n_{max}} w_n \, f_n(E_T) \qquad (1)$$

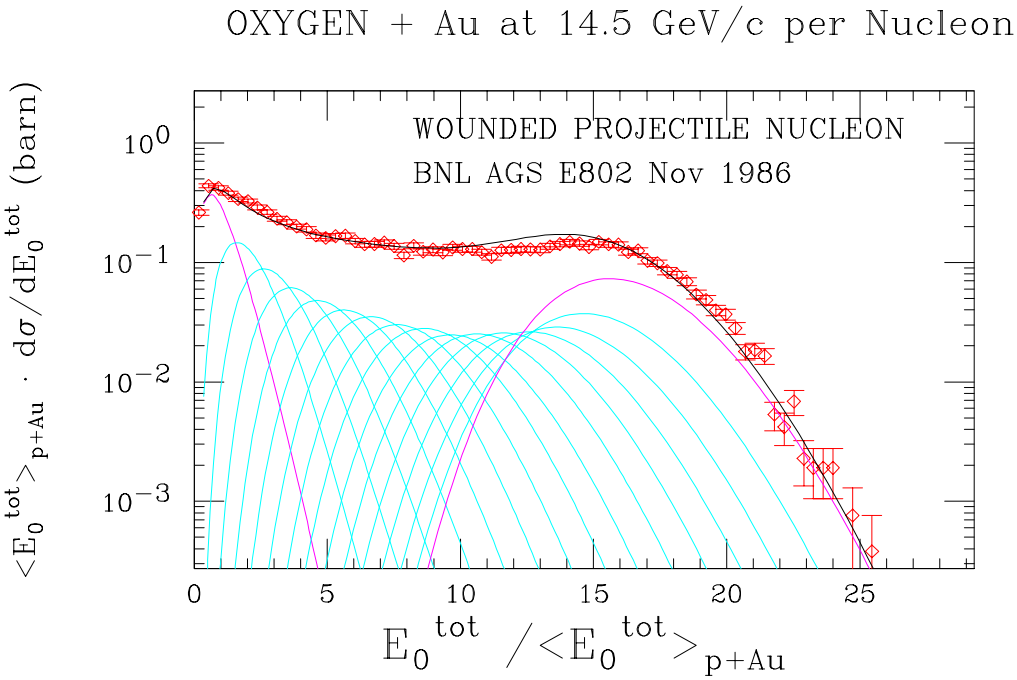
where σ_{BA} is the measured B+A cross section in the interval $\delta\eta$, w_n is the relative probability for n wounded nucleons in the B+A reaction and $f_n(E_T)$ is the calculated E_T distribution on the $\delta\eta$ interval for n independently interacting wounded nucleons. [This assumes that a WN always gives a count on the interval. The general case is slightly more complicated.]

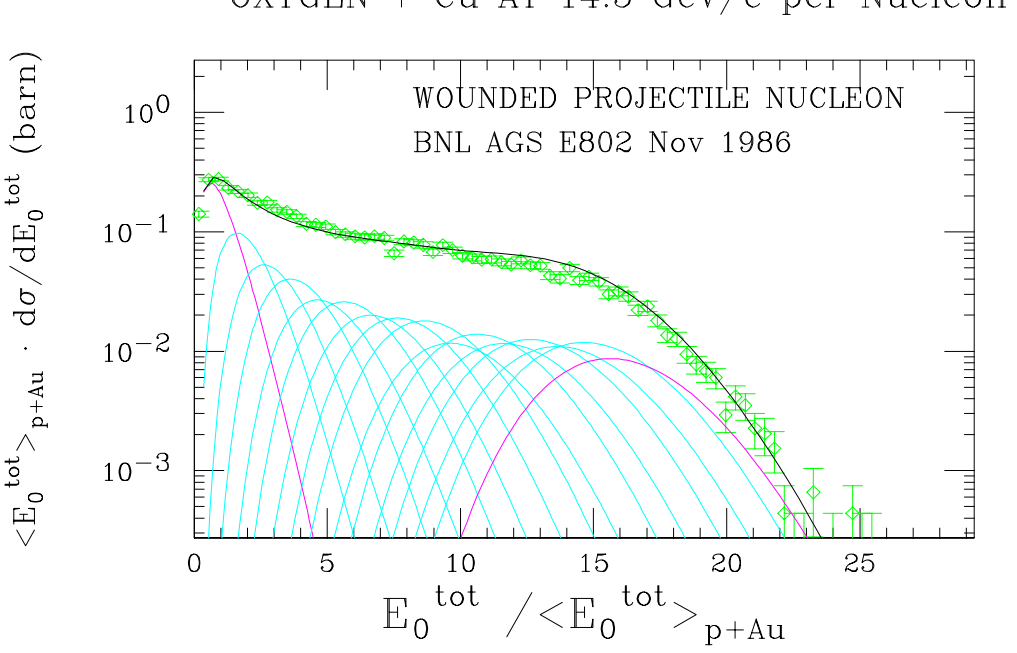
• **Conveniently, E_T disributions for the elementary process (p-p collisions) are Gamma Distributions!**

AGS-E802-Wounded Projectile Nucleon Model works at mid-rapidity p+Au, p+Be vs $\delta\eta$



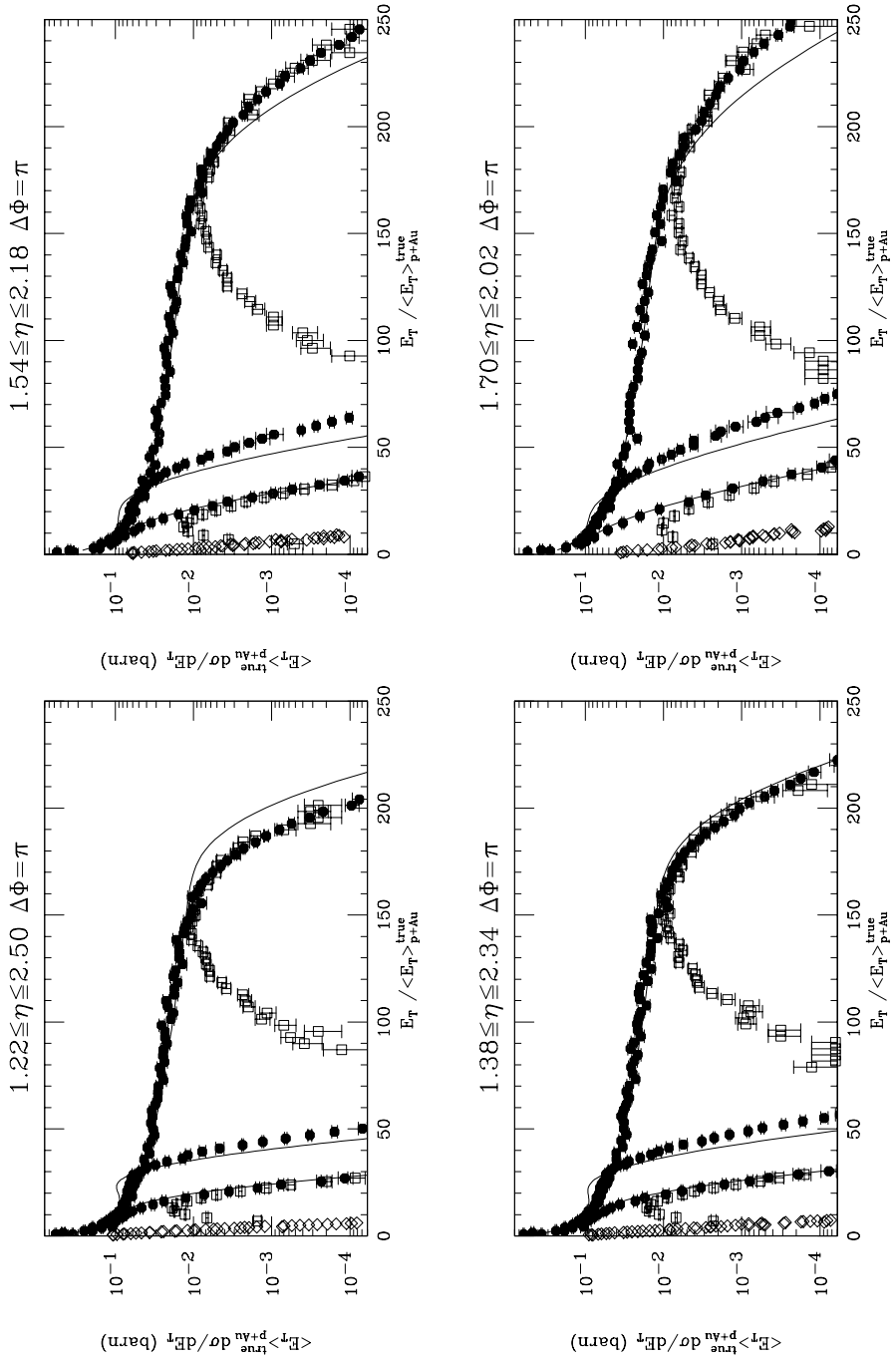
AGS-WNM overpredicts, WPNM excellent O+Au





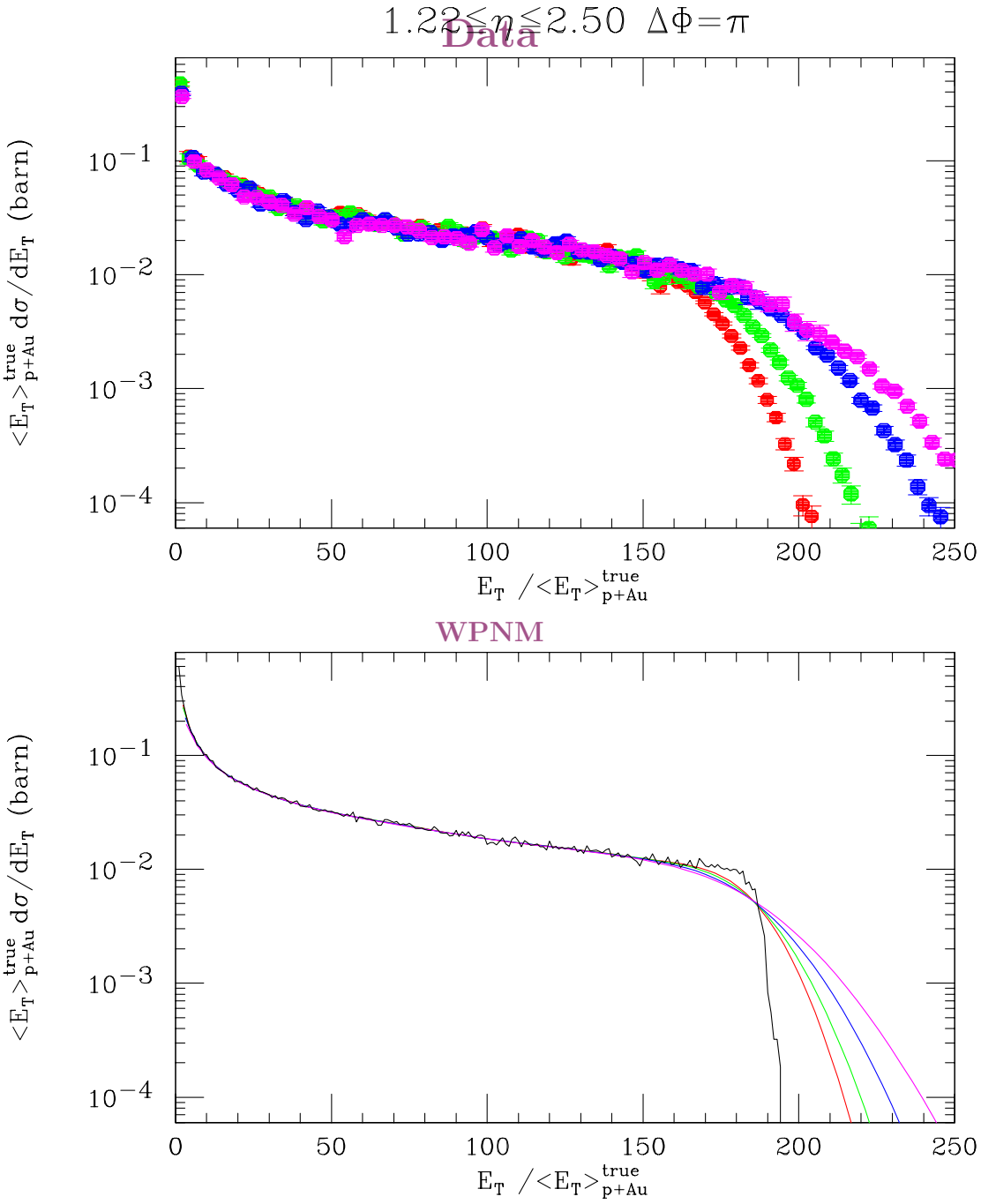
AGS-WPNM reasonable vs $\delta\eta$ O+Cu, Si+Au Au+Au

• Aperture normalized distributions $E_T(\delta\eta)$ in units of $\langle E_T(\delta\eta)\rangle_{\rm p+Au}$. Gives direct reading in projectile participants.



AGS-Au+Au all $\delta\eta$ Data and WPNM

• Aperture normalized distributions $E_T(\delta\eta)$ in units of $\langle E_T(\delta\eta)\rangle_{\rm p+Au}$. Gives direct reading in projectile participants=$N_{\rm part}/2$ for Au+Au.



• Note black line is WPNM w_n only.

We need RHIC p-p data but something interesting from ISR?

• ISR E_T vs $\sqrt{s}$. [AFS, PLB128, 354 (1983)] Slope of upper tail varies markedly with $\sqrt{s}$. Does $\langle p_T \rangle$ change that rapidly or is this a p_T correlation?