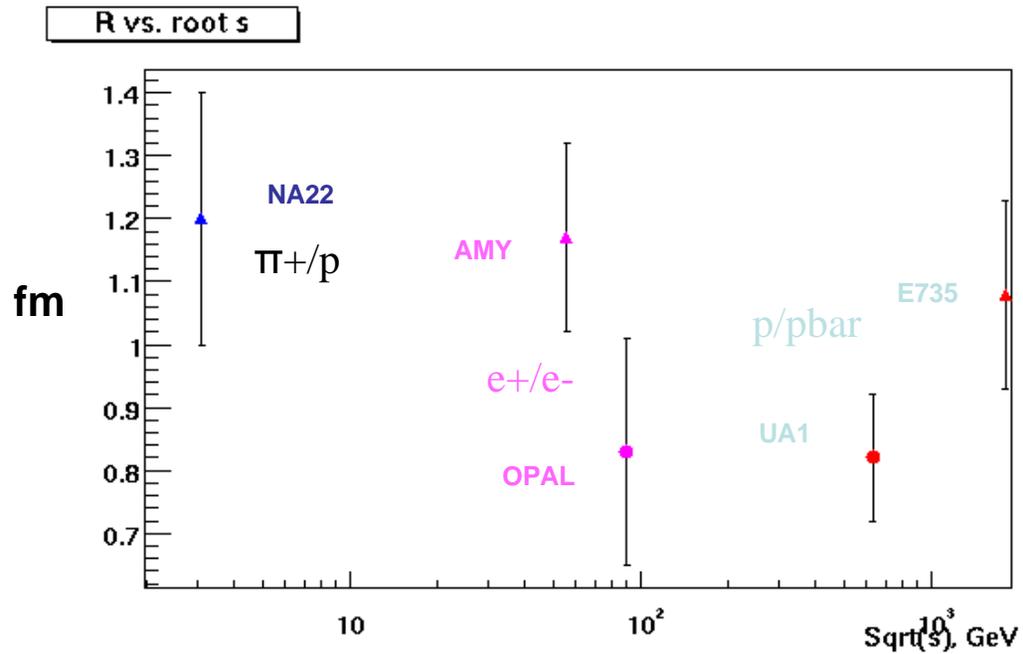


HBT in pp collisions?

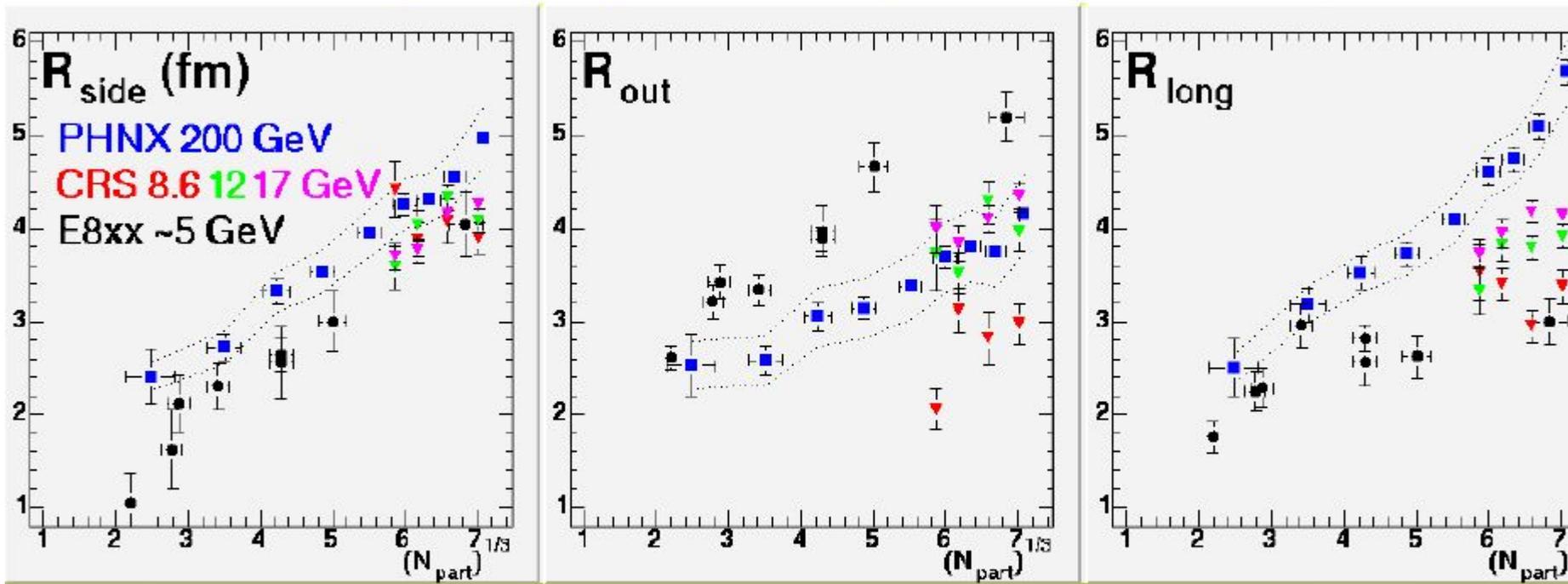


Just a sampling

- Dowell., Proc. Of the VII Topical Workshop on Proton-Antiproton Collider Physics, p115, Word Scientific 1989.
- Lindsey. "Results from E735 at the Tevetron Proton-Antiproton Collider with root s= 1.8TeV", Presented at the Quarkmatter 1991, Gatlinberg, Tennessee, Nov 11-15, 1991.
- OPAL Collaboration. Physics Letters B. Vol 267 #1, 5 September, 1991.
- NA22 Collaboration "Estimation of Hydrodynamical model parameters from the invariant spectrum and the Bose-Einstein Correlations...", Nijmegen preprint, HEN-405, Dec. 97.

Centrality Dependence

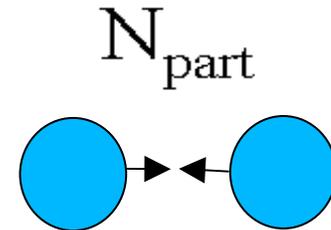
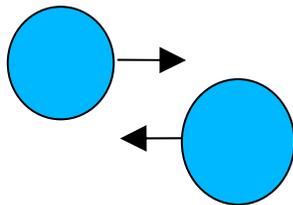
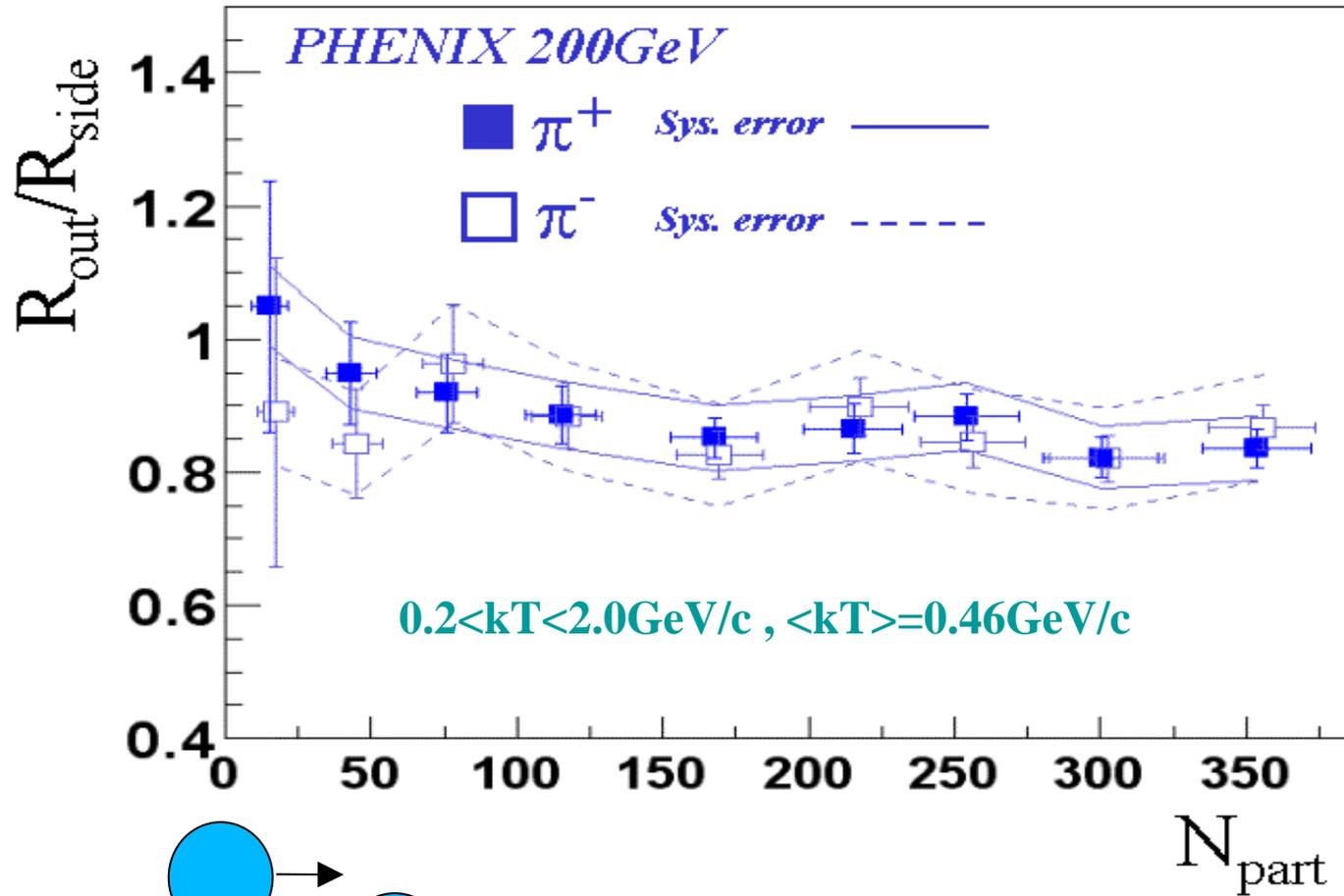
- 5 Energies, 3 experiments, k_T from 0.32-0.46 GeV/c

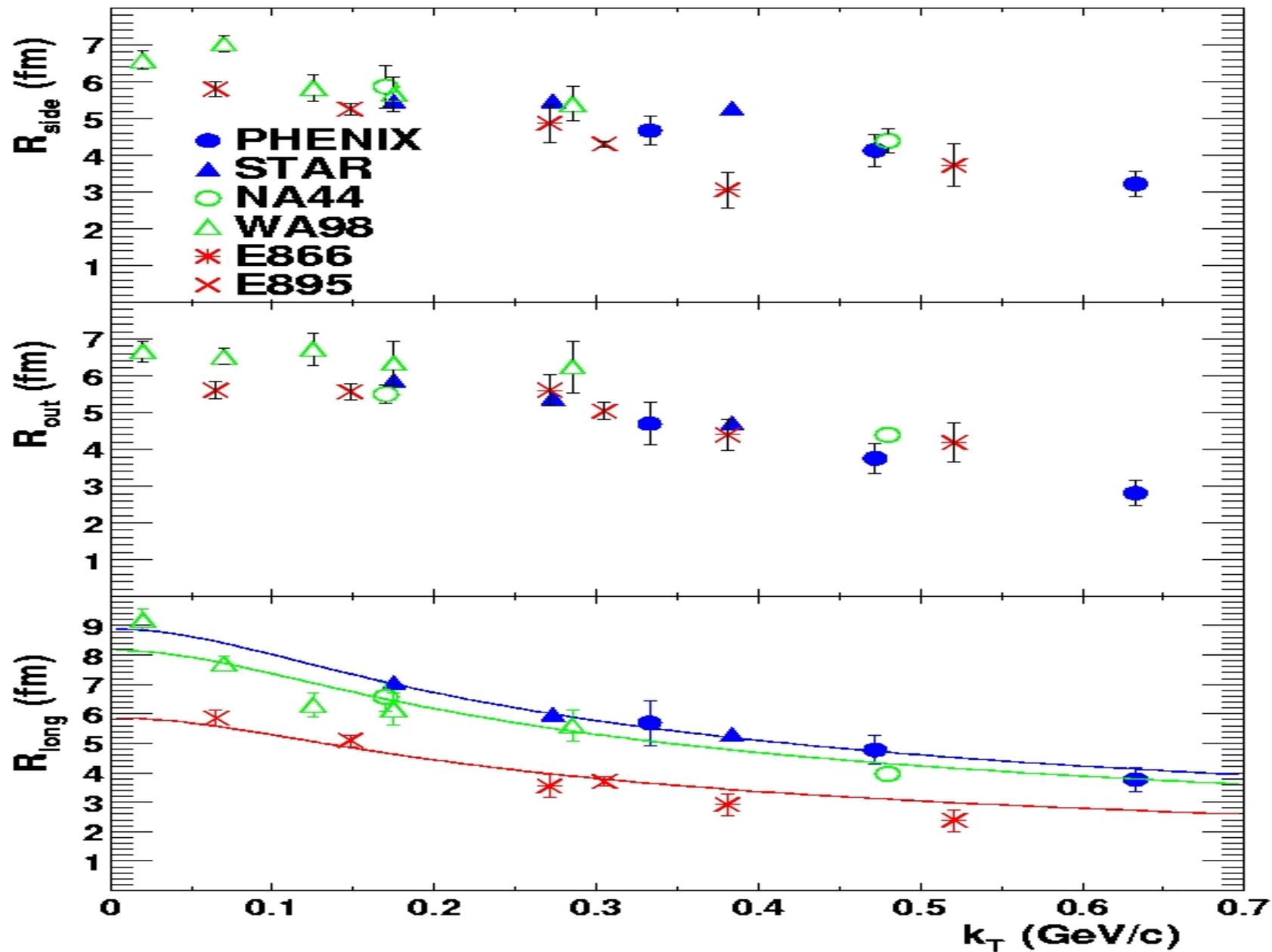


- Rapid increase in R_{long} at high energy
- Systematics fairly well constrained

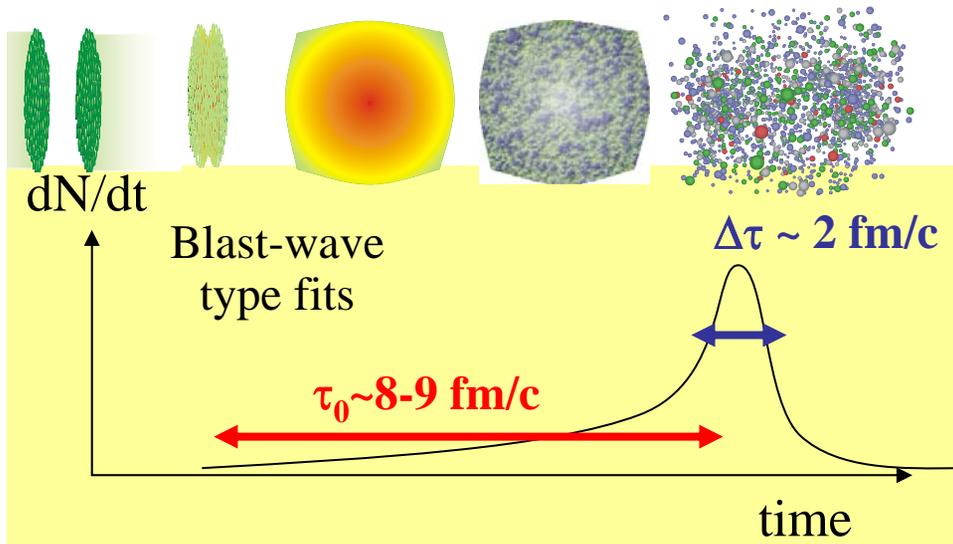
Centrality dependence of $R_{\text{out}}/R_{\text{side}}$

PHENIX PRELIMINARY

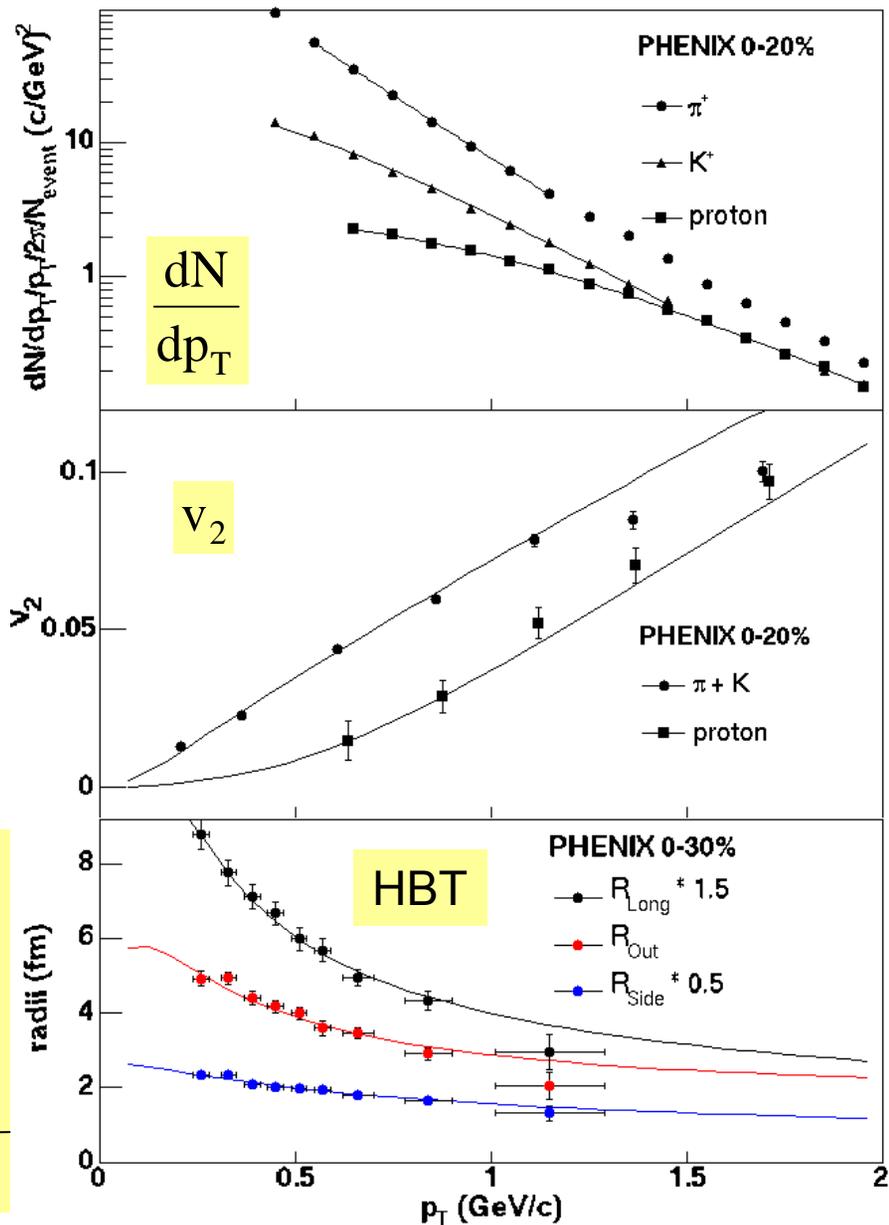




- Hydro (blast wave)
 - Input Short emission time
 - Multiplicity
 - Flow
 - Hbt



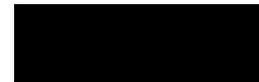
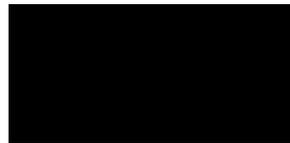
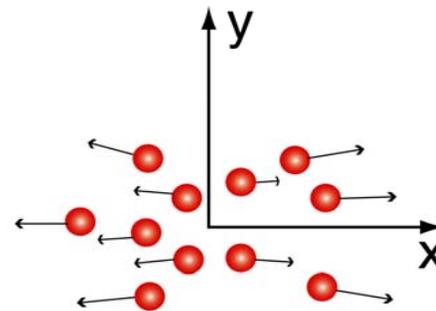
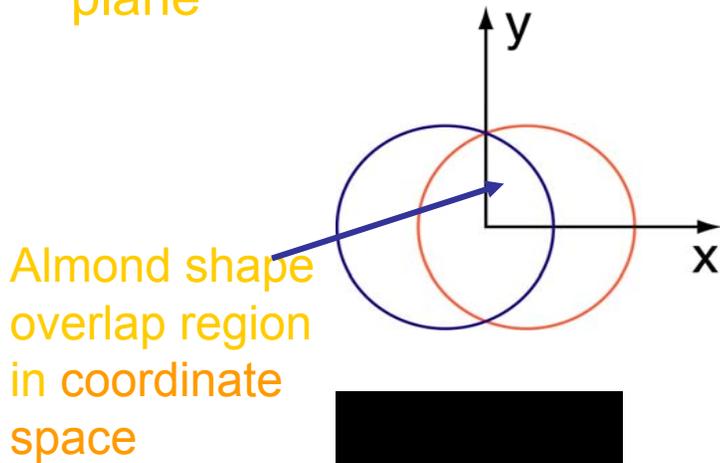
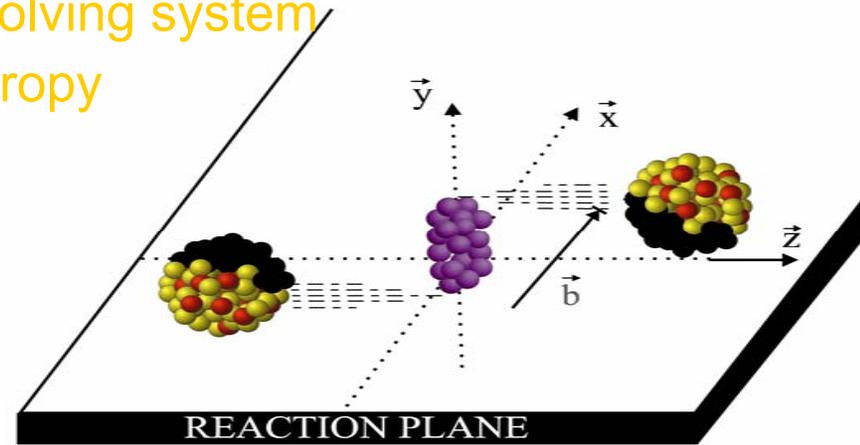
“BlastWave” fits



Pressure? “elliptic flow” barometer

Origin: spatial anisotropy of the system when created, followed by multiple scattering of particles in the evolving system
spatial anisotropy \rightarrow momentum anisotropy

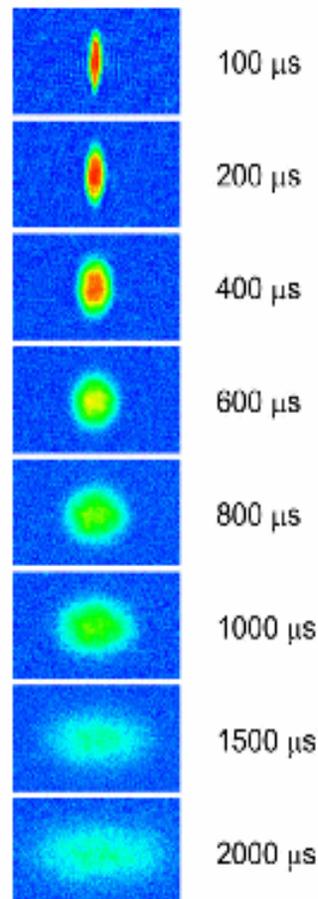
v_2 : 2nd harmonic *Fourier coefficient* in azimuthal distribution of particles with respect to the reaction plane



Elliptic flow with trapped Li^6 atoms:

K.M.O'Hara et al, Science 298,2179, 2002

T.Bourdel et al, PRL 91 020402 , July 11 2003



Magnetic field $B \sim 800G$ shifts (via the Feshbach resonance $|f = 1/2, m_f = 1/2 \rangle \Leftrightarrow |f = 1/2, m_f = -1/2 \rangle$) and makes the 38-th vibrational Li_2 state to exactly **zero energy** \Rightarrow **infinite scattering length a** , very large size and lifetime ~ 1 sec.

Normally gas is transparent, $l \ll L$, and expands without collisions **isotropically**

But in the **strong coupling regime $l \ll L$** it explodes **hydrodynamically !**, see the figure

Cross section can be changed by many orders of magnitude, but the EoS changes by $\sim 20\%$ only ! (like in QGP and CFT... why?)

