

Shadowing effect of dense core: the origin of double-peak structure in di-hadron azimuthal correlation at RHIC

Guo-Liang Ma (SINAP)

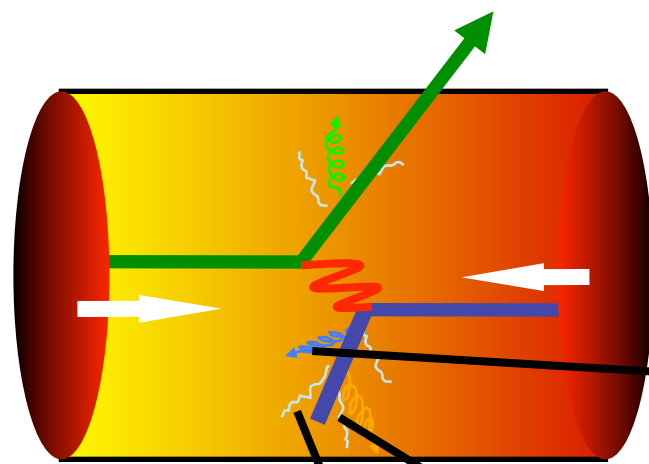
**Shanghai Institute of Applied Physics,
Chinese Academy of Sciences**

**Thanks to X. N. Wang (LBNL), Y. G. Ma (SINAP),
X. Z. Cai (SINAP) and S. Zhang (SINAP)**

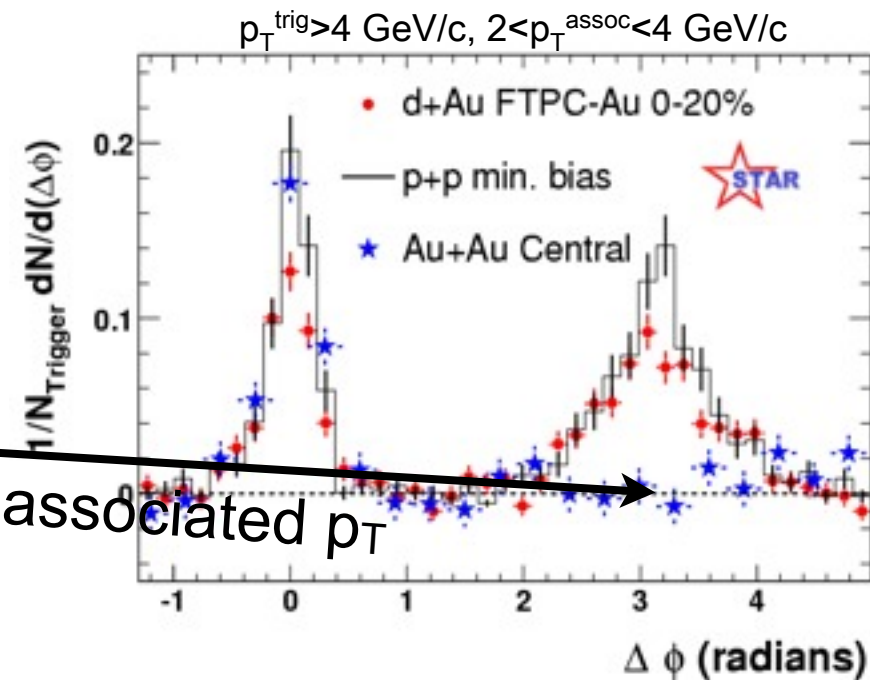
Outline

1. Background introduction
2. Model introduction
3. Results and discussion
4. Summary

What we learn from jet correlation

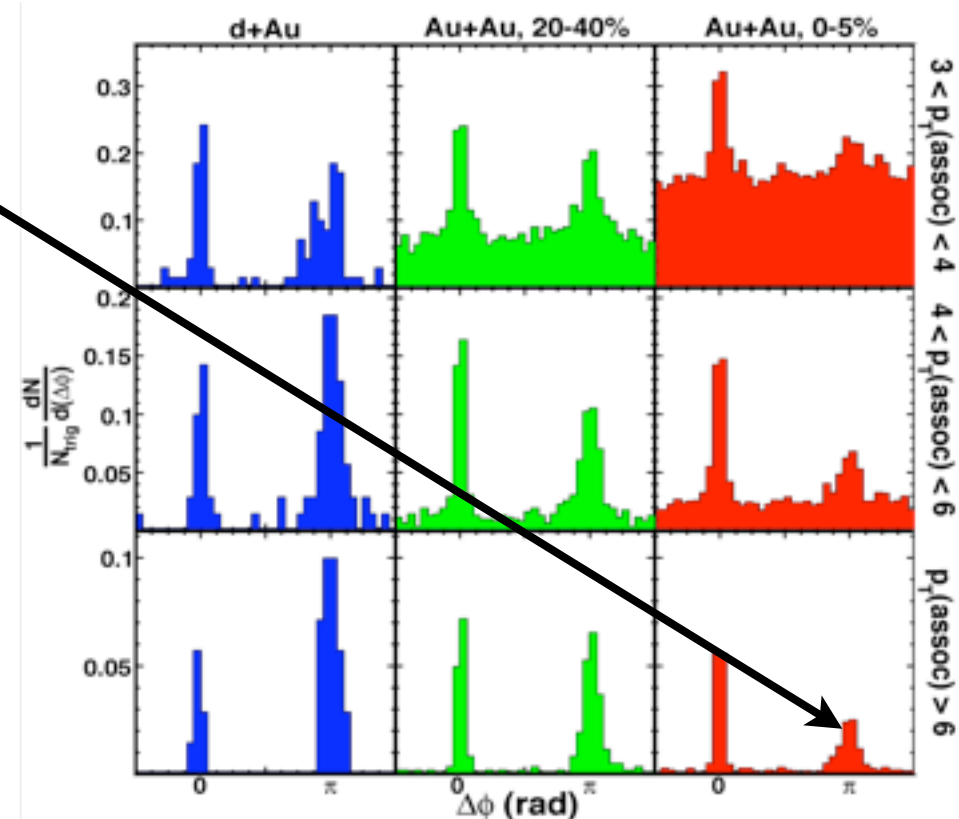
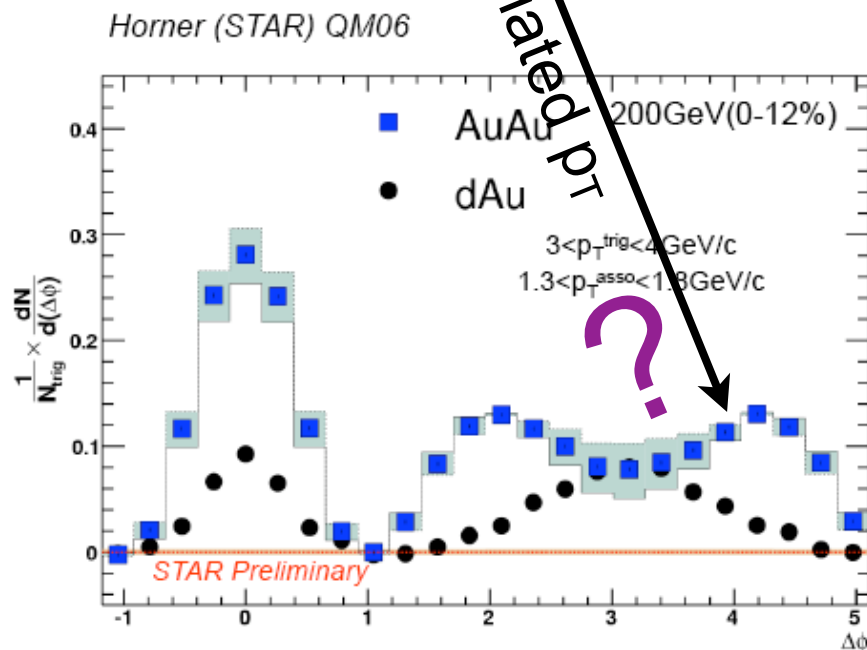


intermediate associated p_T



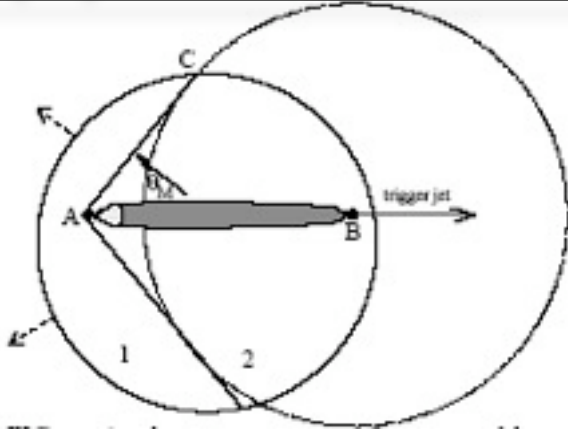
low associated p_T

high associated p_T



What physics behind double-peak structure

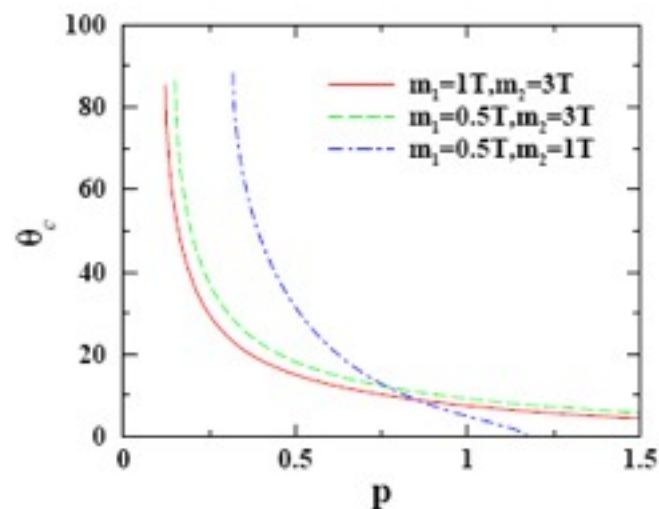
(1) Mach cone shock wave:



$$\frac{c_s}{v_{parton}} = \cos(\theta_M) \quad c_s^2 = \frac{\partial p}{\partial \epsilon}; \quad v_{parton} \approx c$$

Casalderrey-Solana, Shuryak, Teaney, J. Phys. Conf. Ser. 27, 22 (2005).
H. Stöcker, Nucl. Phys. A 750, 121 (2005).

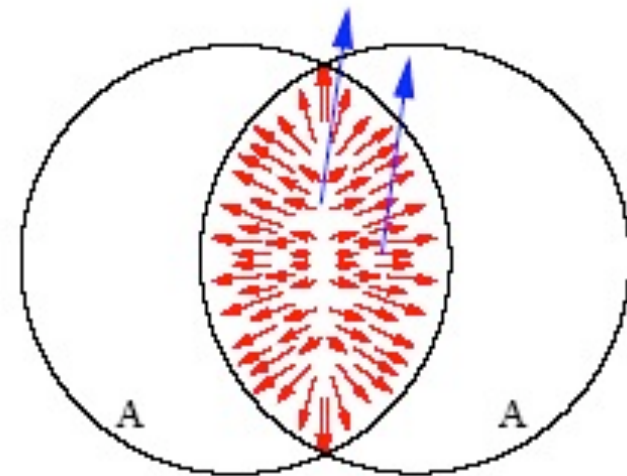
(2) Cherenkov radiation:



$$\Theta_{\text{emission}} = \arccos(1/n(p))$$

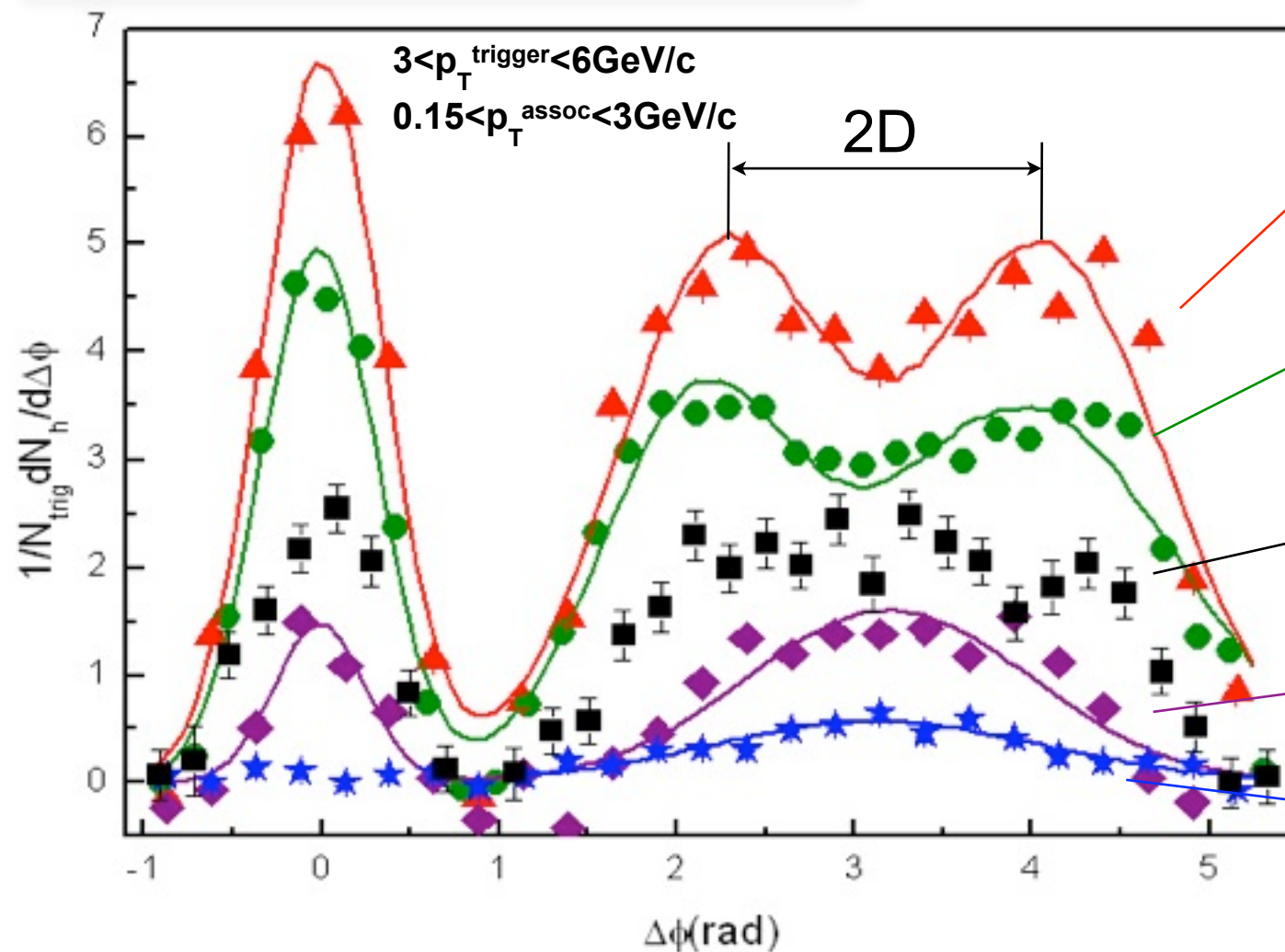
PRL 96, 172302 (2006)
Koch, Majumder, X.-N. Wang
NPA 767, 233 (2006) I.M. Dremin

(3) Correlation of Jet with flowing medium:



PRC 72, 064910 (2005) Armesto

(4) Parton cascade:



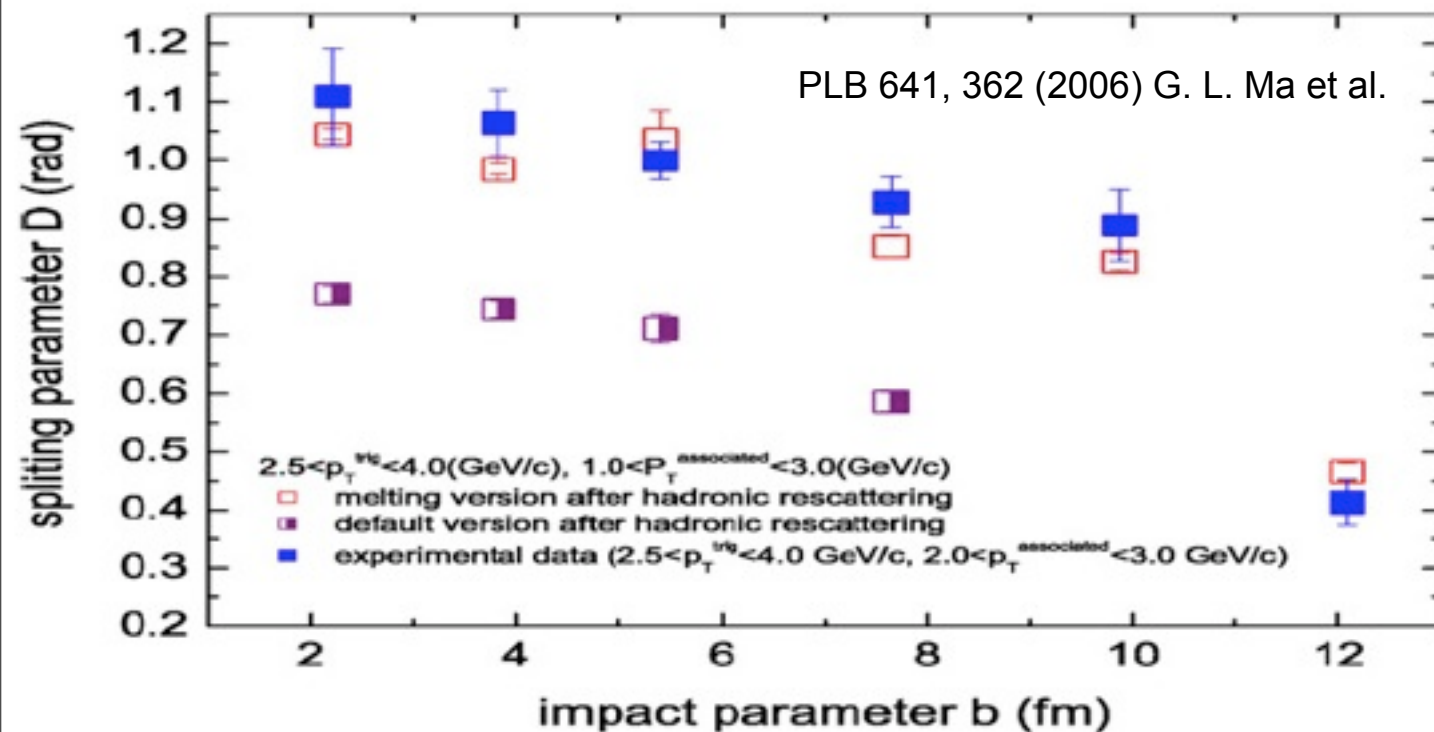
▲ melting version with hadronic rescattering (10mb)

● melting version without hadronic rescattering (10mb)

■ STAR data
0-5% (4-6)x(0.15-4) GeV/c

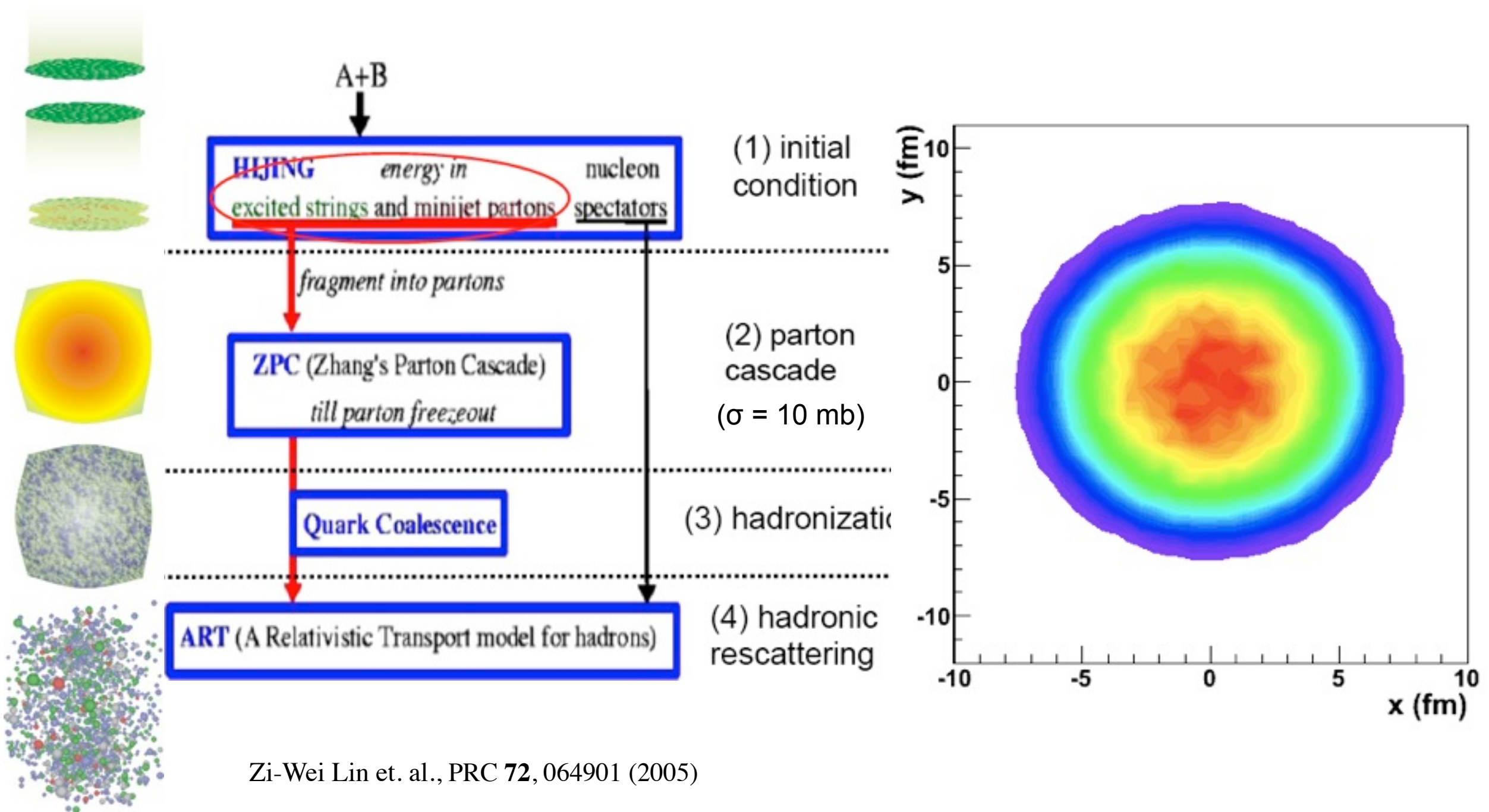
◆ default version with hadronic rescattering

★ default version without hadronic rescattering

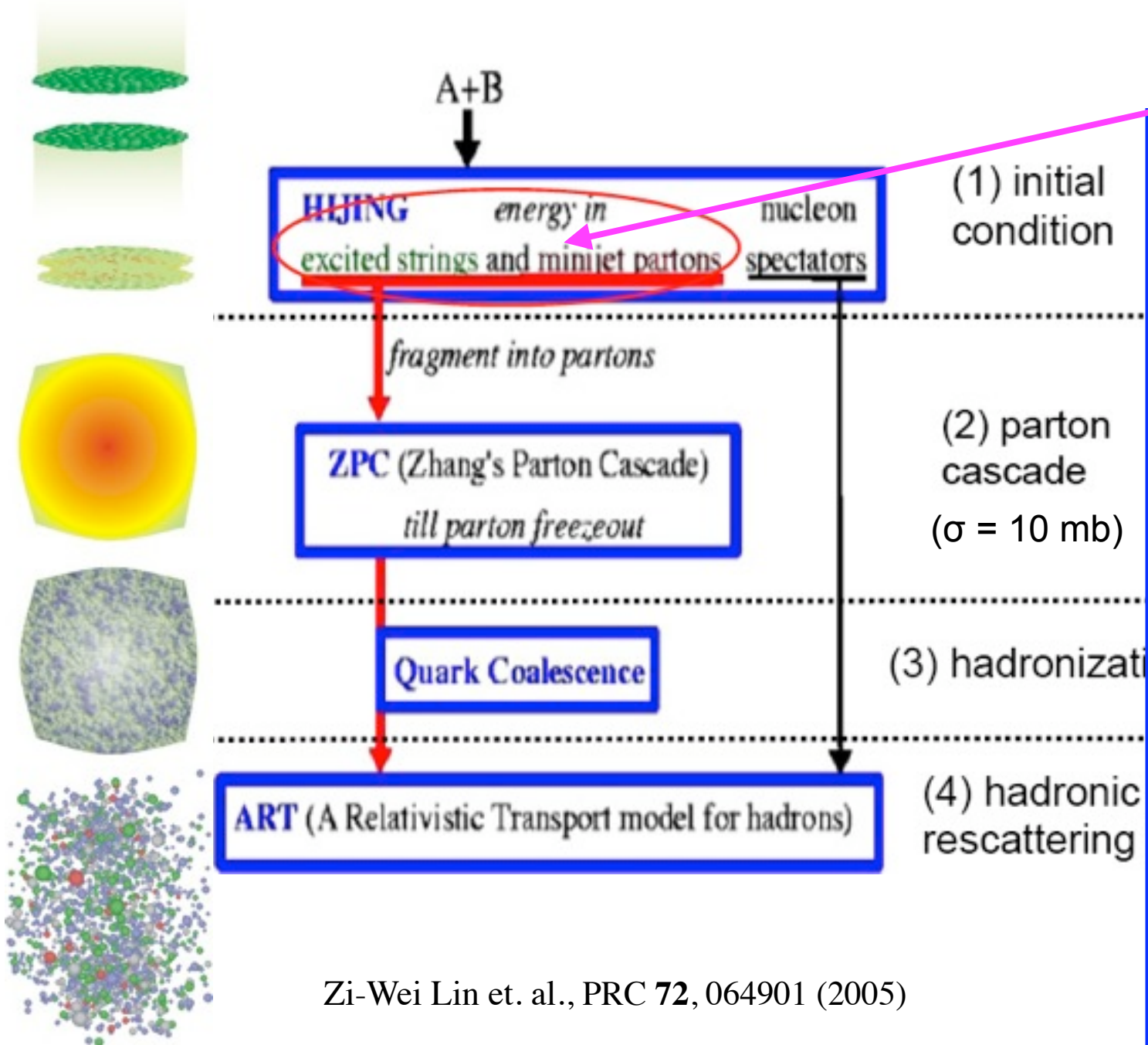


- Double-peak structure is born in strong parton cascade process, and furthermore developed in hadronic rescattering process.
- Parton cascade mechanism is essential for describing the splitting amplitude of experimental double-peak structure.

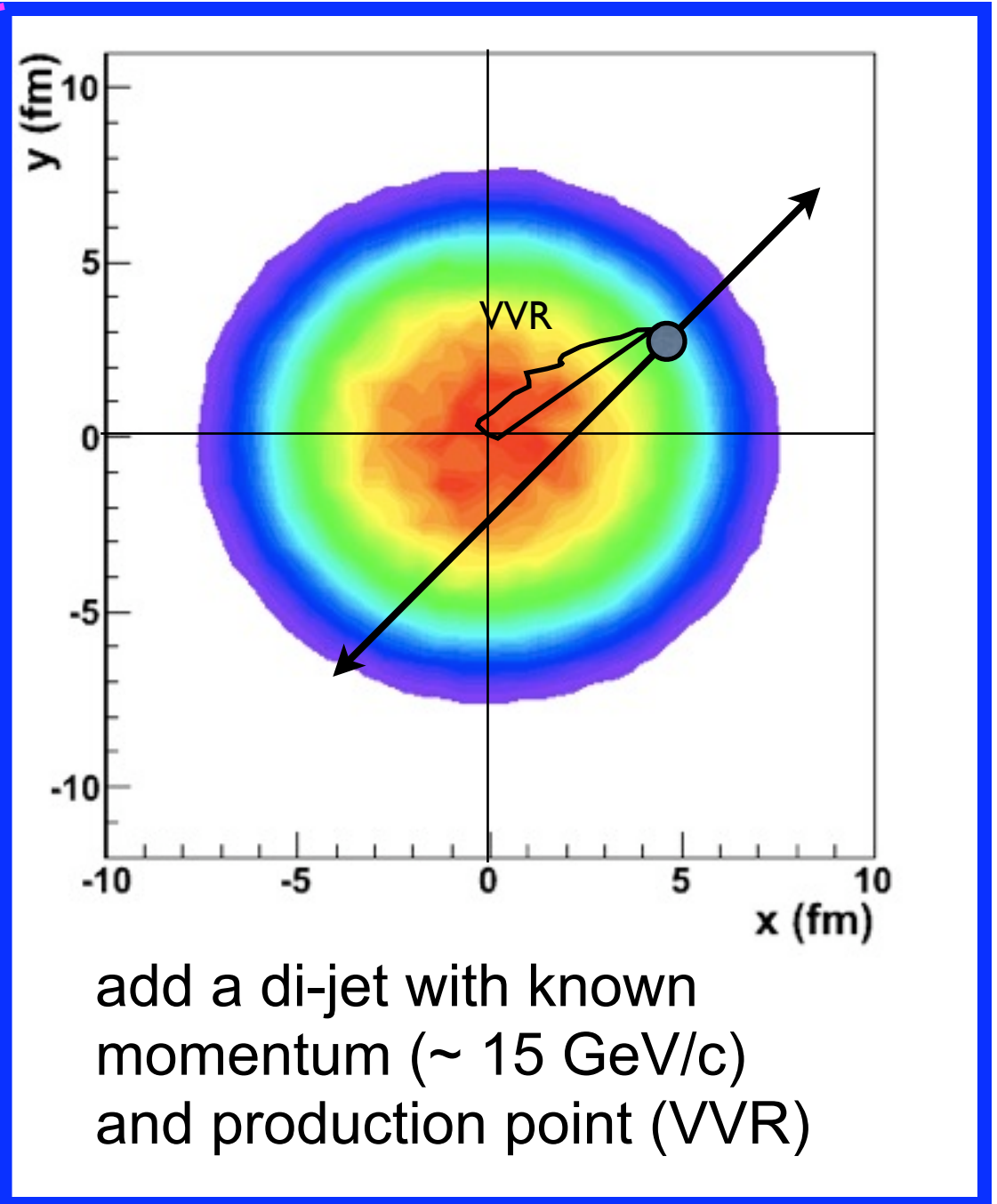
AMPT model



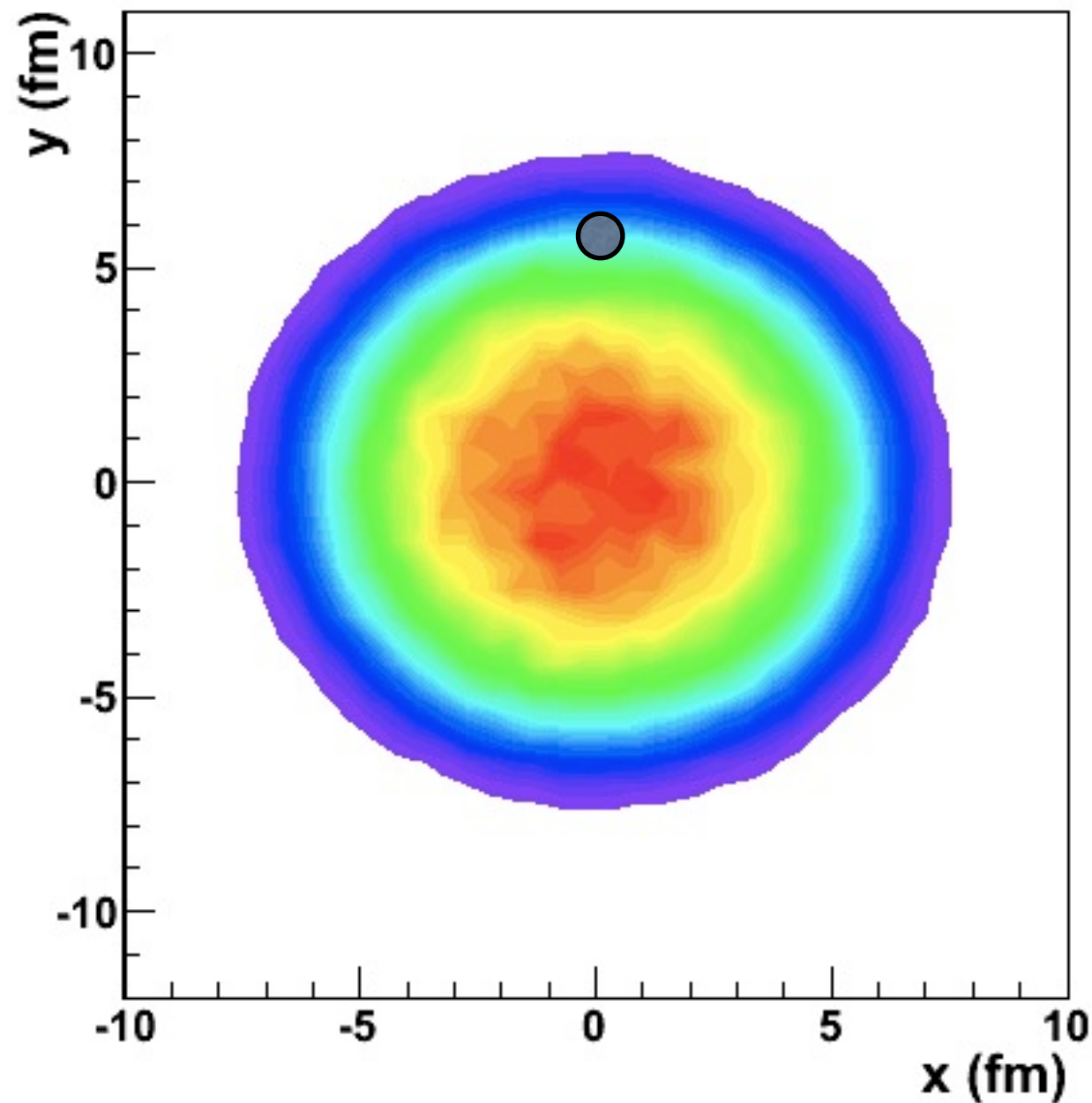
AMPT model with a triggered di-jet



Zi-Wei Lin et. al., PRC **72**, 064901 (2005)

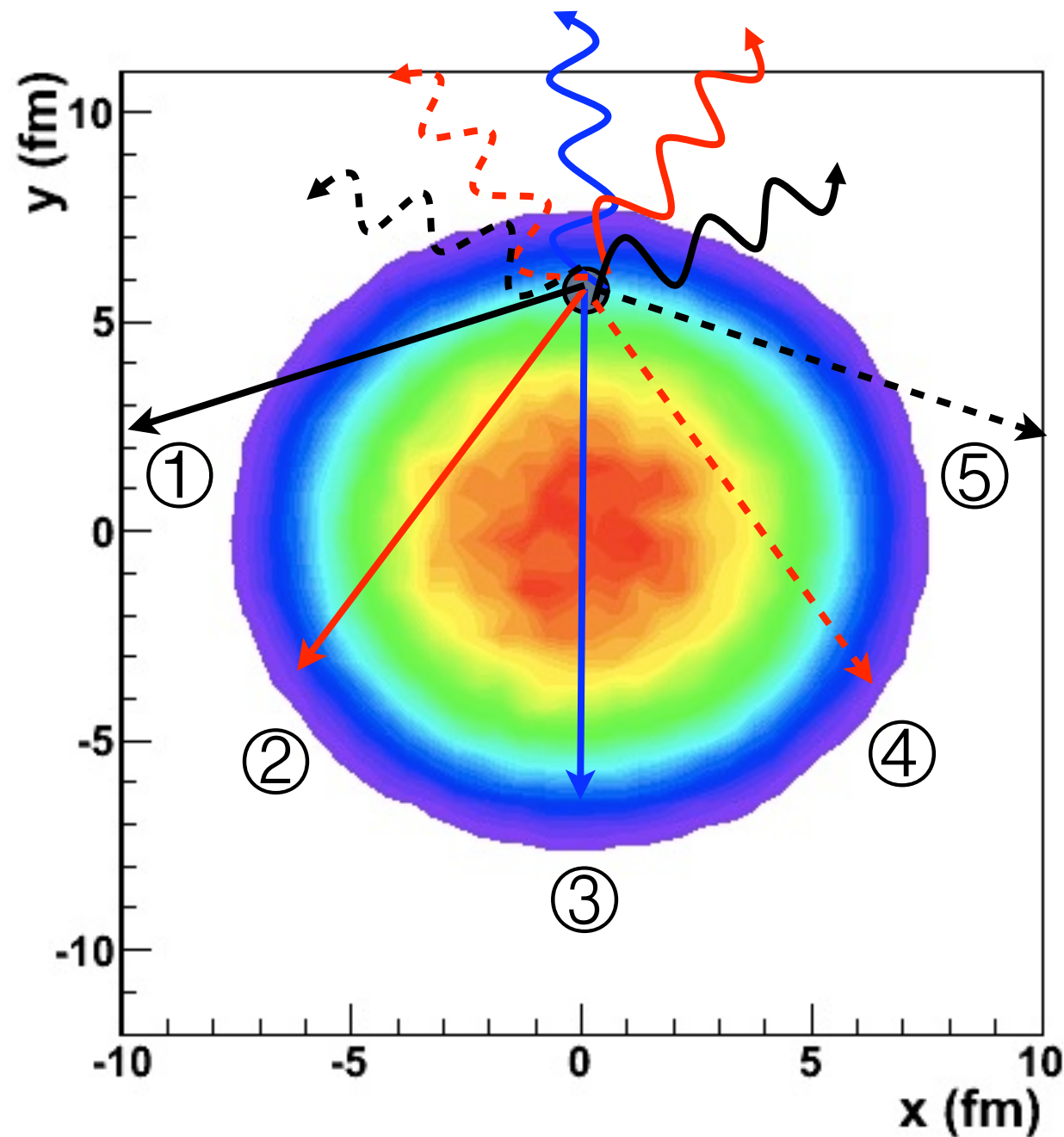


Jet tomography



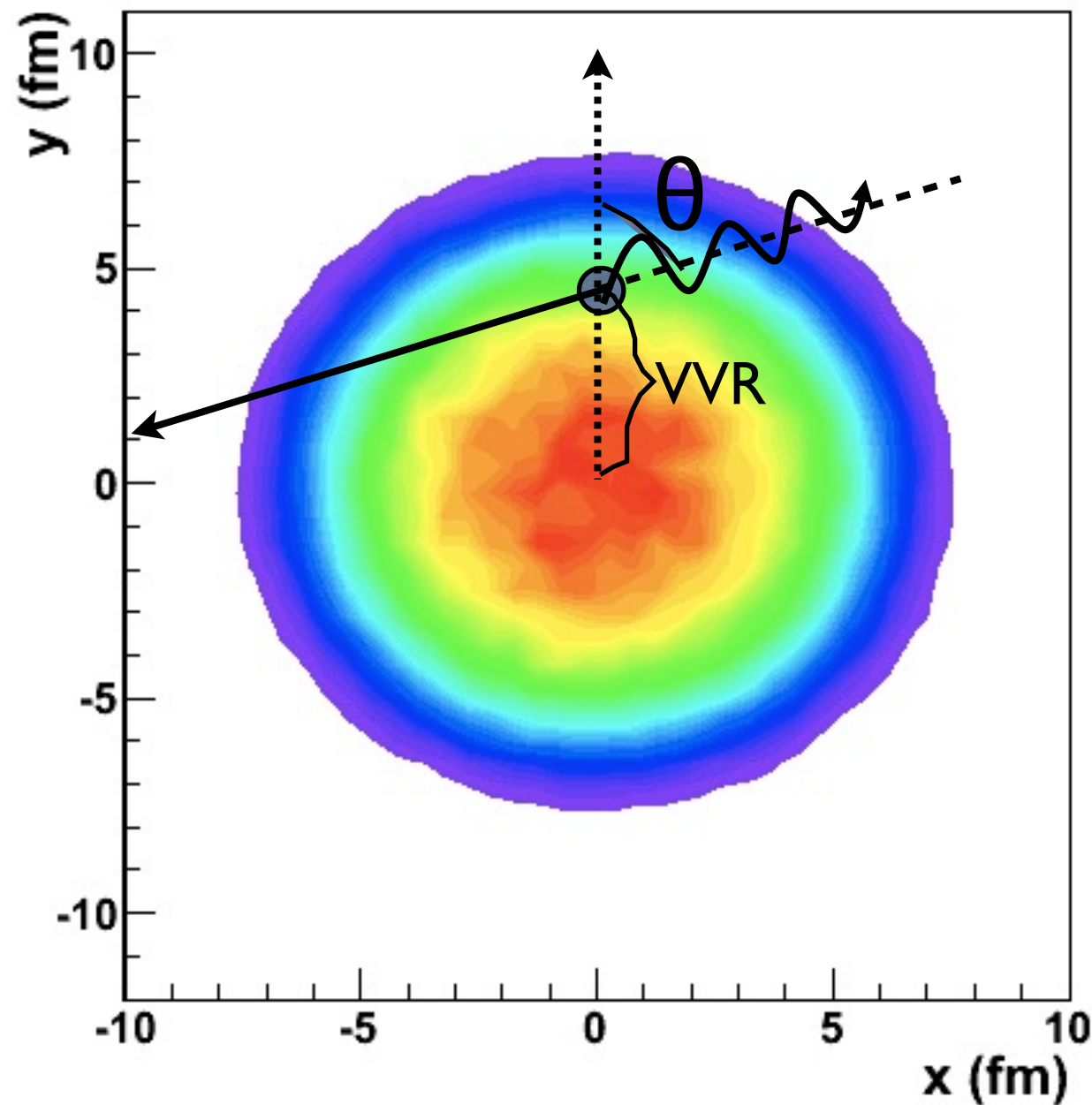
One can probe partonic medium with “Jet-ray” with different configurations of VVR and θ .

Jet tomography



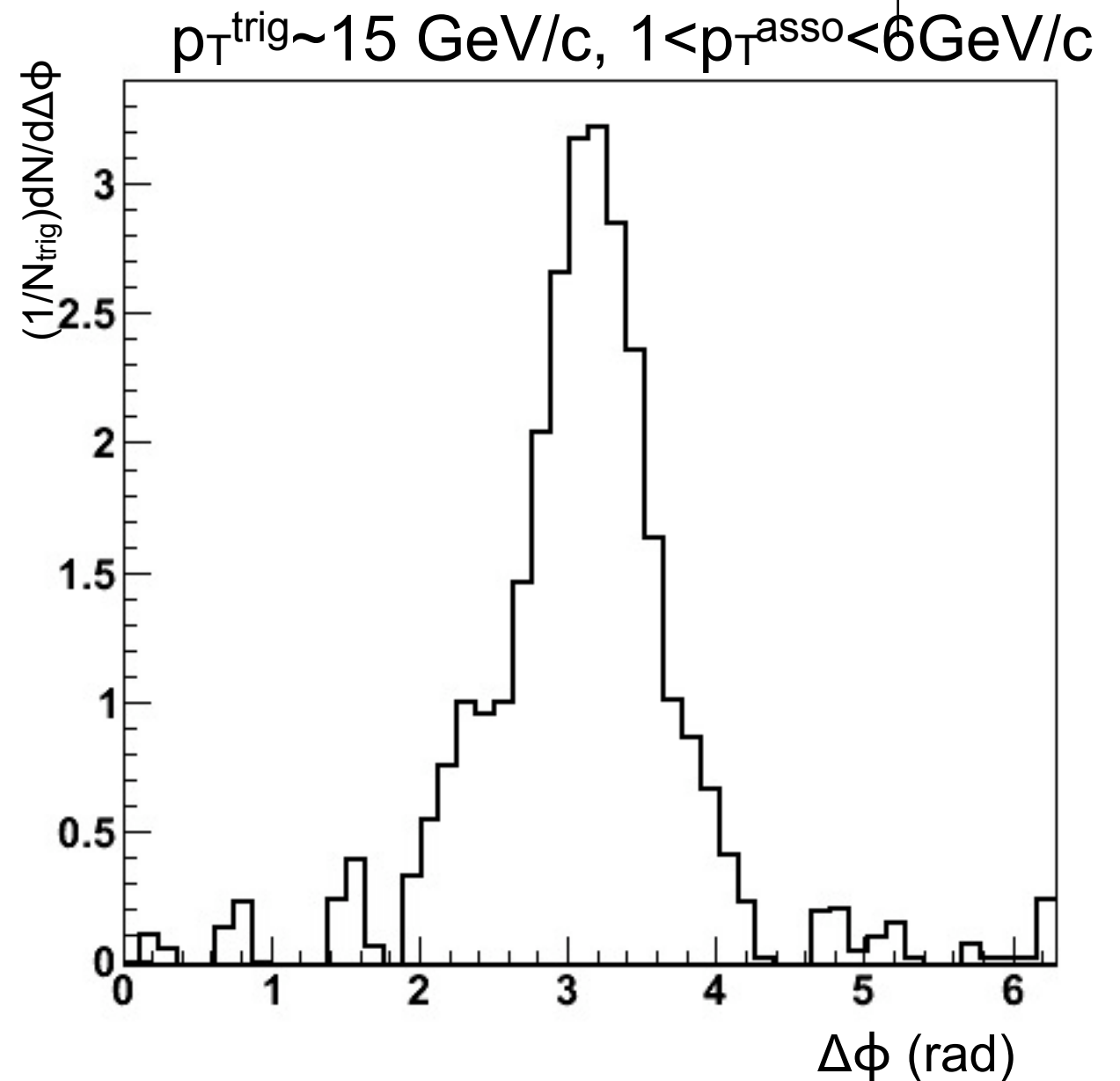
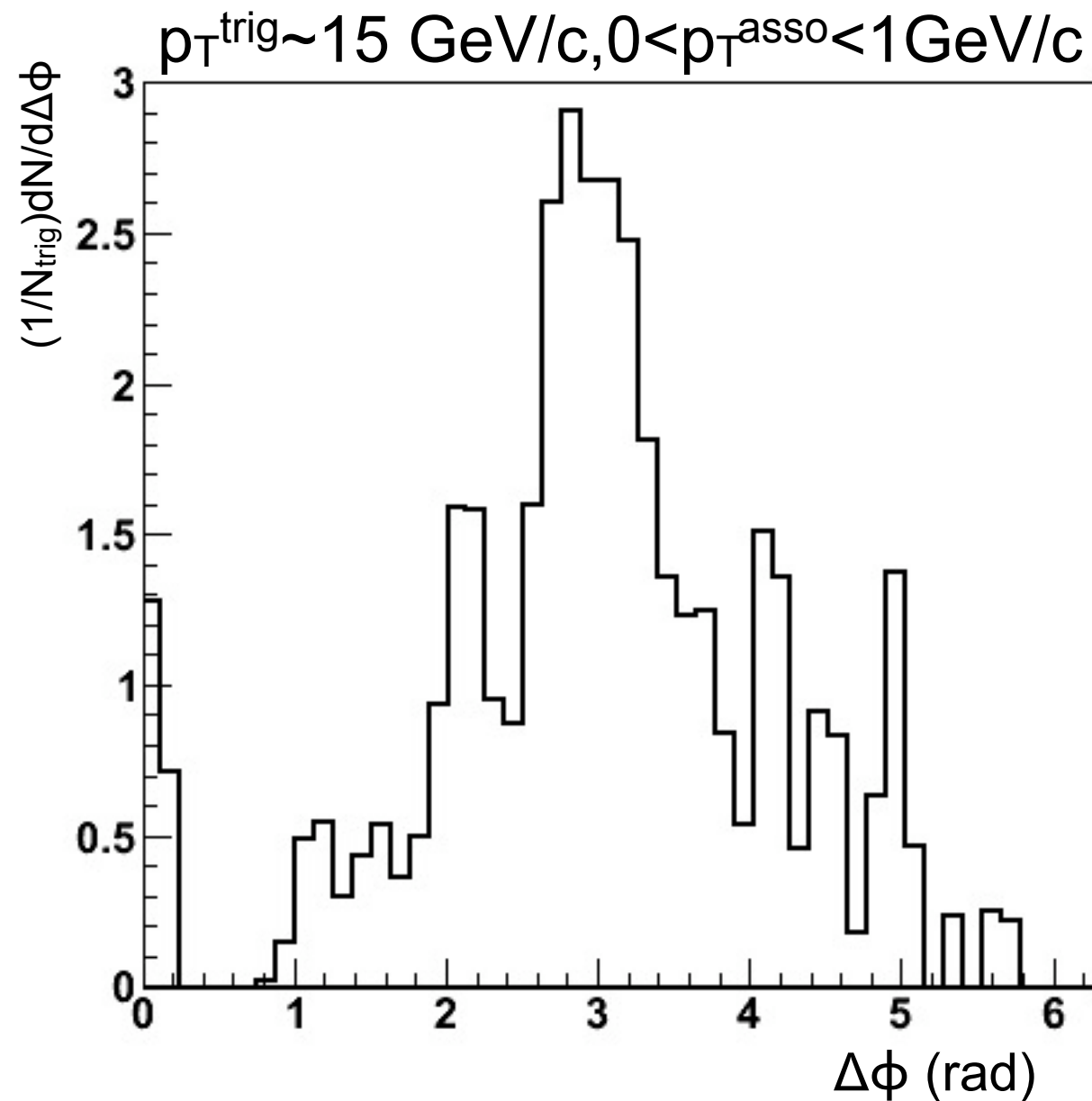
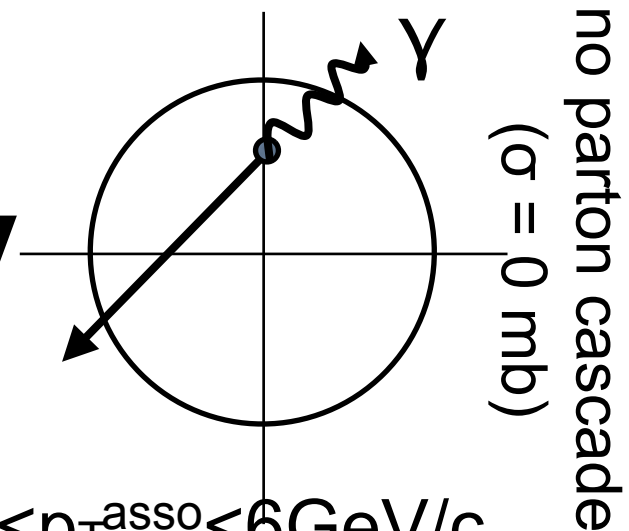
One can probe partonic medium with “Jet-ray” with different configurations of VVR and θ .

Jet tomography



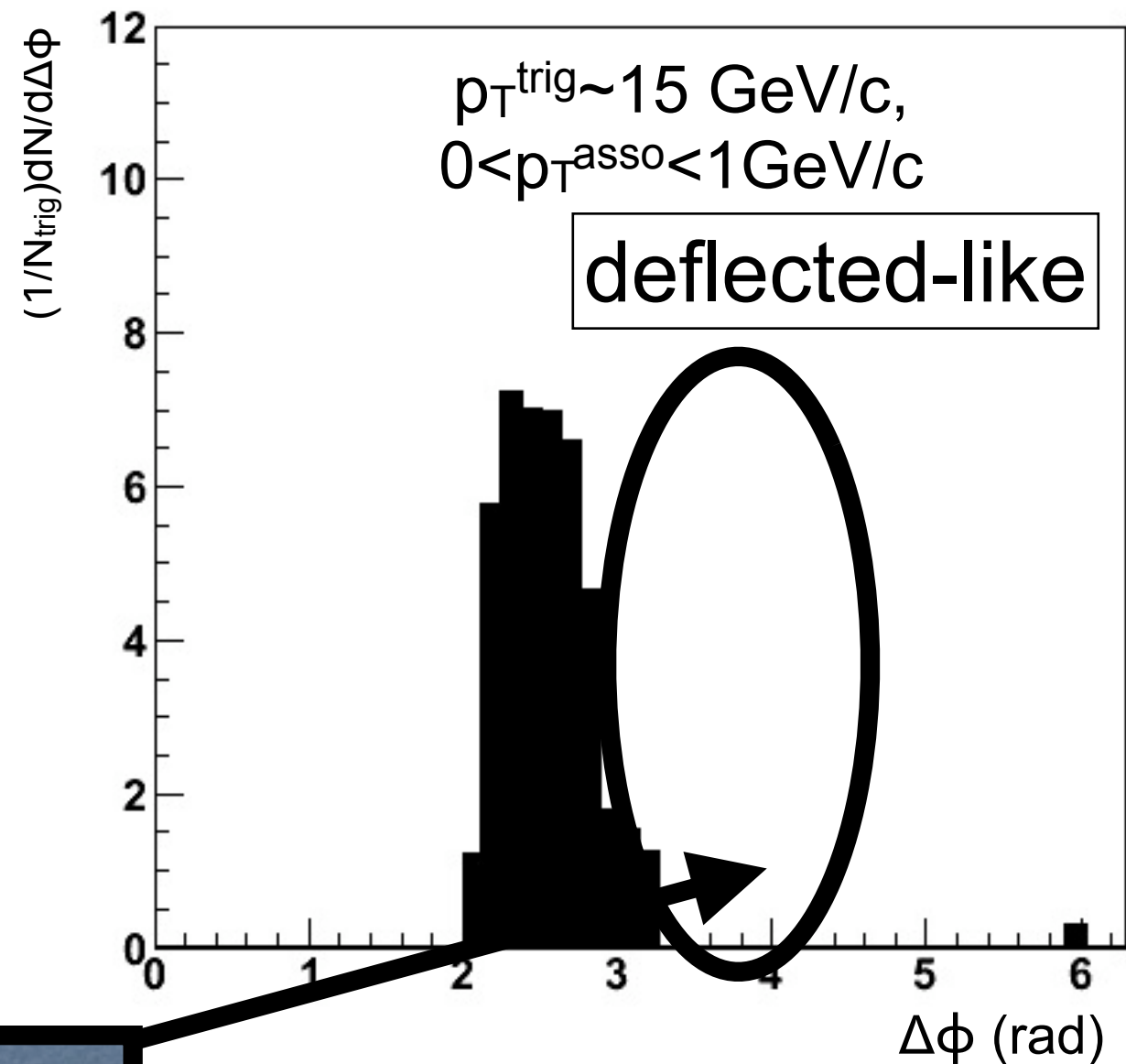
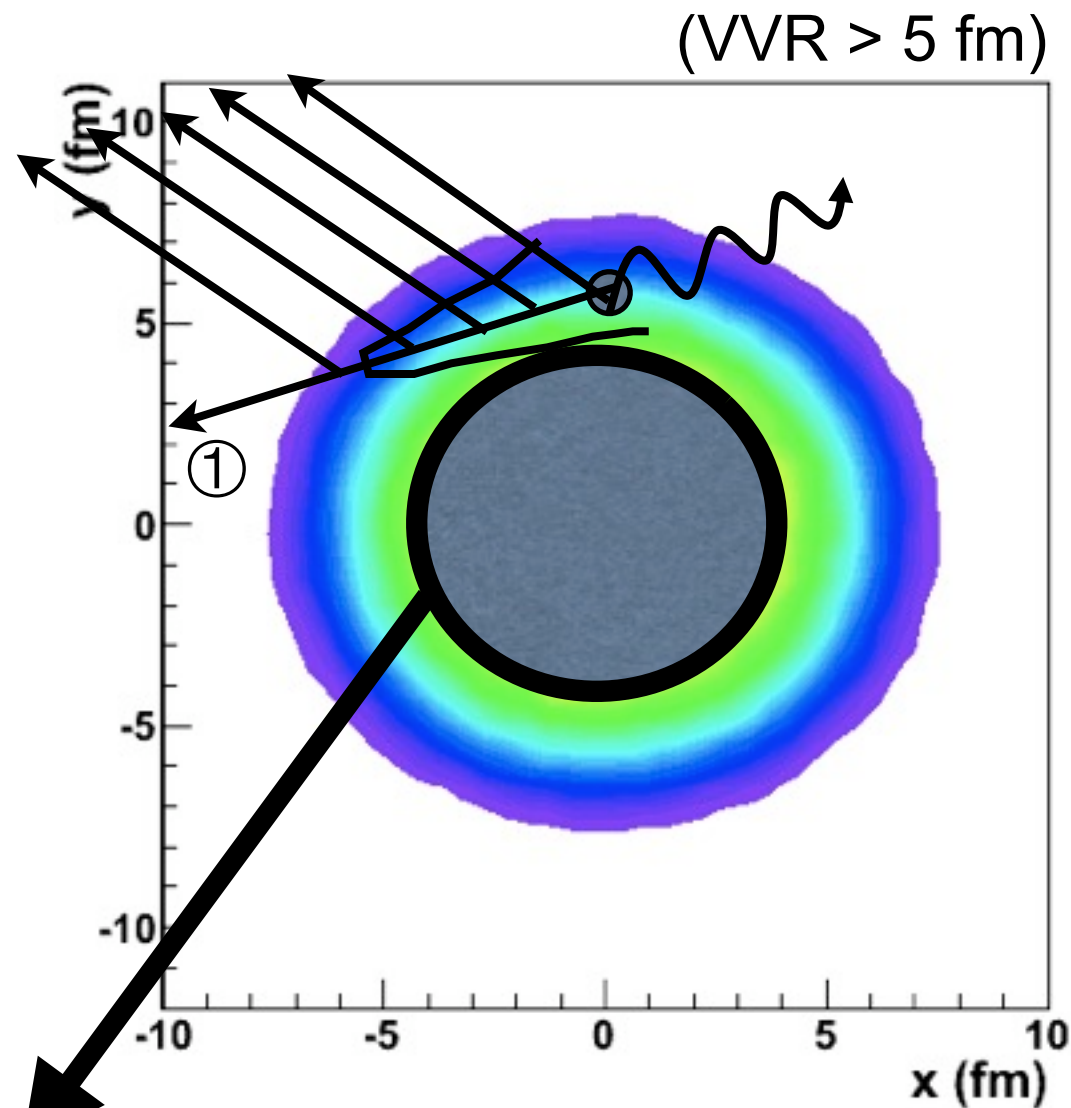
One can probe partonic medium with “Jet-ray” with different configurations of VVR and θ .

What jet looks like initially



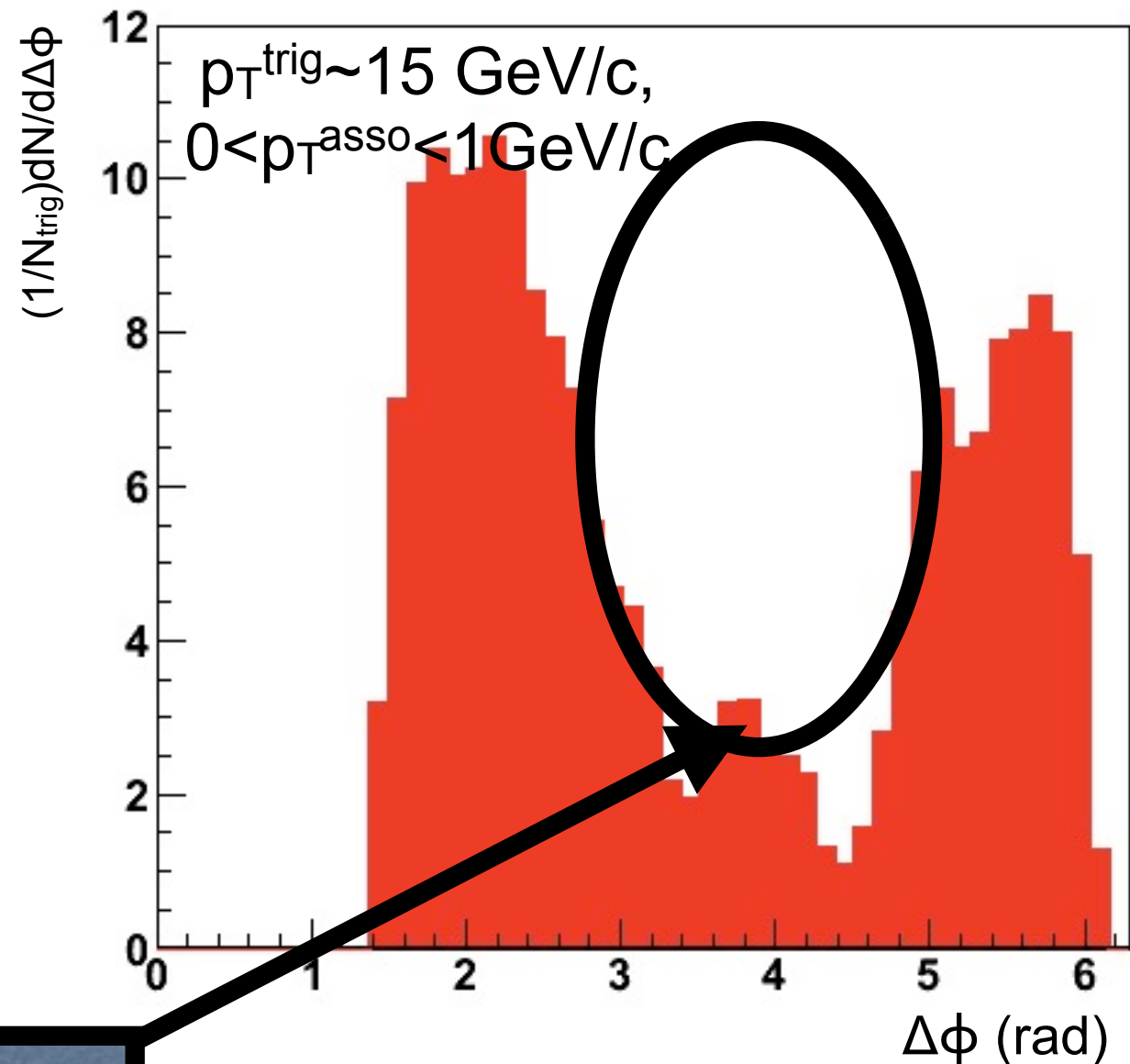
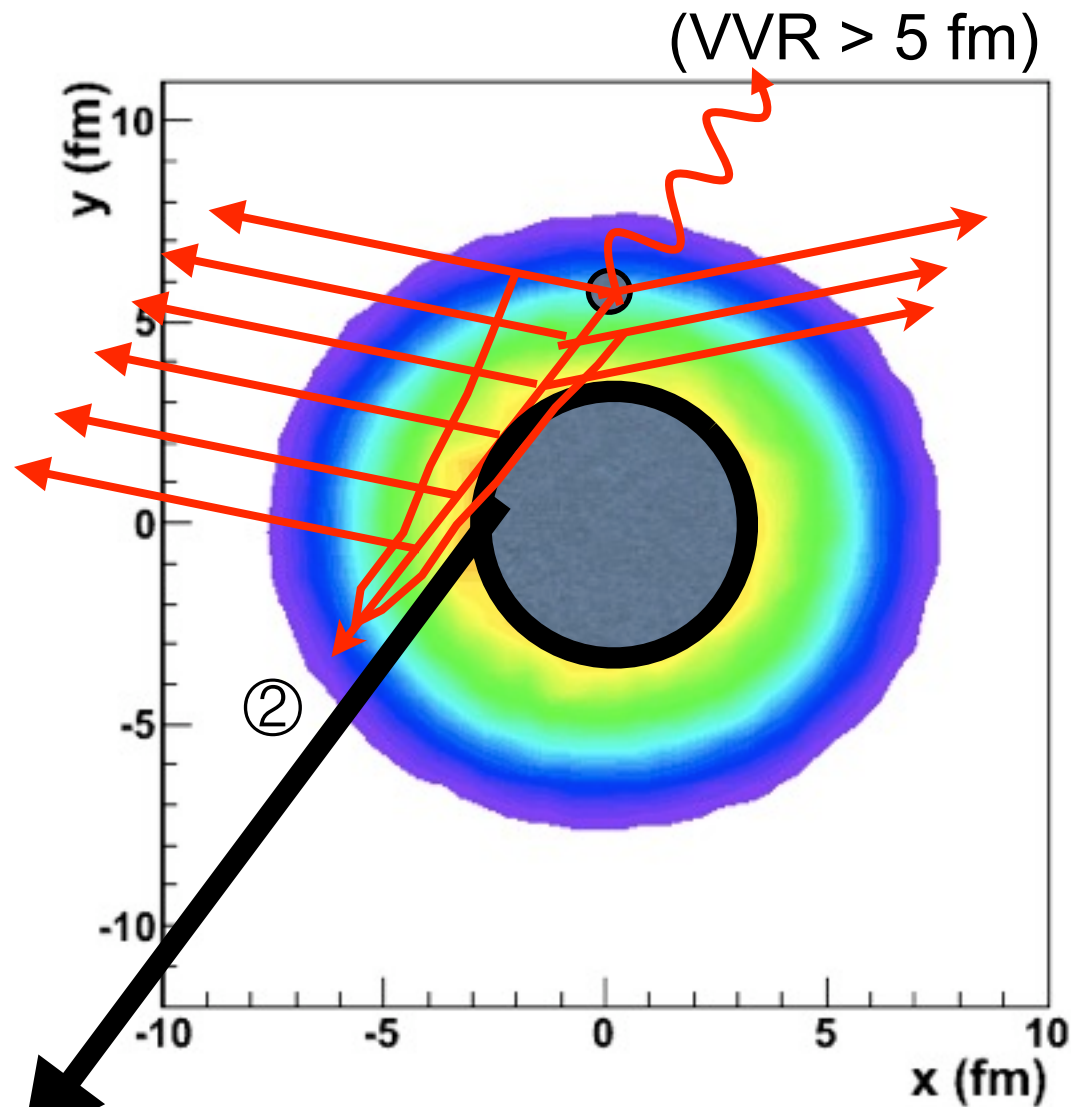
Jet contains a bunch of partons, behaves as a going wave packet.

(1) when jet passes medium tangentially, ...



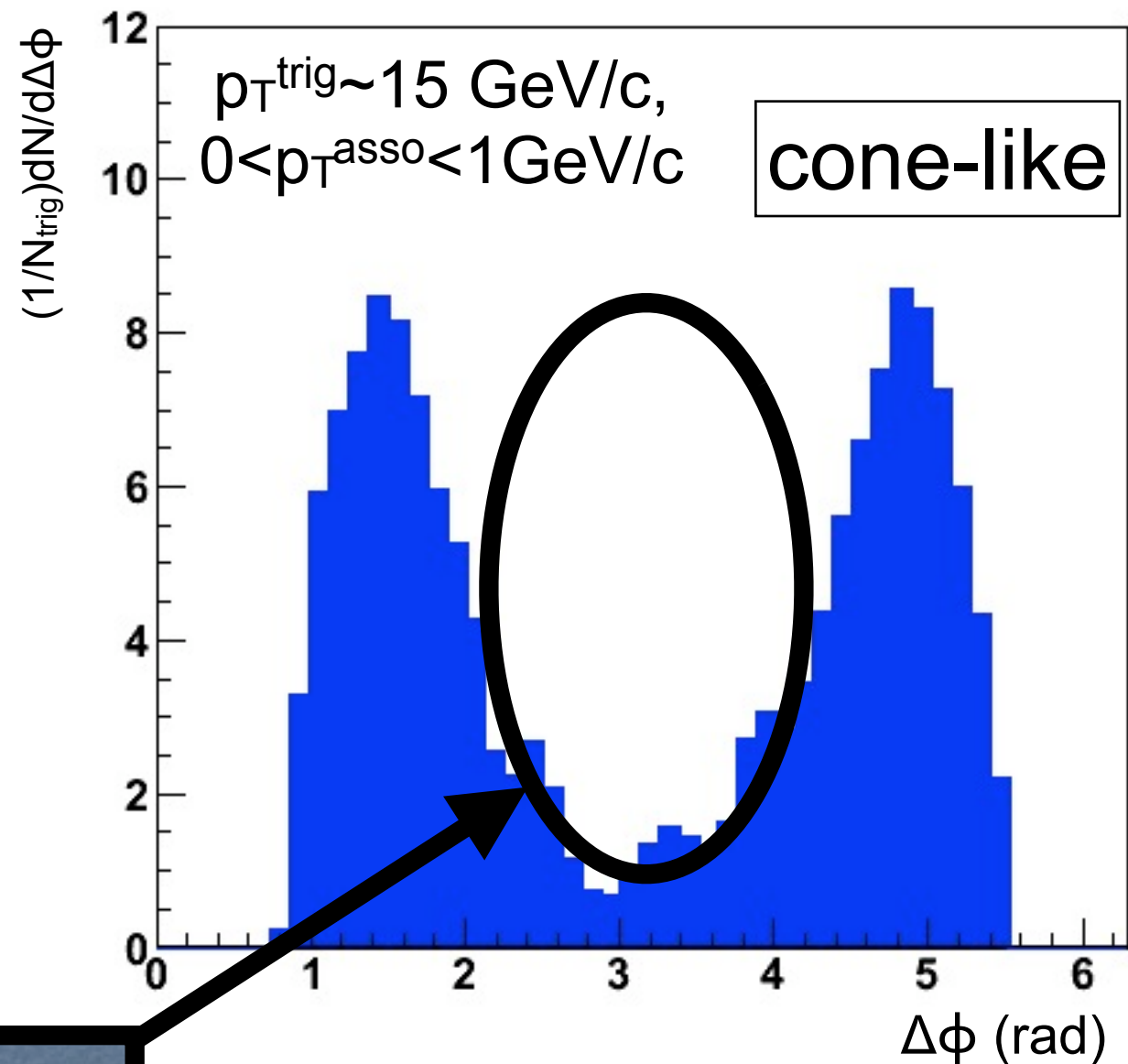
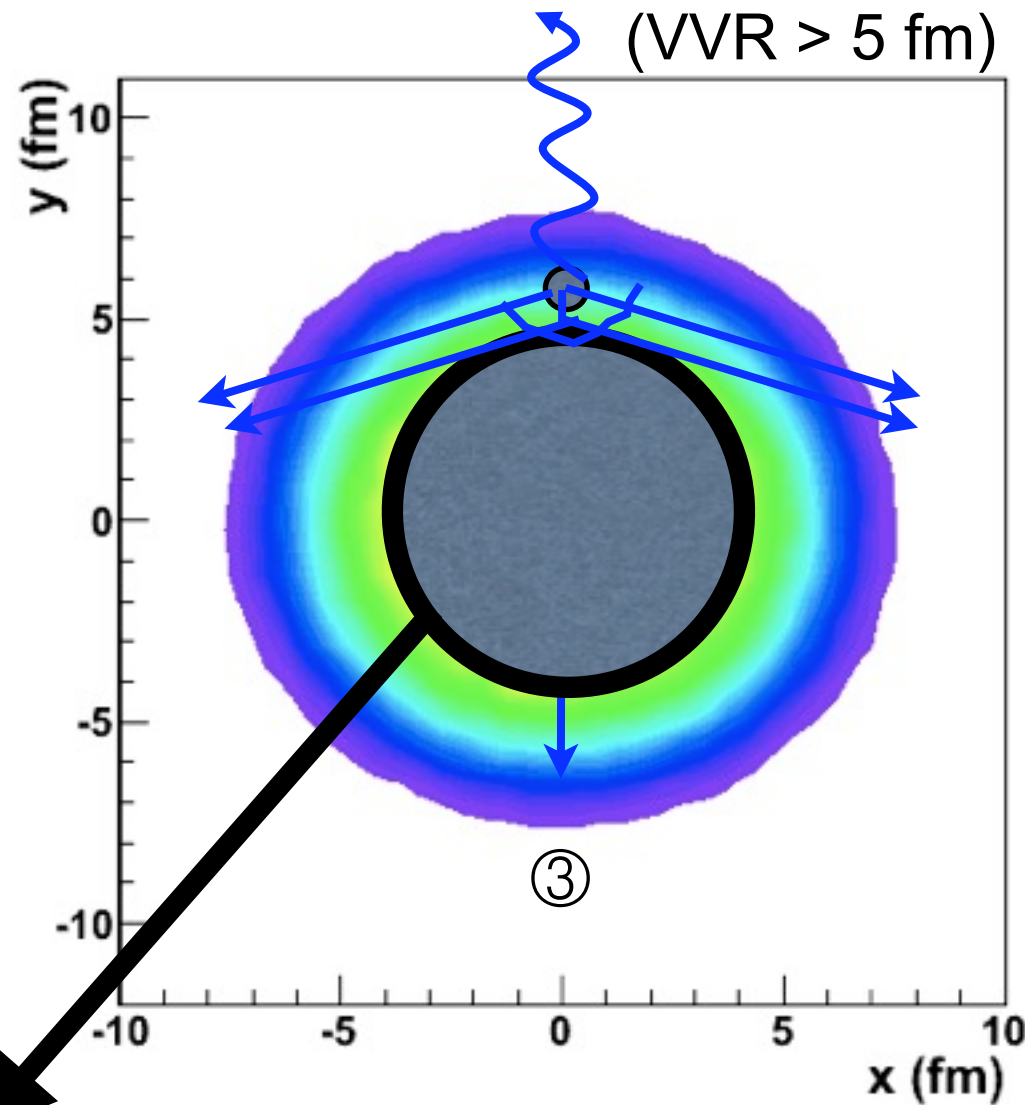
shadowing effect of dense core

(2) when jet passes medium closing to the core, ...



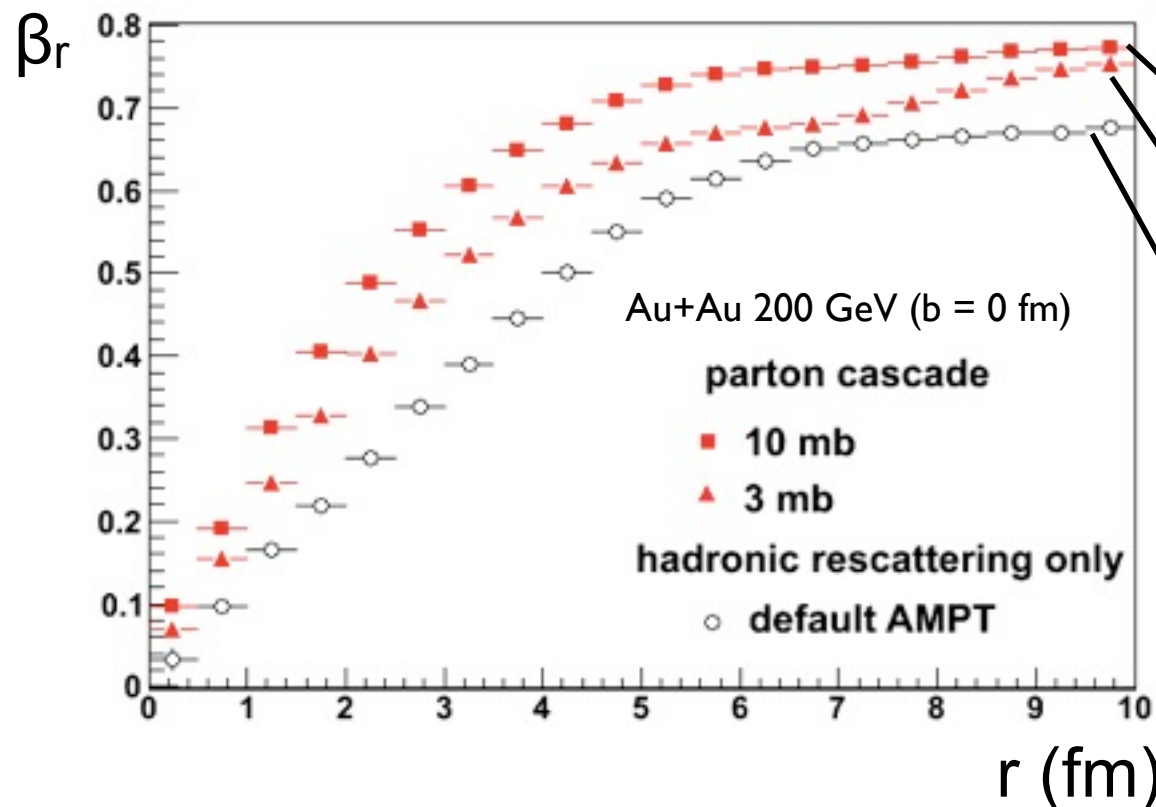
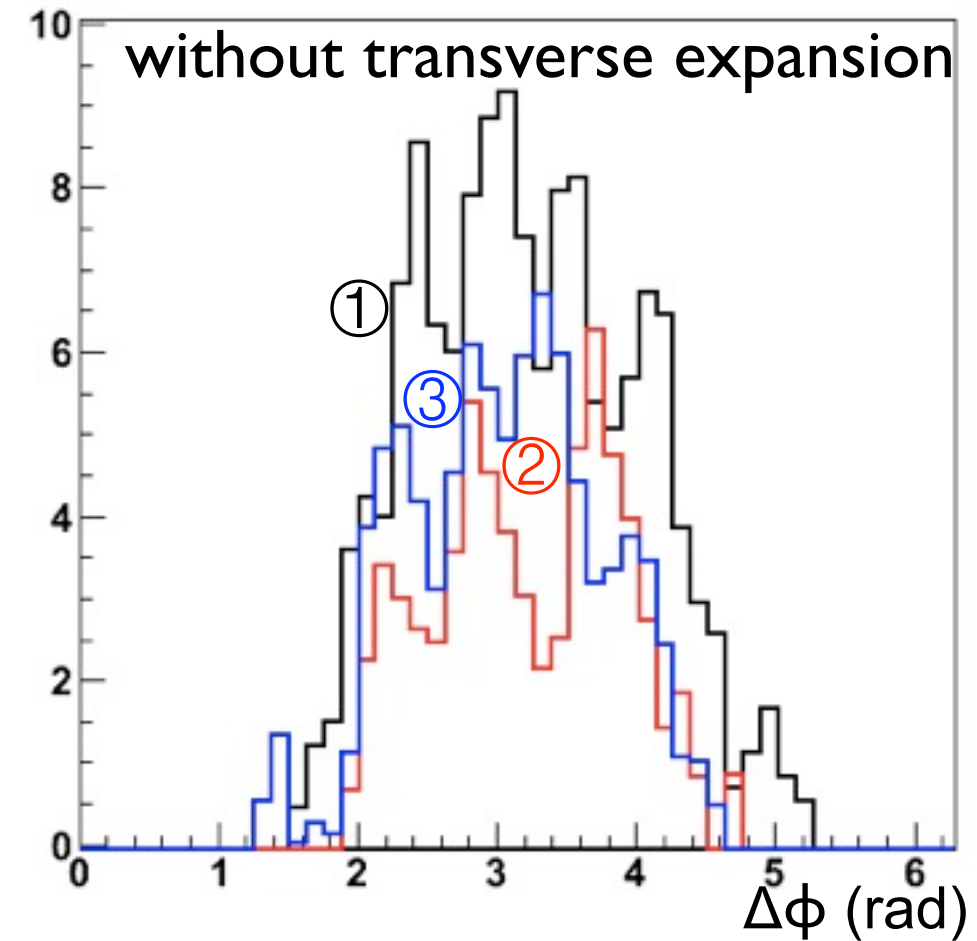
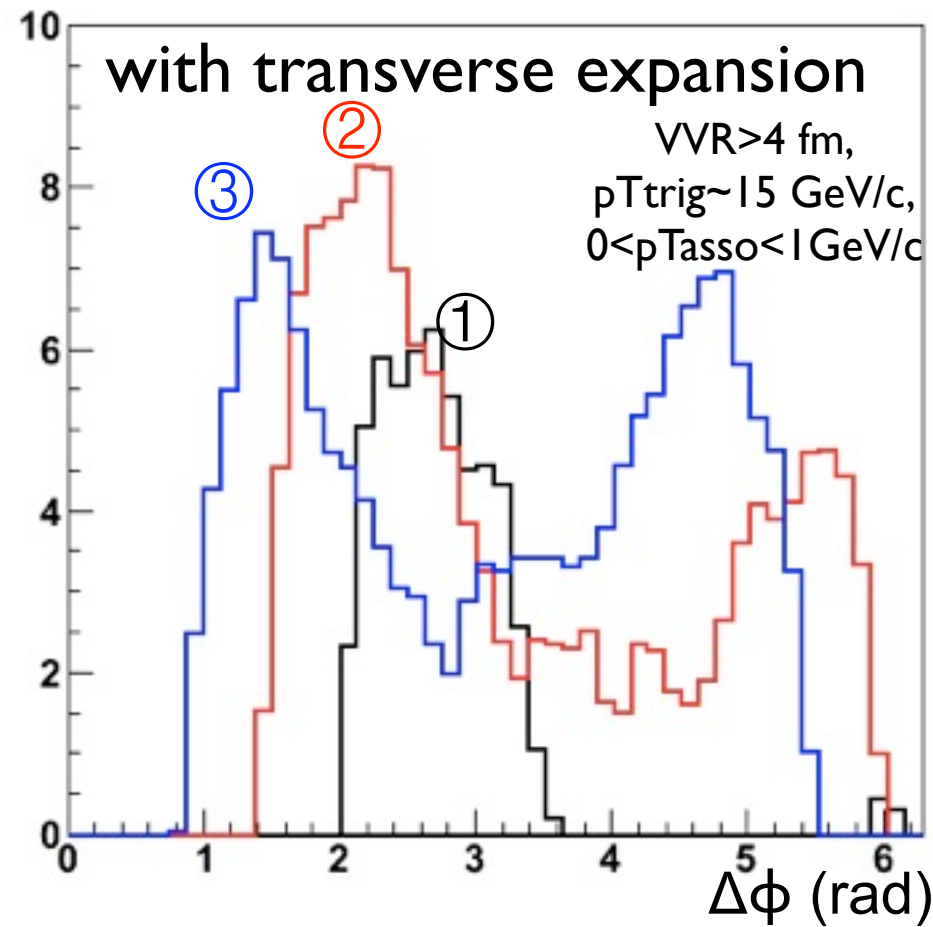
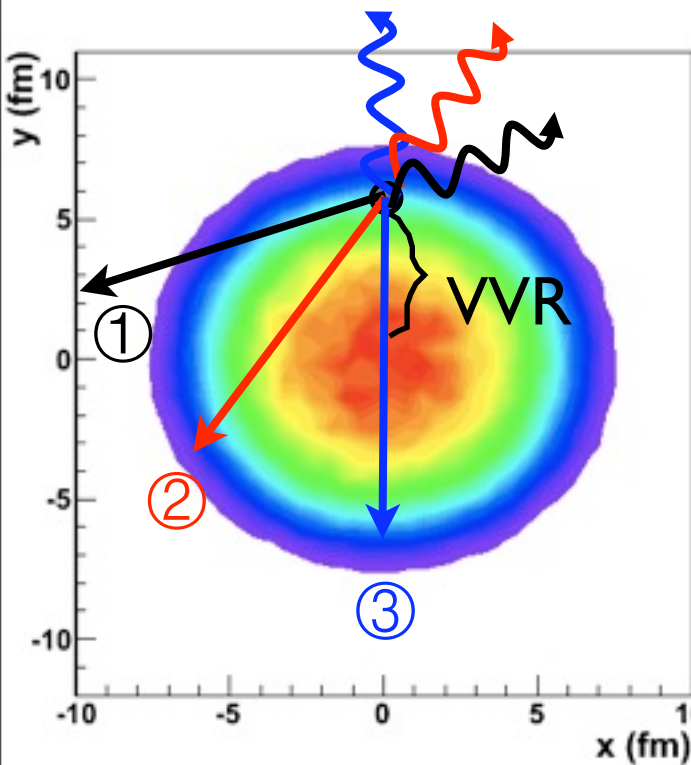
shadowing effect of dense core

(3) when jet passes medium pouching through the core, ...



shadowing effect of dense core

What causes the shadowing effect?



D (rad)

1.10

0.88

0.77

transverse expansion
/ radial flow



shadowing effect

Summary

- Jet tomography is implemented on partonic medium with a triggered di-jet in a dynamical transport model.
- Medium response of double-peak structure indicates the shadowing effect of the dense core, which may result from radial flow / transverse expansion.

Thank you !