

Event structure of pC, dC, α C and CC collisions at incident momentum 4.2 GeV/c per nucleon in P_t space

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JINR

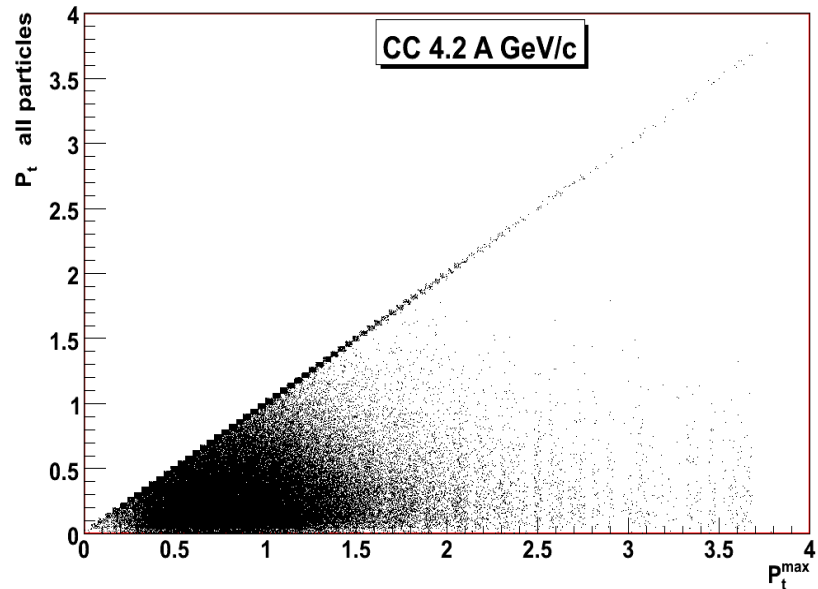
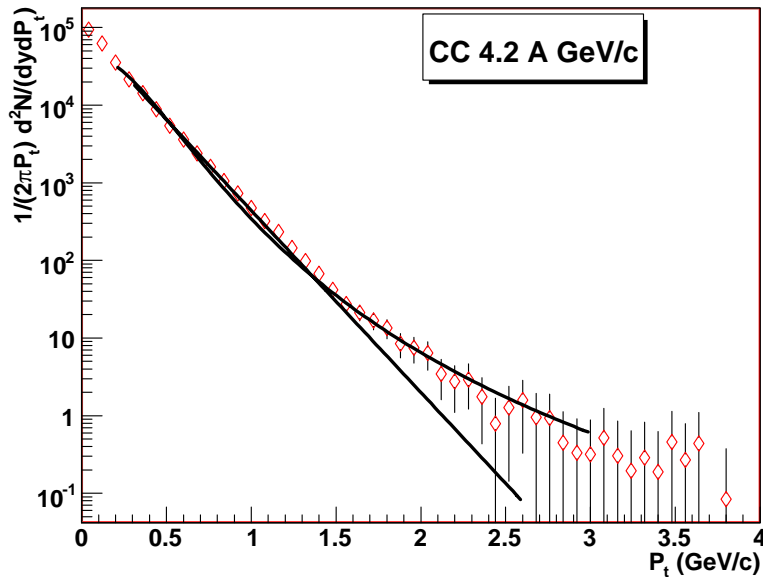
Experimental data

- Experimental data on pC, dC, α C and CC interactions have been obtained by using 2-meter Propane Bubble Chamber of JINR, placed in a magnetic field of 1.5 T and exposed with a beam of light (p, d, α and C) nuclei having incident momentum 4.2 GeV/c per nucleon.

	events
pC	5722
dC	3826
α C	9643
CC	15842

- Only unambiguously identified events of interaction of projectiles with carbon and only charged particles p, π^+ , π^- were used for the analysis.
- Evaporating protons ($P < 0.3$ GeV/c) and stripping particles ($P > 3$ GeV/c & $\theta < 4^\circ$) were excluded from the analysis.

Event structure in p_t space



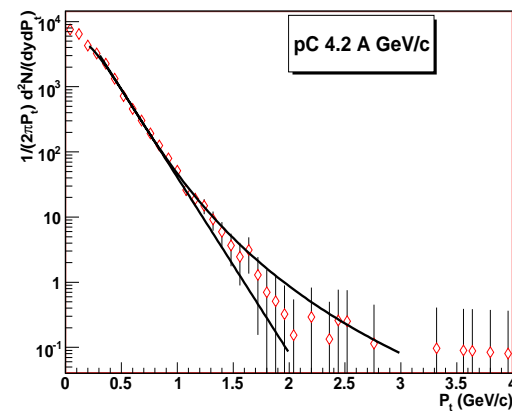
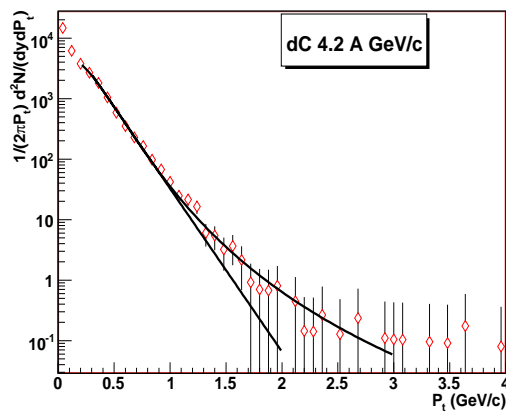
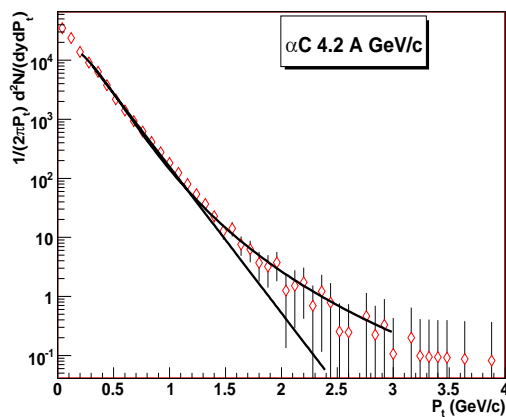
P_t^{\max} – the highest transverse momentum among all particles in event

Levy distribution:
$$\frac{d^2 N}{2 \pi P_t dP_t dy} = \frac{B}{\left(1 + \frac{\sqrt{P_t^2 + m_0^2} - m_0}{nT} \right)^n}$$

m_0 : mass of the hadron

n : power law parameter

Event structure in p_t space



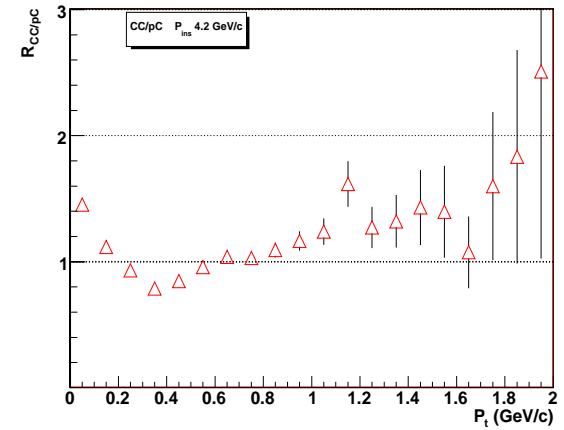
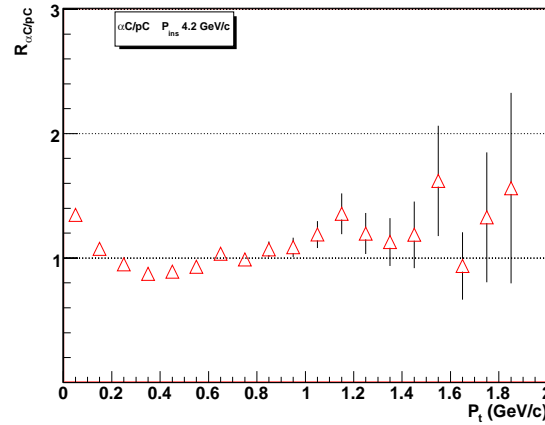
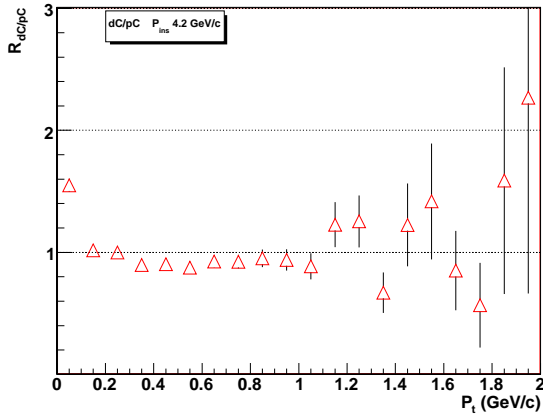
	Exp	Levy	
	Slope	n	T
pC	-6.21 ± 0.10	5	$5.11e-02 \pm 6.58e-04$
dC	-6.21 ± 0.11	5	$4.90e-02 \pm 7.30e-04$
HC	-5.70 ± 0.05	5	$5.13e-02 \pm 4.17e-04$
CC	-5.39 ± 0.02	5	$5.15e-02 \pm 2.86e-04$

Fitting results

	Exp (GeV/c)	Levy (GeV/c)
pC	0.3 – 1.1	0.2 – 3.0
dC	0.3 – 1.1	0.2 – 3.0
HC	0.3 – 1.5	0.2 – 3.0
CC	0.3 – 2.0	0.2 – 3.0

Fitting ranges

dC/pC, α C/pC and CC/pC ratios



$$R_{AC / pC} = \frac{\left(\frac{1}{N} \frac{dN}{dp_t} \right)_{AC}}{\left(\frac{1}{N} \frac{dN}{dp_t} \right)_{pC}} \quad \text{A: d, H, C nuclei}$$

Summary

- Analysis of events in pC, dC, aC and CC interactions was performed by using the variable P_t^{\max}
- Events in the plot of dependence P_t of all particles on P_t^{\max} of event reveal different structure
- Number of particles with high P_t increases with atomic number of colliding nuclei
- From our analysis it becomes clear that the observed features should be more thoroughly investigated since they may provide some new information on the collision dynamics