Z-scaling and Direct Photon Production at High-p_T

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The scaling properties of direct photon production in $pp, \bar{p}p$ and pA collisions at high energies is reviewed. The general concept of z-scaling is applied for the analysis of experimental data on inclusive cross sections obtained at ISR, SpS and Tevatron. The properties of data z-presentation, the energy and angular dependencies, the power law, and A-dependence are discussed. The properties is considered to reflect the fundamental symmetries such as self-similarity, locality and fractality. The use of z-scaling to search for new physics phenomena in hadron-hadron, hadron-nucleus and nucleus-nucleus collisions is suggested. The violation of z-scaling characterized by the change of the anomalous fractal dimension is considered as a new and complimentary signature of nuclear phase transition. The predictions of the cross sections of direct-γ, π^0- and η^0-meson production in pp and pA collisions at RHIC and LHC energies are made.

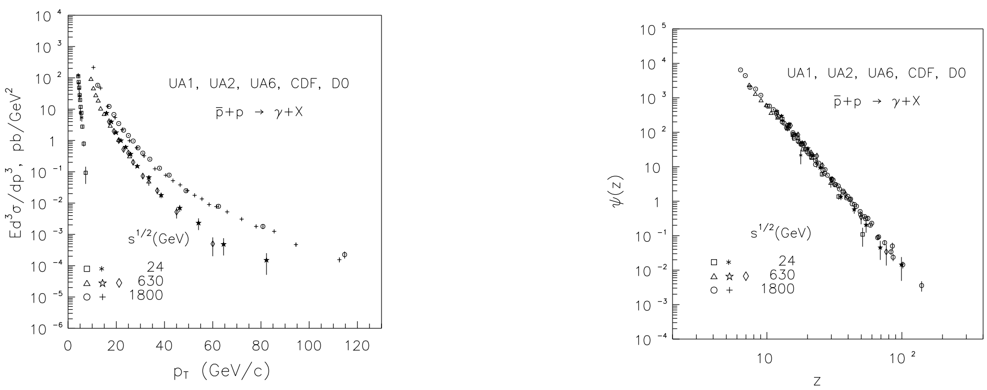

Figure 1: Dependence of inclusive cross section of direct photon production on transverse momentum in $\bar{p}p$ collisions at $s^{1/2} = 24-1800$ GeV and the corresponding scaling function $\psi(z)$. Experimental data on inclusive cross sections obtained by UA1, UA2, UA6, CDF and D0 Collaborations are used in the analysis.

References

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