

Critical behavior of Binder-like ratios and ratios of higher cumulants of conserved charges in QCD deconfinement phase transition

Binder-like ratios of baryon number are firstly suggested in relativistic heavy ion collisions. Using 3D-Ising($O(1)$), $O(2)$, and $O(4)$ models, the critical behavior of Binder-like ratios and ratios of higher cumulants of order parameter are fully presented. Binder-like ratio is shown to be a step function of temperature. The critical point is the intersection of the ratios of different system sizes between two platforms. From low to high temperature through the critical point, the ratios of third cumulants change their values from negative to positive in a valley shape, and ratios of fourth cumulants oscillate around zero. The normalized ratios, like the Skewness and Kurtosis, do not diverge with correlation length, in contrary with corresponding cumulants. Applications of these characters in locating critical point in relativistic heavy ion collisions are fully discussed.

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