Title:	Bin-width optimization in spectral analyses of the systems formed in high energy collisions
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Abstract:	To probe any heavy-ion collision(HIC), we need some observables to describe the final state particles. These observables are then fitted with different distribution functions to obtain some characteristic quantities using which comparison can be done with other collisions. The transverse momentum, p T , is often used to describe final state particles as they come out of a collision. Various distribution functions can describe the transverse momentum spectra of final-state particles in a heavy-ion collision. The transverse momentum spectra obtained in HIC are often studied using the Tsallis, Boltzmann, Fermi-Dirac, and Bose-Einstein distribution functions. In a multi-source thermal model, it is essential to estimate the parameter as accurately as possible, for which bin-width correlation must be properly understood. This thesis work aims to optimize the bin width selection p T distribution to enable a parameter correlation. We define a cost function using the mean integrated squared error function using the spike counts in each p T bin separated by some bin-width Δ and then minimize the cost function by changing the bin-width Δ. In this thesis, we optimize the bin-width value for p T spectra and fit it with Tsallis distribution. We further check for an optimized variable bin width histogram for p T spectra. We also check for other observable such as η and optimize the bin-width for η distributions.
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