

Multi moment cancellation of participant fluctuations - MMCP method

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We propose a new way to correct for finite centrality bin width effect i.e. participant fluctuations in high energy nucleus-nucleus collisions. The MMCP method allows to separate participant fluctuations and obtain fluctuations from one participant - a source - from a combination of the experimentally measured first four moments. The EPOS model is used for the numerical check of the MMCP for the net electric charge fluctuations in the forward rapidity region in Ar+Sc reactions at beam momentum 150 GeV/c. We show that using the existing methods - decreasing a centrality bin width, or using the Centrality Bin Width Correction procedure, one may still leave some residual participant fluctuations in the sample. Moreover, we show that the Centrality Bin Width Correction procedure may alter the fluctuation measures. The most important advantage of the MMCP is its precision even when the amount of measured events does not allow to decrease the centrality bin width, or the experimental determination of participants is difficult, e.g. in collider experiments. Even for the largest centrality bin in the considered case, $c = 0 - 20\%$, the relative error of the MMCP for the scaled variance of a source is below 2%. It is especially important in determination of the base line of the fluctuations in the search for the QCD Critical Point and the signals of the QCD phase transition. <https://arxiv.org/abs/1705.01110>

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