



## Fluctuations in heavy ion collisions and global conservation effects

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We analyze the behavior of cumulants of conserved charges in a subvolume of a thermal system with exact global conservation laws by extending [1] a recently developed [2] subensemble acceptance method (SAM) to multiple conserved charges. Explicit expressions for all diagonal and off-diagonal cumulants up to sixth order that relate them to the grand canonical susceptibilities are obtained. The derivation is presented for an arbitrary equation of state with an arbitrary number of different conserved charges. The global conservation effects cancel out in any ratio of two second order cumulants, in any ratio of two third order cumulants, as well as in a ratio of strongly intensive measures  $\Sigma$  and  $\Delta$  involving any two conserved charges, making all these quantities particularly suitable for theory-to-experiment comparisons in heavy-ion collisions. We also show that the same cancellation occurs in correlators of a conserved charge, like the electric charge, with any non-conserved quantity such as net proton or net kaon number. The main results of the SAM are illustrated in the framework of the hadron resonance gas model. We also elucidate how net-proton and net- $\Lambda$  fluctuations are affected by conservation of electric charge and strangeness in addition to baryon number.

[1] V.Vovchenko, R.V.Poberezhnyuk, V.Koch, JHEP 10 (2020) 089

[2] V.Vovchenko, O.Savchuk, R.V.Poberezhnyuk, M.I.Gorenstein, V.Koch, Phys.Lett.B 811 (2020) 135868

### Present via

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