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Combinants and correlation functions in nuclear collisions

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Multiplicity distributions in e+e- and pp collisions analysed via combinants exhibit oscillatory behavior of the modified combinants. The possible sources of these oscillations and their impact on our understanding of the multiparticle production mechanism were discussed [1-3]. The set of combinants, Cj provides a similar measure of fluctuations as the set of cumulant factorial moments, Kq, which are very sensitive to the details of the multiplicity distribution and were frequently used in phenomenological analyses of data. However, while cumulants are best suited to the study of the densely populated region of phase space, combinants are better suited for the study of sparsely populated regions because calculation of Cj requires only a finite number of probabilities P(N <j).
In this presentation we discuss how these method can be used in nuclear collisions. We demonstrate how correlation functions can be related to combinants and illustrate how just the information about the sign of these correlation function can be used in analyses of multiplicity distributions in nuclear collisions. It is argued that measuring couplings of the genuine multi-particle correlation functions could provide cleaner information on possible non-trivial dynamics in heavy-ion collisions.

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[2] H.W.Ang, A.H.Chan, M.Ghaffar, M.Rybczynski, G.Wilk, Z.Wlodarczyk, EPJA 56 (2020) 117
[3] H.W.Ang, M.Ghaffar, A.H.Chan, M.Rybczynski, Z.Wlodarczyk, G.Wilk Mod.Phys Lett. A 34 (2019) 1950324

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