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# Scaling properties of charged particle multiplicity fluctuations at $\sqrt{s_{\rm NN}} = 2.76$ TeV in ALICE at the LHC

*Monday 1 August 2022 18:50 (10 minutes)*

Spatial distributions of produced charged particles characterise the system formed in heavy-ion collisions. To learn about the mechanism of particle production and the phase space changes from quarks to hadrons, one of the basic tools is to study fluctuations in particle production. Local charged particle density fluctuations in the phase space are expected to scale with universal scaling exponent for the systems near the critical point. In this talk, scaling properties of multiplicity fluctuations of the charged particles produced in Pb–Pb collisions at $\sqrt{s_{\rm NN}} = 2.76$ TeV recorded with ALICE detector at the LHC are investigated in the two-dimensional $(\eta, \varphi)$ phase space in low transverse momentum region, using Normalized Factorial Moments (NFM). Power-law growth of NFM with increasing number of bins in the phase space region, a feature of bin-to-bin dynamical fluctuations that is consistent with self-similar behaviour [1], is observed. NFM of $q^{\rm th}$ order ($F_{\rm q}$) show linear dependence on the second-order NFM ($F_2$). The value of the scaling exponent ($\nu$) so determined indicates the order of the phase transition within the framework of Ginzburg-Landau theory [2,3]. Dependence of scaling exponents calculated in the low transverse momentum bins on the $p_{\rm T}$ bin position, width and the centrality of the events will be presented. A comparison of the results with that from the models with no physics of phase transition will also be presented.

**References**

1. R. C. Hwa and C. B. Yang, Phys. Rev. C **85**, 044914 (2012).
2. R. C. Hwa and M. T. Nazirov, Physical Review Letters, **69**, No. 5, 741 (1992).
3. R.C. Hwa and C. B. Yang, Acta Physica Polonica B, **48**, 23 (2016).

## Preferred track

Collectivity & Multiple Scattering

## Subfield

Heavy-ion experiment

## Attending in-person?

Yes

## On behalf of collaboration?

On behalf of the ALICE Collaboration

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**Session Classification:** Poster Session

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