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pT-Dependent Particle Number Fluctuations From Principal Component Analyses in Hydrodynamic Simulations of Heavy-Ion Collisions

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We carry out a principal component analysis of fluctuations in a hydrodynamic simulation of heavy-ion collisions, and compare with experimental data from the CMS collaboration. The principal components of anisotropic flow reproduce the trends seen in data, but multiplicity fluctuations show an interesting difference in transverse momentum dependence. We checked this is also the case for other hydro models. To investigate this, we construct an analytical toy model and verify that hydrodynamic simulations agree with its predictions. We find that the discrepancy in the momentum trend is likely due to the fact that hydrodynamic models typically have transverse momentum fluctuations that are larger than seen experimentally.

We conclude that the $n=0$ principal components open a new window on initial fluctuations, which can be used to rule out initial condition models.

More details can be found in [arXiv:1906.03045](https://arxiv.org/abs/1906.03045)

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