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A scaling relation between proton-nucleus and nucleus-nucleus collisions

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I compare the flow-like correlations in high multiplicity proton-nucleus (p + A) and nucleus- nucleus (A + A) collisions. At fixed multiplicity, the correlations in these two colliding systems are strikingly similar, although though the system size in p + A is smaller. Based on an independent cluster model and a simple conformal scaling argument, where the ratio of the mean free path to the system size stays constant at fixed multiplicity, I argue that flow in p + A emerges as a collective response to the fluctuations in the position of the clusters, just like in A + A collisions. By examining the recent LHC data carefully, I show that this simple model captures the essential physics of elliptic and triangular flow in p + A collisions. I also explore the implications of the model for jet energy loss in p + A collisions.

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