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New results on fluctuations and correlations from the NA61/SHINE experiment at the CERN SPS

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The exploration of the QCD phase diagram is the most important task of present heavy ion experiments. In particular, we want to study the phase transition from hadronic to partonic matter and look for the critical point (CP) of strongly interacting matter. Fluctuations and correlations in kinematic characteristics and particle yields may help to locate the CP (in analogy to enlarged fluctuations due to critical opalescence close to a CP in a liquid/gas transition). The strong interactions program of the NA61/SHINE experiment may allow to discover or rule out the existence of the CP in the SPS energy domain. For this purpose we perform a two-dimensional scan of the $(T - \mu_B)$ phase diagram by varying the energy ($5.1 < \sqrt{s_{NN}} < 16.8/17.3$ GeV) and the system size (p+p, Be+Be, Ar+Sc, Xe+La, Pb+Pb) of the collisions.

In this presentation new NA61/SHINE results on fluctuations and correlations in p+p, Be+Be, and Ar+Sc collisions will be presented. In particular, results on transverse momentum and multiplicity fluctuations, as well as higher order moments of net-charge fluctuations will be discussed. Results on correlations in azimuthal angle and pseudorapidity will be also shown. The NA61/SHINE data will be compared to predictions of string hadronic models and to results from other experiments at the same energy range.

Experimental Collaboration

NA61/SHINE Collaboration

Primary author: GREBIESZKOW, Katarzyna (Warsaw University of Technology (PL))**Presenter:** GREBIESZKOW, Katarzyna (Warsaw University of Technology (PL))**Session Classification:** Heavy ion physics**Track Classification:** Heavy Ion Physics