

Recent results from the strong interaction programme of the NA61/SHINE experiment

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The exploration of the QCD phase diagram ($T-\mu_B$) particularly the search for a phase transition from hadronic to partonic degrees of freedom and the QCD critical point is one of the most challenging theoretical and experimental tasks in present heavy ion physics. Unfortunately the QCD predictions are to a large extent qualitative, as QCD phenomenology at finite temperature and baryon number is one of the least explored domains of the theory. The experimental study of the properties of the onset of deconfinement and the search for the QCD critical point is very challenging because of the rapid expansion of the hot dense medium created in ion-collisions.

The fixed-target NA61/SHINE experiment at CERN SPS is pursuing a rich programme on strong interactions, which covers the study of the onset of deconfinement and the search for the QCD critical point. To obtain these goals NA61/SHINE scans a broad region of the QCD phase diagram by varying the momentum (13A-158A GeV/c) and the size of colliding systems (p+p, p+Pb, Be+Be, Ar+Sc, Xe+La, Pb+Pb). New NA61/SHINE results on particle spectra and event-by-event fluctuations in p+p, Be+Be and Ar+Sc collisions will be discussed together with previous NA49 results. In particular the results concerning the observation of the onset of deconfinement as well as multiplicity fluctuations measurements will be presented. The observation of rapid change of hadron production properties that starts when moving from Be+Be to Ar+Sc collisions will be explained. It is interpreted as the beginning of the formation of large clusters of strongly interacting matter - the onset of fireball. The future ion program of the NA61/SHINE experiment including planned measurements of charm hadrons, mostly D mesons, production in Pb+Pb collisions will be presented.

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