Contribution ID: **27** Type: **Oral**

Recent results from NA61/SHINE experiment and physics plans beyond 2020

Sunday, 7 April 2019 09:00 (20 minutes)

NA61/SHINE is a multi-purpose experiment to study hadron-proton, hadron-nucleus and nucleus-nucleus collisions at the CERN Super Proton Synchrotron (SPS) with a large acceptance detector system. The measurements performed for a wide range of reactions provide valuable data for studying properties of hadronic matter under extreme conditions. They also provide precise results on hadron production for determining the neutrino flux in long-baseline neutrino experiments and for more reliable simulations of cosmic-ray showers.

The primary aim of the experiment is the investigation of the phase transition from hadron gas to quark-gluon plasma and the search for associated critical point. For this we have made a two-dimensional scan of the (T−μB) 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).

In this presentation the NA61/SHINE results on particle spectra as well as
fluctuations and correlations in p+p, Be+Be, Ar+Sc, and Pb+Pb collisions will be
presented. The evolution of non-monotonic structures in pion and strangeness production as a function of system size and energy will be addressed. The obtained results reflect very interesting features and might be related to the onset of deconfinement as well as to the onset of formation of large clusters of strongly interacting matter.

The motivation to study the open charm production at the SPS energies will be
presented. Results of first measurements will be shown.
Information on future (after the Long Shutdown 2) systematic measurements of open charm production in Pb+Pb will be provided. Planned major detector upgrade of the NA61/SHINE facility will be also presented.

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Session Classification: Session V