Contribution ID: **149** Type: **oral**

Prospects for the NA60+ experiment at the CERN SPS

Thursday, 14 January 2021 17:10 (20 minutes)

In this talk, the prospects and the physics goals of a new fixed-target experiment, NA60+, which has been proposed for taking data with heavy-ion collisions at the CERN SPS in the next years, will be presented. The competitiveness and complementarity of the NA60+ physics program in the landscape of the experiments foreseen at other facilities in the next decade will also be discussed.

The high-intensity beams provided by the CERN SPS in a wide energy interval provide a unique opportunity to investigate the region of the QCD phase diagram at high baryochemical potential, $\mu_{\rm B}$, via measurements of rare signals. In particular, the main goals of the NA60+ experiment will be focused on precision studies of heavy quark and thermal dimuon production in Pb-Pb collisions via a beam-energy scan in the centre-of-mass energy interval $\sqrt{s_{\rm NN}} = 5-17$ GeV. The proposed experimental apparatus consists of a vertex telescope located close to the target, and a muon spectrometer located downstream of a hadron absorber. The vertex telescope will consist of several planes of monolithic active pixel sensors embedded in a dipole magnetic field. The muon spectrometer will utilize GEM and RPC detectors for muon tracking and trigger, and a toroidal magnet based on a new light-weight and general-purpose concept. This apparatus, based on state-of-the-art technologies, will allow a very broad and ambitious physics program.

The high-precision measurements of dimuon invariant mass distributions will open the possibility to investigate the order of the phase transition from the quark-gluon plasma to the hadron gas in the interval $\mu_{\rm B} \approx 200 - 400$ MeV via the first measurement of the caloric curve. In addition, the first direct measurement of $\rho - {\rm a}_1$ chiral mixing could be achieved by a precision measurement of the dimuon yield in the ${\rm a}_1$ mass region. Furthermore, a simultaneous precision study of hidden and open charm will be carried out, by measuring charmonium states though dimuon decays and open-charm hadrons from their hadronic decays reconstructed from the tracks in the vertex telescope. These measurements in the charm sector will provide new insights into the transport properties of the QGP and into the threshold energy for the onset of deconfinement.

Author: PRINO, Francesco (Universita e INFN Torino (IT))

Presenter: PRINO, Francesco (Universita e INFN Torino (IT))

Session Classification: FE

Track Classification: New facilities: DIS and hadronic experiments