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Measuring dilepton and heavy quark production at large μ_B ; the NA60+ experiment at the CERN SPS

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The high- μ_B region of the QCD phase diagram has become the object of several studies, focused on the investigation of the order of the phase transition and the search for the critical point. Accessing rare probes, which include electromagnetic observables and heavy quark production, is experimentally challenging as it requires large integrated luminosities, and a fixed-target environment may represent an ideal solution for these studies. The CERN SPS can cover, with large beam intensity, the collision energy region $5 < \sqrt{s_{NN}} < 17$ GeV, which was little studied until now with rare observables. A future experiment, NA60+, is being proposed to access this region and perform accurate measurements of the dimuon spectrum from threshold up to the charmonium region, as well as a study of charm and strange hadrons, via their 2- and 3-body hadronic decays. The experiment, which is also part of the Physics Beyond Colliders CERN initiative, includes a muon spectrometer, based on tracking gas detectors (GEM, MWPC) coupled to a vertex spectrometer based on Si detectors (MAPS). The time slot after the Long Shutdown 3 of the LHC (>2027) is foreseen for the first data taking, with Pb and proton beams.

In this contribution we will review the project and its recent developments, including the technical aspects and the R&D status, as well as detailed studies of the physics performances for the observables under study.

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