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Overview of the NA60+/DiCE experiment at the CERN SPS

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NA60+/DiCE is a new experiment, proposed for data taking in the coming years, which aims to explore the high baryochemical potential region of the QCD phase diagram. NA60+/DiCE will perform a beam-energy scan with Pb–Pb and p–A collisions in the range 6 < \sqrt{s_{NN}} < 17, taking advantage of the high-intensity beams available at the CERN SPS.

The experimental apparatus comprises a vertex spectrometer and a large-acceptance muon spectrometer., A vertex telescope with ultra-thin, large-area Monolithic Active Pixel Sensors (MAPS) is positioned close to the target and operates within a dipole magnetic field. Downstream, the set-up includes a muon spectrometer based on large-area gaseous detectors and a second dipole magnet. A high-intensity beam grants access to rare observables that have been scarcely explored such as hidden and open charm.

Open charm hadrons will be reconstructed via their decays into charged hadrons, tracked by the silicon detectors of the vertex spectrometer. High-precision measurements of the yields of D^0, D^+, D_s^+ mesons, and \Lambda_c^+ baryons will provide valuable constraints on the transport properties of the QGP and on charm-quark hadronization.

Charmonium states will be studied through their dimuon decay channels, reconstructed by matching muon tracks between the vertex spectrometer and the muon spectrometer. Measurements of J/\psi and \psi(2S) at different collision energies will enable the identification of the onset of charmonium suppression in a deconfined medium, which can be correlated with the system's temperature, also determined via thermal dimuons measured by NA60+/DiCE.

Additionally, NA60+/DiCE will investigate hadronic decays of strange hadrons and hypernuclei production; the corresponding performance studies will be presented.

This talk will cover the technical aspects of the experimental apparatus, the R&D progress, and the physics program and its potential impact alongside other experiments.

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