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Di-muon measuements with CBM experimet at FAIR

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Collision of heavy nuclei at relativistic energies provide a unique opportunity to study the behavior of strongly interacting matter under extreme conditions of temperature and density. Till date such collisions are only known way for laboratory investigation of a possible phase transition from hadronic matter to a plasma of de-confined quarks and gluons as well as the restoration of the chiral symmetry which is spontaneously broken in the hadronic world. While the ultra-relativistic heavy-ion collisions at RHIC and LHC probes the QCD medium at high temperatures and small baryo-chemical potentials, QCD phase diagram is relatively less explored in the regime of large baryon densities. Theoretical calculations based on QCD inspired models suggest a potentially rich phase structure in the high density region including the emergence of a first-order transition along with a second-order critical endpoint. Heavy-ion collisions at lower collision energies offer unique opportunities for systematic studies of this regime.

With beam kinetic energies in the range 2 - 11 A GeV, the Compressed Baryonic Matter (CBM) experiment at FAIR, aims to probe the QCD phase diagram in the range 500 < \mu_B < 800 MeV. Production of lepton pairs has been identified as a unique tool to determine the temperature and life time of the high baryon density fireball created in these collisions. In additions dileptons provide direct information about hadron spectral functions, in particular the ρ-meson and its mixing with the chiral partner a1 , sensitive to chiral symmetry restoration. In this talk we will present a brief overview of the physics opportunities and challenges of the foreseen di-muon measurements, in the FAIR energy domain.

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