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QCD phase diagram and magnetic fields

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The magnetized phase diagram for three-flavor quark matter is studied within the Polyakov extended Nambu–Jona-Lasinio model. The magnetic field induces multiple phase transitions for the quarks. The approximate chiral restoration is accomplished through several intermediate steps. We analyze the effect of the magnetic field on the spinodal and binodal regions of the phase transitions. Due to the various phase transitions that the quarks undergo, several critical endpoints emerge in the phase diagram. The isentropic trajectories around these CEPs are analyzed. A focusing effect is observed on the region towards the CEPs that are related with the strange quark phase transitions. Compared to the quark phase transitions, the deconfinement transition turns out to be less sensitive to the external magnetic field and the crossover nature is preserved over the whole phase diagram.

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