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Various aspects of QCD and 2 color QCD phase diagrams with non-zero chiral imbalance

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Phase structure of dense quark matter with chiral and isospin imbalance is considered in the framework of effective models. There has been considered as two color as well as three color QCD. It was shown that chiral imbalance has several rather peculiar properties such as being universal catalyzer, i. e. it catalyzes all the considered symmetry breaking patterns in the system, including the diquark condensation phenomenon (color superconductivity). Duality properties found earlier have been considered in both case. It was shown that the phenomenon of color superconductivity, which dominates at high baryon density, does not suppress the previously known effect that the chiral the imbalance leads to charged pion condensation in a dense quark medium, i.e. quark medium with nonzero baryon density. It was investigated how the chiral imbalance affects the phase of the color superconductivity. It has been shown that chiral imbalance leads to the appearance phases of color superconductivity in dense quark matter at lower values of baryon chemical potentials than in a chirally symmetric medium. It may have some interesting implications for collision experiments heavy ions with medium energies (at moderate energy heavy ion collisions).

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