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Quark mass generation by monopole condensation

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We show that monopole quark interactions break flavor chiral SU(2) symmetry as well as chiral U(1) symmetry. The interactions induce quark masses when the monopoles condense even in the chiral limit (current quark masses vanish.) The masses are estimated to be approximately 20MeV. Thus, the pions are not massless even in the chiral limit.
Furthermore, the presence of the interactions leads to the fact that the chiral symmetry breaking and the quark confinement simultaneously arises. Because fluctuations of color electric fields are large in dense quark matters, they expel the monopole condensation. Then, the deconfinement of quarks and the restoration of the chiral symmetry simultaneously arise.

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