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Magnetic catalysis and diamagnetism from pion fluctuations (online)

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In the framework of Nambu–Jona-Lasinio model beyond mean field approximation, the effects of pion fluctuations on (inverse) magnetic catalysis and magnetic susceptibility are studied. The negative magnetic susceptibility at low temperature is observed when contributions from both neutral and charged pions are taken into account. In weak field approximation, it is observed that at finite temperature, the magnetic inhibition effect in the chiral limit, resulting from the difference between the transverse and longitudinal velocities of neutral pions, converts to weak magnetic catalysis when considering a non-zero current quark mass. Moreover, the magnetic catalysis is amplified by the charged pions.

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