Operator relations and chemical effects on chiral dynamics in QCD

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Abstract: Taylor expansions of operator expectation values in QCD with respect to chemical potentials of quarks are studied. Maxwell's relations between coefficients and Ward identities between series are used to relate the operators which give the Taylor coefficients of the series for the chiral condensate, the pseudoscalar susceptibility and the mass dependence of quark number susceptibilities. Through such relations the physics of chiral dynamics are explored. The renormalized expectation values of the chiral condensate and its Taylor coefficients are extracted from simulation.