ELECTROMAGNETIC MULTIPOLE MOMENTS OF BARYONS

Alfons J. Buchmann[1]
[1]University of Tübingen, Germany

Electromagnetic multipole moments reveal interesting details concerning the charge and magnetization distributions in baryons. We calculate the charge quadrupole and magnetic octupole moments of baryons using a broken SU(6) symmetry approach.

The broken SU(6) spin-flavor formalism includes in addition to the usual one-quark currents, two- and three-quark terms in the electromagnetic current operator. The two- and three-quark operators provide an effective description of quark-antiquark and gluon degrees of freedom in baryons. They are classified as higher order terms in an $1/N_c$ expansion of the QCD Lagrangian.

Our results are compared to experimental quadrupole and octupole transition moments. The latter are extracted from electromagnetic transition amplitudes to excited nucleon states as measured at various facilities.

We attempt to interpret our numerical results for the higher order electromagnetic multipole moments in terms of deviations of the baryon charge and magnetization distributions from spherical symmetry. In particular, using various nucleon models, we try to extract information on the geometric shape of the charge and magnetic moment distributions in the nucleon ground state.