

Electromagnetic mass shifts of pseudoscalar mesons within the quark-parton-gluon model

V. Bardek, "Rudjer Bošković" Institute, Zagreb, Yugoslavia

Some implications of the parton model concerning the electromagnetic mass shifts of mesons in the pseudoscalar octet are investigated. It is well known that in the framework of the Cottingham dispersion approach to electromagnetic mass shifts, the exact scaling of deep-inelastic hadron-structure functions leads directly to logarithmically divergent results. However, keeping in mind the summation rules for the quark-parton-gluon model, it is possible that the logarithmically divergent increase in mass is due to the collective effect of individual, also logarithmically divergent electromagnetic mass shifts of elementary quark-parton constituents. If we assume in terms of the renormalization procedure that the originally logarithmically-divergent values of mass shifts of elementary constituents can be considered as finite in magnitudes, then the complete electromagnetic mass shift of mesons can be uniquely decomposed into three contributions: the elastic contribution, the interacting contribution and the contribution due to the mass shift of the quark parton. Assuming that the interacting contribution is negligibly small, the last (third) contribution can be calculated for each meson of the pseudoscalar octet. The calculation shows that this contribution vanishes exactly for the charged pion, and it is just the vanishing of this contribution that explains the success of the elastic approximation in the case of the charged pion. Furthermore, the relations obtained show consistency of the electromagnetic and  $SU(3)$  mass shifts of the constituents of the pseudoscalar meson octet.