

Abstract Submitted
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A parametrization of the baryon octet and decuplet masses

PHUOC HA, Towson University — We construct a general parametrization of the baryon octet and decuplet masses including the three-body terms using the unit operator and the symmetry-breaking factors, $M^d = \text{diag}(0, 1, 0)$ and $M^s = \text{diag}(0, 0, 1)$, in conjunction with the spin operators. Our parametrization which is equivalent to the usual chiral description is the first general parametrization in the context of effective field theory in the “quark” representation, where it has the minimal number of operators needed to describe all the octet and decuplet masses. We show that at two-loop level in the heavy-baryon chiral effective field theory, contributions of the three-body terms are cancelled and the general expression for baryon masses is reduced to the independent one- and two body operators. Our parametrization is particularly useful to an analysis of the baryon mass splittings due to both hypercharge-breaking and isospin-breaking effects.

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