

High Precision baryon mass sum rules from quantum group $SU_q(3)$ baryon flavor symmetry

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The quantum group $SU_q(3)$ is taken as a baryon flavor symmetry to derive mass relations. Including second order flavor symmetry breaking and accounting for electromagnetic contributions, we derive q-deformed octet and decuplet baryon mass relations accurate to 0.02% and 0.08 % respectively as well as a new relation between the octet and decuplet masses accurate to within 1.0%. The use of quantum groups as flavor symmetries, in the case of baryons, allows us to derive a formula for the Cabibbo angle in terms of the deformation parameter q and the spin of the baryons. Further applications of quantum groups to Cabibbo mixing, gauge theory and neutrino oscillations are discussed.