The $\pi N^* N^*$ and $\eta N^* N^*$ couplings in a Chiral Unitary Approach.

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The chiral unitary model is based on the implementation of exact unitarity together with a chiral expansion of $\mathrm{Re}(T^{-1})$ instead of the T matrix, in a way analogous to the effective range expansion in quantum mechanics. Using this model we will generate dynamically the negative parity nucleon resonance $N^* \equiv N^*(1535)$, by means of the Bethe Salpeter equation with coupled meson baryon channels in the $S = 0$ sector. Afterwards, we will obtain the strong $\pi^0 N^* N^*$ and $\eta N^* N^*$ couplings in terms of known couplings of the π and η to baryons and other mesons as given by the chiral Lagrangians, presenting the different diagrams which contribute to the relevant couplings. Comparison of the strength and sign of the couplings involving the ground state nucleon N, and the same couplings involving its negative parity resonance N^*, will be used to obtain information on the chiral assignment for the nucleon[1]. Our results will be compared to the ones obtained by the quark model and the large-N_c approach.

References

[1] J.C. Nacher, A. Parreño, E. Oset, A. Ramos, A. Hosaka and M. Oka, Nucl. Phys. **A678** (2000) 187.