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Global analysis of the Delta(1232) contribution in the pion photo-production off nucleons

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We study the effects of the $\Delta(1232)$ resonance as an effective degree of freedom in a global analysis of the pion photo-production off nucleons. Cross sections and polarization observables have been calculated for charged and neutral pion channels in relativistic chiral perturbation theory up to third order in the δ counting. We compare our model with a large database containing the available experimental data. This allows us to strongly constrain some little known low-energy constants and even see the effect of those that are still unknown. We find that the $\Delta(1232)$ inclusion leads to an improved convergence of the chiral series. Finally, we compare our results with the low-energy constants previously determined in related calculations such as nucleon EM form factors, axial charged current and the EM $\Delta(1232)$ decay.
Our aim is to use these values for low-energy constants as inputs for further calculations involving electromagnetic and weak interactions for hadron processes in order to have a more complete and accurate description at the low energy regime of the hadronic physics.

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