Propagator of the Δ Resonance and Determination of the Magnetic Moment of the Δ^+ from the $\gamma p \to \gamma \pi^o p$ Reaction

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The photon-proton scattering reactions $\gamma p - \gamma' p'$, $\gamma p - \pi^{o'} p'$ and $\gamma p - \gamma' \pi^{o'} p'$ are investigated by the field-theoretical one-particle π, ω, ρ-meson, nucleon and Δ-isobar exchange model. Proceeding from the separable model of the πN amplitude the procedure of construction of the microscopic propagator of the Δ resonance is suggested. This procedure allows one to determine the $\pi N - \Delta$ form factors and Δ propagator as a spin 3/2 particle microscopic propagator explicitly from the πN P_{33} phase shifts. The numerical calculation of the cross section of the $\gamma p - \gamma' p'$, $\gamma p - \pi^{o'} p'$ and $\gamma p - \gamma' \pi^{o'} p'$ reactions are performed with two different separable models of the Δ propagator and with the propagator of Breit-Wigner shape. It is demonstrated that the numerical description of these reactions in the Δ-resonance region are very sensitive to the model of the Δ-propagator and it is shown that this sensitivity is the result of the difference between the basic P_{33} partial πN phase shift analyses. The dependence of the cross-sections of the $\gamma p \to \gamma' \pi^{o'} p'$ reaction on the magnitude of the Δ^+ magnetic moment is examined and the most convenient kinematical region for the determination of the magnetic moment of the Δ^+-resonance from the forthcoming data is indicated.

References

[1] A. I. Machavariani and Amand Faessler. Phys. Rev. C. **C72** (2005) 024002