The field-theoretical description of the $\gamma p - \gamma' \pi' N'$ reaction in the Δ resonance region and determination of the magnetic moment of the Δ^+ resonance

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The structure of the complete set of diagrams for the amplitudes of the $\gamma p - \gamma' \pi' N'$ reactions in the framework of the field-theoretical approach is discussed. Unlike the other relativistic approaches, our resulting amplitudes of the $\gamma p \to N' \pi' \gamma'$ reactions requires one variable vertex functions as input ingredient for construction of the amplitude. In particular, besides the $\gamma p - p'$, $\gamma + meson - meson'$ and $meson + p - N'$ vertex functions, the present approach contains more complicated four-point vertices of γN $gamma - meson$ and $meson - nucleon$ systems. They can be determinated by the calculation of the equal-time commutators. These four-point (seagull) terms can been expressed through the one-variable vertex functions and they contain all contributions caused by the virtuality of the intermediate off-mass shell particles.

We suggest the procedure of the construction of the propagator of the Δ in the framework of the separable model of the πN interaction. This procedure allows us to obtain the $\pi N - N$ form-factor and Δ propagator directly from the πN phase-shifts. We demonstrate the significance of the form of the Δ propagator by description of the experimental data on the the $\gamma p - \gamma' \pi' N'$ reaction. Our recent results for description of the the $\gamma p - \gamma' \pi' N'$ reaction are represented.