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Regge approach to the reaction of $\gamma N \to K^* \Lambda$

Byung-Geel Yu,[1,*] Yongseok Oh,[2,3,†] and Kook-Jin Kong[1,‡]

[1]*Research Institute of Basic Sciences, Korea Aerospace University, Goyang, Gyeonggi 10540, Korea*
[2]*Department of Physics, Kyungpook National University, Daegu 41566, Korea*
[3]*Asia Pacific Center for Theoretical Physics, Pohang, Gyeongbuk 37673, Korea*

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Photoproduction of K^* vector meson off the nucleon is investigated within the Regge framework where the electromagnetic vertex of $\gamma K^* K^*$ fully takes into account the magnetic dipole and electric quadrupole moments in addition to the electric charge of the spin-1 K^* vector meson. The t-channel $K^*(892)$, $K(494)$, and $\kappa(800)$ meson exchanges are considered for the analysis of the production mechanism. The rapid decrease of the cross sections for the $\gamma p \to K^{*+}\Lambda$ reaction experimentally observed beyond the resonance region is well reproduced by the dominance of the exchange of K-meson trajectory. The total cross section for the $\gamma n \to K^{*0}\Lambda$ reaction is predicted to be about twice that of the $\gamma p \to K^{*+}\Lambda$ reaction. The role of the K^* electromagnetic multipole moments is studied through the analysis of total and differential cross sections and model predictions are presented for the polarization asymmetries of the photon, recoiled Λ, and parity asymmetry. We suggest measuring the photon polarization asymmetry as a tool to identify the role of the magnetic dipole and electric quadrupole moments of the K^* vector meson.

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Electromagnetic properties of hadrons are important to unravel the internal structure of hadrons. In the case of vector mesons, in particular, their magnetic moments and electric quadrupole moments are known to be $\mu = e_V/m_V$ and $\mathcal{Q} = -e_V/m_V^2$ [1,2] in the limit of a pointlike structure, where e_V (m_V) is the charge (mass) of the vector meson. Therefore, any deviation from these canonical values implies the nontrivial internal structure of the vector meson and may give a clue on the properties of the constituents of vector mesons [3].

In this respect, the recent experimental data from the CLAS Collaboration on K^* photoproduction at the Thomas Jefferson National Accelerator Facility [4,5] draw attention as they provide information on the properties of vector mesons as well as on the production mechanisms of strangeness via the spin-1 vector meson. However, there are only a few model calculations attempting to analyze the reaction processes of $\gamma p \to K^{*+}\Lambda$ [6–8] and $\gamma n \to K^{*0}\Lambda$ [9], based on either the effective Lagrangian approach or a Regge-pole ansatz with hadronic form factors for the suppression of the reaction cross sections.

Moreover, these model calculations treated electromagnetic interactions of the K^* vector meson only through the charge coupling by dropping out higher multipoles. As stated above, however, spin-1 vector mesons have non-vanishing magnetic dipole and electric quadrupole moments even in the pointlike structure. Therefore, it is legitimate to investigate the role of these higher multipoles, which is the main motivation of the present work. The information on higher electromagnetic multipoles of vector mesons, if found, will lead to an insight on the dynamical properties of vector mesons through their production mechanisms. Indeed, the contribution from such terms is found to be screened by other contributions in cross sections, and it would be very difficult to extract any information on these properties through the measurement of differential cross sections. However, because it is related to the spin structure of vector mesons, one may expect that some polarization observables would provide a useful tool to extract meaningful information. In the present work, we search for such possibilities.

In the Regge approach of Ref. [8], a cutoff function was introduced to explain the measured data. However, since the role of the cutoff function is already played by the intrinsic Gamma function, $\Gamma[\alpha_{K^*}(t)]$, in the Regge amplitude, we do not adopt additional cutoff functions. Instead, we use the K^* trajectory used in Refs. [10,11] which has a lower intercept than that of Ref. [8] and we could obtain reasonable results in cross sections for the reaction of $\gamma p \to K^{*+}\Lambda$. Therefore, we do not have any additional parameters for the production amplitude.

In a recent publication [12], two of us studied photoproduction of charged ρ meson, i.e., $\gamma N \to \rho^\pm N$ including electromagnetic multipoles of vector mesons. We found that the existing data of Refs. [13–15] on these processes could be reasonably reproduced within the Regge framework. Encouraged by this observation we here study the reaction processes $\gamma p \to K^{*+}\Lambda$ and $\gamma n \to K^{*0}\Lambda$ in the Regge approach in order to see the role of the structure of the $\gamma K^* K^*$ vertex in the analysis of data reported in Refs. [4,5,16].

*bgyu@kau.ac.kr
†yohphy@knu.ac.kr
‡kong@kau.ac.kr

As discussed in Ref. [12], the validity of the Ward identity for the $\gamma K^* K^*$ vertex is crucial to provide a reliable prescription for gauge invariance in charged-meson photoproduction. The most general form of the electromagnetic $\gamma K^* K^*$ vertex $\Gamma^{\mu\nu\alpha}_{\gamma K^* K^*}(q, q')$ which satisfies the Ward identity is given by

$$\eta^*_\nu \Gamma^{\mu\nu\alpha}_{\gamma K^* K^*}(q, q')\eta_\alpha \epsilon_\mu = -\eta^*_\nu(q)\Big\{ e_{K^*}[(q+q')^\mu g^{\nu\alpha} - q'^\nu g^{\mu\alpha} - q^\alpha g^{\mu\nu}] + e\kappa_{K^*}(k^\nu g^{\mu\alpha} - k^\alpha g^{\mu\nu}) - e\frac{(\lambda_{K^*}+\kappa_{K^*})}{2m^2_{K^*}}\left[(q+q')^\mu k^\nu k^\alpha - \frac{1}{2}(q+q')\cdot k(k^\nu g^{\mu\alpha} + k^\alpha g^{\mu\nu})\right]\Big\}\eta_\alpha(q')\epsilon_\mu, \tag{1}$$

where k_μ, q'_μ, and q_μ are photon, the incoming and outgoing K^* momenta with $q'_\mu = q_\mu - k_\mu$. Spin polarization vectors of the photon and K^* are denoted by ϵ_μ and η_μ, respectively. Then, the magnetic dipole and electric quadrupole moments of the K^* meson are given by

$$\mu_{K^*} = (1+\kappa_{K^*}), \qquad \mathcal{Q}_{K^*} = \lambda_{K^*}, \tag{2}$$

in units of $e/(2m_{K^*})$ and $e/m^2_{K^*}$, respectively.

Theoretical estimates on the magnetic dipole and electric quadrupole moments of the K^* vector meson are reported in various models inspired by QCD [17,18]. In the present work, we adopt the values predicted in Ref. [18], namely, $e_{K^*} = +1$, $\kappa_{K^*} = 1.23$ (therefore, $\mu_{K^*} = 2.23$) and $\lambda_{K^*} = -0.38$ for the K^{*+} and $e_{K^*} = 0$, $\kappa_{K^*} = -0.26$ (therefore, $\mu_{K^*} = -0.26$) and $\lambda_{K^*} = 0.01$ for the K^{*0}.

We now consider the t-channel Regge-pole exchange in production amplitudes. Given the Born amplitude for the process $\gamma(k) + N(p) \to K^*(q) + Y(p')$, where the momentum of each particle is denoted in the parenthesis, the meson exchange in the t-channel is Reggeized by replacing the t-channel pole with the Regge-pole of the form,

$$\mathcal{R}^\varphi(s,t) = \frac{\pi\alpha'_J}{\Gamma[\alpha_J(t)+1-J]\sin[\pi\alpha_J(t)]}\left(\frac{s}{s_0}\right)^{\alpha_J(t)-J}, \tag{3}$$

which is written collectively for a meson φ of spin-J with the phase $\frac{1}{2}[(-1)^J + e^{-i\pi\alpha_J(t)}]$ assigned to the exchange-nondegenerate single meson, in general.

Recalling that the energy dependence of the total cross section is given as $\sigma \sim s^{\alpha_J(0)-1}$, the steep decrease of the cross section for the $\gamma p \to K^{*+}\Lambda$ reaction with increasing photon energy, as observed by the CLAS Collaboration [4], implies the dominance of the exchange of the kaon trajectory, whereas K^* of nonzero spin and K^*_2 as well should be suppressed in the region over the resonance peak.

With these in mind we write the Reggeized amplitude which consists of kaon and scalar meson κ in addition to the K^* exchange as

$$\mathcal{M} = \bar{u}(p')\eta^*_\nu(q)(\mathcal{M}^{\mu\nu}_{K^*N} + \mathcal{M}^{\mu\nu}_K + \mathcal{M}^{\mu\nu}_\kappa)\epsilon_\mu(k)u(p), \tag{4}$$

where the Born amplitude is utilized for gauge invariance of the K^* exchange,

$$\mathcal{M}^{\mu\nu}_{K^*p} = \Big\{\left(g^V_{K^*p\Lambda}\gamma^\nu + \frac{g^T_{K^*p\Lambda}}{4M_p}[\gamma^\nu, \not{q}]\right)\frac{\not{p}+\not{k}+M_p}{s-M_p^2}\left(e_p\gamma^\mu - \frac{e\kappa_p}{4M_p}[\gamma^\mu, \not{k}]\right) + \Gamma^{\mu\nu\alpha}_{\gamma K^{*+}K^{*+}}(q,q')\frac{(-g^{\alpha\beta}+q'^\alpha q'^\beta/m^2_{K^*})}{t-m^2_{K^*}}\left(g^V_{K^*p\Lambda}\gamma^\beta + \frac{g^T_{K^*p\Lambda}}{4M_p}[\gamma^\beta, \not{q}']\right) - e_p\frac{g^T_{K^*p\Lambda}}{4M_p}[\gamma^\nu,\gamma^\mu]\Big\}(t-m^2_{K^*})\mathcal{R}^{K^*}(s,t)\frac{1}{2}(-1+e^{-i\pi\alpha_{K^*}(t)}), \tag{5}$$

for the $\gamma p \to K^{*+}\Lambda$ reaction and

$$\mathcal{M}^{\mu\nu}_{K^*n} = \Gamma^{\mu\nu\alpha}_{\gamma K^{*0}K^{*0}}(q,q')(-g^{\alpha\beta}+q'^\alpha q'^\beta/m^2_{K^*}) \times \left(g^V_{K^*n\Lambda}\gamma^\beta + \frac{g^T_{K^*n\Lambda}}{4M_n}[\gamma^\beta, \not{q}']\right) \times \mathcal{R}^{K^*}(s,t)\frac{1}{2}(-1+e^{-i\pi\alpha_{K^*}(t)}) \tag{6}$$

for the $\gamma n \to K^{*0}\Lambda$ process, respectively. Here, we assume the identity $(t-m^2_{K^*})\mathcal{R}^{K^*}(s,t) = 1$ in Eqs. (5) and (6) for a simple Reggeization, including the phase factor.

Charge and anomalous magnetic moment of proton are denoted by e_p and κ_p and $M_p(M_n)$ is proton (neutron) mass. Also we define $t = (q-k)^2$. The exchanges of kaon and κ trajectories are given by

$$\mathcal{M}^{\mu\nu}_K = i\frac{g_{\gamma KK^*}}{m_0}g_{KN\Lambda}\varepsilon^{\mu\nu\alpha\beta}k_\alpha q'_\beta\gamma_5\mathcal{R}^K(s,t)\begin{Bmatrix} e^{-i\pi\alpha_K(t)} \\ 1 \end{Bmatrix}, \tag{7}$$

$$\mathcal{M}^{\mu\nu}_\kappa = \frac{g_{\gamma\kappa K^*}}{m_0}g_{\kappa N\Lambda}(k\cdot q' g^{\mu\nu} - q'^\mu k^\nu)\mathcal{R}^\kappa(s,t)\frac{1}{2}(1+e^{-i\pi\alpha_\kappa(t)}), \tag{8}$$

where $m_0 = 1$ GeV is the mass scale parameter. In Eq. (7), the phases of the K exchange are to be read for the $\gamma p \to K^{*+}\Lambda$ reaction (upper) and the $\gamma n \to K^{*0}\Lambda$ reaction (lower), which are consistent with the phase relations in $\rho^\pm$ photoproduction [12].

Given the phases of the Regge poles, we use the trajectories

$$\alpha_\kappa(t) = 0.7(t - m_\kappa^2), \tag{9}$$

for the κ trajectory, and

$$\alpha_K(t) = 0.7(t - m_K^2),$$
$$\alpha_{K^*}(t) = 0.83t + 0.25, \tag{10}$$

for the K and K^* trajectories. [10,11].

For the $\gamma p \to K^{*+}\Lambda$ process, the proton pole in the s-channel and the contact term are included in addition to the t-channel K^{*+} exchange in order to satisfy the gauge-invariance condition. We also preserve the proton anomalous magnetic moment term in the s-channel Born term for the γp reaction because of the expected role of the magnetic interactions between the particles of nonzero spin. Hereafter, we call the whole amplitude given by Eq. (5) as the gauge invariant K^* exchange from the standpoint of the t-channel Regge pole exchange, whereas we mean the single K^* exchange in the t-channel only by the second term of Eq. (5). In the case of the $\gamma n \to K^{*0}\Lambda$ process, however, only the t-channel $\kappa + K + K^{*0}$ exchanges are included with the magnetic dipole and electric quadrupole moments of K^{*0} which are themselves gauge-invariant.

In the Reggeization of K^{*+} exchange we use $g^V_{K^*N\Lambda} = -4.5$ and $g^T_{K^*N\Lambda} = -10$ obtained by using the flavor SU(3) relations with the ratios $\alpha_V = 1$ and $\alpha_T = 0.4$ from $g^V_{\rho NN} = 2.6$ and $g^T_{\rho NN} = 9.62$ following Refs. [12,19].

For the estimate of the K exchange, we use $g_{KN\Lambda} = -13.24$ consistent with the SU(3) prediction with $\alpha = 0.365$ and $g_{\pi NN} = 13.4$, and the couplings $g_{\gamma KK^{*+}} = 0.254$ and $g_{\gamma KK^{*0}} = -0.388$ are determined from the measured decay widths $\Gamma_{K^*\to K^+\gamma} = 50.3$ keV and $\Gamma_{K^*\to K^0\gamma} = 116.6$ keV, respectively. The negative sign for $g_{\gamma KK^{*0}}$ follows the quark model prediction.

The radiative decay constants relevant to the scalar meson κ is unknown at present and we use the prediction of Ref. [20], which gives the decay width of K^{*0} as

$$\Gamma(K^{*0} \to \kappa\gamma) = \frac{1}{96\pi}\frac{e^2}{\tilde{g}_\rho^2}\left(\frac{m_{K^*}^2 - m_\kappa^2}{m_{K^*}}\right)^3 \left|-\frac{8}{3}\beta_A\right|^2, \tag{11}$$

supposing that the K^* mass m_{K^*} be larger than the κ mass m_κ. The values of $\beta_A = 0.72\ \text{GeV}^{-1}$ and $\tilde{g} = 4.04$ are estimated in Ref. [20]. In this work we consider $m_\kappa = 800$ MeV and $g_{\gamma\kappa K^{*0}} = 0.144\ \text{GeV}^{-1}$, which gives $\Gamma(K^{*0} \to \kappa\gamma) \approx 0.411$ keV. The SU(3) relation $g_{\gamma\kappa K^{*0}} = -2g_{\gamma\kappa K^{*\pm}}$ is kept through the present work, and we get $g_{\gamma\kappa K^{*+}} = -0.072$ [21]. For the scalar meson-baryon coupling constant we adopt $g_{\kappa N\Lambda} = -14.7$ following the recent result of QCD sum rule calculation [22].

Figure 1 shows the computed total cross sections for the reactions of $\gamma p \to K^{*+}\Lambda$ in the presence of the proton anomalous magnetic moment $\kappa_p = 1.79$ and $\gamma n \to K^{*0}\Lambda$ as functions of photon energy E_γ in the laboratory frame. The contributions from the K-trajectory exchange in Eq. (7), κ-trajectory exchange in Eq. (8), and the t-channel K^*-trajectory exchange in Eq. (5) are displayed by the dashed, dot-dot-dashed, and dot-dashed lines in order. The red dotted line is from the gauge-invariant K^* exchange $\mathcal{M}_{K^*p}$ in Eq. (5) which contains the s-channel proton pole term and the contact term. The experimental data are taken from the CLAS Collaboration [4] for $\gamma p \to K^{*+}\Lambda$ and from the ABHHM Collaboration [16] for $\gamma n \to K^{*0}\Lambda$, respectively. These results show that the γp reaction exhibits the dominance of K exchange over the gauge invariant K^* exchange which is physical. But the single K^* exchange is comparable to the K. The γn process is totally governed by the K exchange as expected from the small K^* electromagnetic moments, and the cross section is found to be about double the size of the γp cross section.

As mentioned above, we keep the anomalous magnetic moment of the proton because of the expected interaction between the electromagnetic moments of vector meson

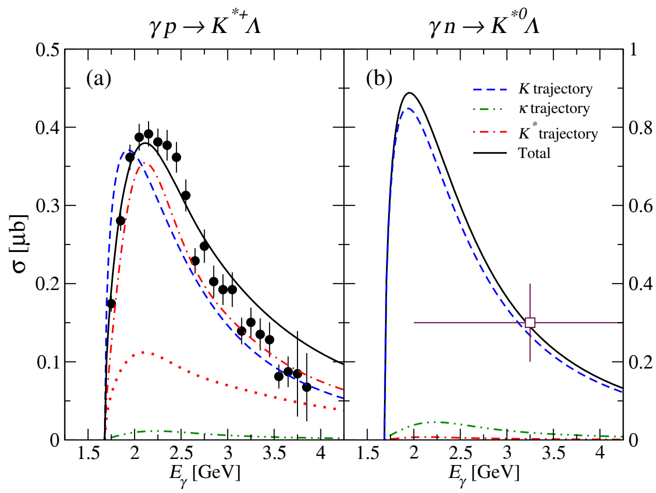

FIG. 1. Total cross sections (a) for $\gamma p \to K^{*+}\Lambda$ and (b) for $\gamma n \to K^{*0}\Lambda$. Blue dashed, green dot-dot-dashed, and red dot-dashed lines are the contributions from the K, κ, and the t-channel K^* exchange with $\kappa_{K^*} = 1.23$ and $\lambda_{K^*} = -0.38$ for the γp process, and $\kappa_{K^*} = -0.26$ and $\lambda_{K^*} = 0.01$ for the γn process, respectively. The gauge-invariant K^* exchange $\mathcal{M}_{K^*p}$ with $\kappa_p = 1.79$ in Eq. (5) is given by the red dotted line. The solid lines show the results of the full calculation. Experimental data for the γp reaction are from Ref. [4] (filled circles) and those for the γn reaction are from Ref. [16] (open square).

with the magnetic moment of the proton pole term. For a test of this speculation, i.e., as an attempt which has to be tested in experiments, we study the correlation of the K^* electromagnetic moments and the proton magnetic moment in cross sections.

Figure 2 illustrates the role of the κ_{K^*} and λ_{K^*} terms in total cross sections in the presence of κ_p [Fig. 2(a)], and in the absence of it [Fig. 2(b)]. In Fig. 2(a) the dotted line is the contribution of the single K^* exchange with only the charge coupling in the first term in Eq. (1), and the dashed line is obtained with the charge plus the magnetic moment in the first and second terms, respectively, which reveals the sizable role of the K^* magnetic moment. Furthermore, by comparing with the dot-dashed line in Fig. 1(a) we also figure out the contribution of the electric quadrupole moment of the third term in Eq. (1).

In Fig. 2(b), it should be noted that the difference of the cross sections between the case with $\kappa_{K^*} = 1.23$, $\lambda_{K^*} = -0.38$ given by the solid line and the case without them given by the dash-dotted line is quite noticeable in the absence of κ_p. This discrepancy disappears, however, in the presence of $\kappa_p = 1.79$, as can be seen in Fig. 2(a). In other words, the difference between the two blue dash-dotted curves almost doubles in (a) and (b), which exhibits a nontrivial role of the proton anomalous magnetic moment κ_p as well as the κ_{K^*} and λ_{K^*}. Therefore, this signifies that the κ_p in the proton pole term should be activated in the Reggeization of the production amplitude in case of the vector meson not only for theoretical consistency but also for phenomenological consequences just as we have demonstrated.

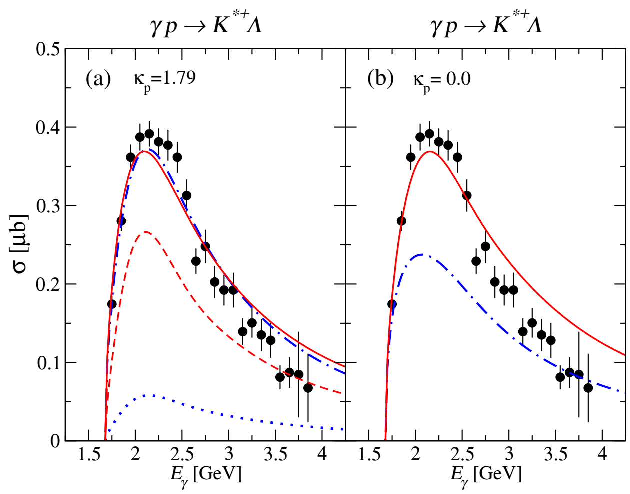

FIG. 2. Effects of K^* electromagnetic multipole moments on the total cross section for $\gamma p \to K^{*+}\Lambda$ in the case (a) with $\kappa_p = 1.79$ and (b) without κ_p. In (a), the red dashed line is the single K^* exchange in the t-channel with $\kappa_{K^*} = 1.23$ but with $\lambda_{K^*} + \kappa_{K^*} = 0$ in Eq. (1). The corresponding cross section from the full calculation in Eq. (4) is given by the red solid line. The blue dotted line is the single K^* exchange with $\kappa_{K^*} = 0$ and $\lambda_{K^*} = 0$ and the total cross section corresponding to this set is depicted by the blue dash-dotted line. In (b), the full cross sections with and without κ_{K^*} and λ_{K^*} in the K^* exchange are shown by the solid and dash-dotted lines, respectively.

The observed differential cross sections for both reaction processes are reasonably reproduced by the present model calculations as shown in Fig. 3. Enhancement at forward angles in both cases illustrates dominance of K-trajectory exchange shown by the blue dashed lines in Fig. 3 for $E_\gamma = 2.35$ GeV (2.2 GeV) in the case of γp (γn) reaction. Similar to the case of the total cross section, the contribution of K^* without multipoles does not significantly alter the differential cross section in the presence of κ_p.

Although contributions of K^* multipoles, i.e., κ_{K^*} and λ_{K^*} terms, are small in cross sections, their effects may be found in spin polarization asymmetries. Furthermore, since the contributions of N^* resonances in the $\gamma p \to K^{*+}\Lambda$ process are found to be rather insignificant [7], the reaction process is of benefit to the measurement of such observables on a clean background. Figure 4 presents the photon polarization observable (Σ) together with the parity asymmetry (P_σ) and the recoil polarization (P_Λ) for both processes. Following the convention and definitions of Refs. [23,24], the photon polarization asymmetry is given by

$$\Sigma = \frac{\sigma^{(\perp,0,0,0)} - \sigma^{(\parallel,0,0,0)}}{\sigma^{(\perp,0,0,0)} + \sigma^{(\parallel,0,0,0)}}, \qquad (12)$$

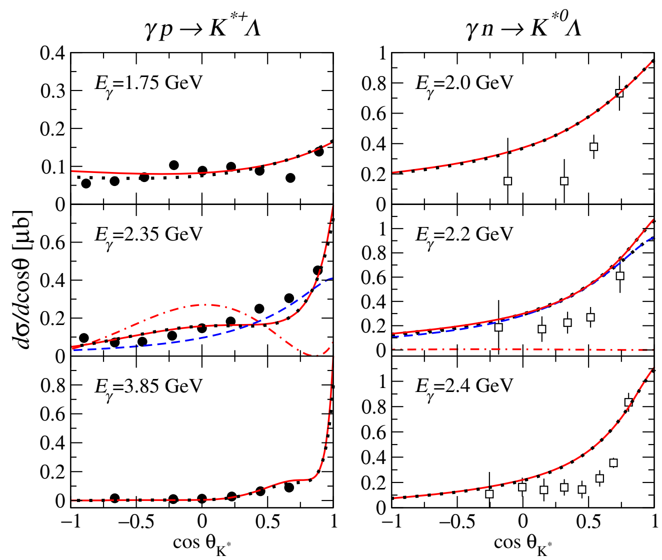

FIG. 3. Differential cross sections for $\gamma p \to K^{*+}\Lambda$ and $\gamma n \to K^{*0}\Lambda$ reactions. Dotted lines are the results without κ_{K^*} and λ_{K^*} terms. The respective contributions of K and K^* exchanges are shown with the same notation as in Fig. 1. Experimental data are taken from Ref. [4] (filled circles) and from Ref. [5] (open squares).

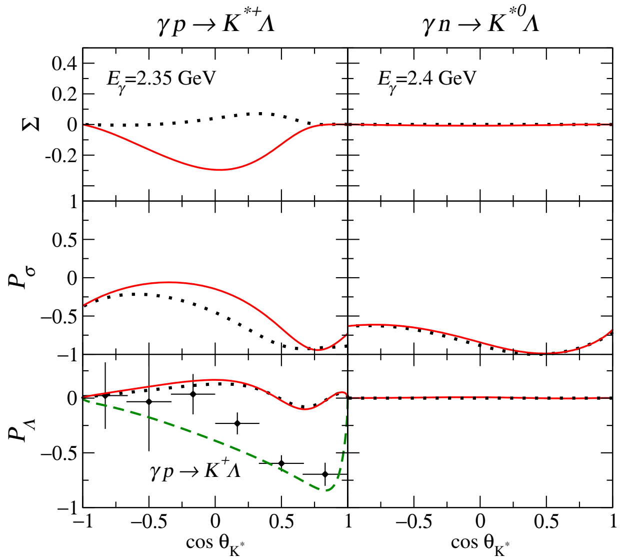

FIG. 4. Spin polarization observables of $\gamma p \to K^{*+}\Lambda$ at $E_\gamma = 2.35$ GeV and $\gamma n \to K^{*0}\Lambda$ at $E_\gamma = 2.4$ GeV. The solid lines are from the full calculation while the dotted lines are obtained without κ_{K^*} and λ_{K^*} terms. For comparison, the recoil polarization for $\gamma p \to K^+\Lambda$ is given by the green dashed line (left) together with data taken from Ref. [25].

where we define $\sigma^{(B,T,Y,V)}$ for the differential cross section $d\sigma/d\Omega$ with the superscripts (B, T, Y, V) denoting the polarizations of photon beam, target proton, produced hyperon, and produced K^* vector-meson, respectively. The superscript 0 means unpolarized state and $\parallel$ ($\perp$) corresponds to a photon linearly polarized parallel (perpendicular) to the reaction plane but normal to the photon beam direction. It should be noted that the negativeness of Σ in γp reaction is largely due to the K^* exchange, which reveals a sizable dependence on κ_{K^*} and λ_{K^*}. Thus, measuring this observable is desirable to verify the role of the K^* magnetic moment and electric quadrupole moment.

The parity asymmetry defined as

$$P_\sigma = 2\rho^1_{1-1} - \rho^1_{00}, \tag{13}$$

measures the asymmetry between the natural and unnatural parity of exchanged mesons in terms of density matrix elements [26]. In particular, the predicted value $P_\sigma \approx -1$ for the γn reaction is understood by the dominance of the K exchange of unnatural-parity over the natural-parity exchanges of κ and K^*. Recently P_σ of the $\gamma p \to K^{*0}\Sigma^+$ reaction was reported [27] and the comparison of P_σ in various channels for the K^* production will be useful to understand the production mechanism of strangeness via the spin-1 vector meson.

The observation of the recoil polarization, P_Λ, is also interesting since the Λ hyperon produced in the final state is self-analyzing [25]. The asymmetry between spin polarizations of the final Λ along with the y'-axis is defined by [23]

$$P_\Lambda = \frac{\sigma^{(0,0,+y,0)} - \sigma^{(0,0,-y,0)}}{\sigma^{(0,0,+y,0)} + \sigma^{(0,0,-y,0)}}, \tag{14}$$

which can be measured by the subsequent weak decay of the final Λ through the $\Lambda \to p\pi$ decay. Viewed from the different spin structure of the final state $K^{*+}\Lambda$ from the case of the final state $K^+\Lambda$ in the $\gamma p \to K^+\Lambda$ process, it is informative to compare P_Λ asymmetry in both reactions. The dashed line for the P_Λ in the latter process is estimated from Ref. [11] with the experimental data of Ref. [25], which shows a quite different spin polarization of Λ from the $K^{*+}\Lambda$ production process, as expected. The experimental measurements of these observables, therefore, will be a testing ground to confirm models for the electromagnetic production of strangeness through spin-1 vector mesons with electromagnetic multipoles.

In summary, we have investigated photoproduction of $\gamma N \to K^*\Lambda$ focusing on the role of electromagnetic multipoles of K^* vector meson. With the $\gamma K^* K^*$ vertex that fully accounts the magnetic dipole and electric quadrupole moments of K^* more than electric charge, analysis of existing data was performed based on the Regge approach. We found that the production mechanism of the $\gamma p \to K^{*+}\Lambda$ process can be understood by the dominance of K in comparison to the K^* exchange, while the $\gamma n \to K^{*0}\Lambda$ process totally proceeds with the dominance of K exchange. Although the dependence of total and differential cross sections on the K^* electromagnetic multipole moments is insignificant, in particular, in the presence of the proton anomalous magnetic moment, we found that the photon beam asymmetry may be useful to reveal the role of K^* electromagnetic moments in the production of K^* vector meson. Our predictions for spin polarization observables would be tested by future measurements at current electron/photon beam facilities.

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