Regge exchange	Parameters	$p(\gamma^*,\pi^+)n$	$n(\gamma^*,\pi^-)p$	Regge trajectory $\alpha_i(t)=\alpha_i^0+\alpha_i' t$
$\pi(140)/b_1(1235)$	$g_{\pi NN}=13.4$	$+e^{-i\pi\alpha_\pi(t)}$	1	$\alpha_\pi(t)=\alpha_\pi'(t-m_\pi^2)$ $\alpha_\pi'=0.74$
$\rho(770)/a_2(1320)$	$G_{\rho NN}=3.4$ $\kappa_\rho=6.1$ $G_{\rho\gamma\pi}=0.728$ GeV^{-1} $\Lambda_{\rho\gamma\pi}=m_{\omega(782)}$	$-e^{-i\pi\alpha_\rho(t)}$	1	$\alpha_\rho(t)=0.53+0.85t$
$a_1(1260)$	$G_{a_1NN}=7.1$ $G_{a_1\gamma\pi}=1.1$ GeV^{-1} $\Lambda_{a_1\gamma\pi}=m_{\rho(770)}$	$\frac{1-e^{-i\pi\alpha_{a_1}(t)}}{2}$	$\frac{1-e^{-i\pi\alpha_{a_1}(t)}}{2}$	$\alpha_{a_1}(t)=\alpha_\rho(t)-1$
Resonances	$\beta=3$, $\xi=0.4$	$+e^{-i\pi\alpha_\pi(t)}$	1	$\alpha_\pi(t)$ with $\alpha_\pi'\to\frac{\alpha_\pi'}{1+a\frac{Q^2}{W^2}}$ $a=2.4$

TABLE I: A summary table of a model parameters. See the text for the details.

curve) at $W=\sqrt{s}=2.2$ GeV in comparison with the on-shell parameterization of the proton's Dirac form factor $F_1^p(Q^2)$ Eq. (42) (solid curve). It is clearly seen that F_s is considerably harder than F_1^p. This difference reflects the influence of the higher lying resonances.

There is an additional effect which we would like to take into account. In Refs. [25, 27] it has been observed that in exclusive reaction $(e,e'\pi^+)$ the slope of partonic contributions which is driven by the intrinsic transverse momentum distribution of partons slightly decreases with increasing value of Q^2. Since in our present description the contribution of resonances is dual to direct partonic interaction we accommodate this anti-shrinkage effect in the transition form factors $\mathcal{F}_{s(u)}$, see Eq. (13), using the slope parameter

$$\alpha_\pi' \to \frac{\alpha_\pi'}{1+a\frac{Q^2}{W^2}}, \tag{45}$$

with $a\simeq 2.4$. This behavior has been found from the fit to the (Q^2,W) dependence of the transverse partonic DIS slope of [25, 27]. Eq. (45) is effective in electroproduction and in the resonance transition form factors $\mathcal{F}_{s(u)}$, Eq. (13), only. For real photons the phase of $\mathcal{F}_{s(u)}$ is that of $\mathcal{F}_{\gamma\pi\pi}$ and a proper Regge limit of [29] is guaranteed.

Then using the R/P-transition form factor, Eq. (43), the transverse cross section $d\sigma_{\rm T}/dt$ gets large (solid curve) in agreement with JLAB data, see Figure 4. The effect of resonances is much smaller in the longitudinal response $d\sigma_{\rm L}/dt$ but it improves the description of data at higher values of $-t$. As we shall see, the same effect will strongly influence the interference cross sections and allow to explain both the sign and magnitude of $d\sigma_{\rm TT}/dt$ and $d\sigma_{\rm LT}/dt$. The solid curves include the effect of the DIS slope, Eq. (45). The dash-dash-dotted curves correspond to the results without Eq. (45); the effect is rather small at forward angles and could be partially absorbed in a redefinition of ξ. To be in line with [25, 27] we keep this phenomenological behavior.

The model parameters are summarized in Table I. The Regge phase pattern discussed above and used in the calculations is also shown for different reggeon exchange contributions. The cut-off $\Lambda_{\gamma\pi\pi}$ in the pion form factor, Eq. (14), is a fit parameter. From the fit to the longitudinal data we observe essentially three regions. At small values of $Q^2<0.4$ GeV^2 the model results are remarkably consistent with a VMD value of $\Lambda^2_{\gamma\pi\pi}=m^2_{\rho(770)}\simeq 0.59$ GeV^2. The intermediate region $0.6<Q^2<1.5$ GeV^2 in $F\pi$-1 experiment [2] demands somewhat smaller value of $\Lambda^2_{\gamma\pi\pi}\simeq 0.4$ GeV^2. In the deep (Q^2,W) region the JLAB, Cornell and DESY data can be well described using $\Lambda^2_{\gamma\pi\pi}\simeq 0.46$ GeV^2. In our calculations we shall follow these prescriptions for $\Lambda_{\gamma\pi\pi}$.

VII. JLAB $F\pi$-1, $F\pi$-2 AND π-CT DATA

In this section we study the R/P-effects in partial π^+ electroproduction cross sections measured at JLAB. We compare the model results with the differential cross sections in the $p(\gamma^*,\pi^+)n$ reaction from the $F\pi$-1 [2], $F\pi$-2 [1] and π-CT [3] experiments. At JLAB the reaction $n(\gamma^*,\pi^-)p$ has been also measured off the deuteron target and π^- data will be soon reported [50].

In Figure 6 we show our results for the $p(\gamma^*,\pi^+)n$ reaction together with the high-Q^2 data from [1, 3]. The data points in each (Q^2,W) bin correspond to slightly different values of Q^2 and W for the various $-t$ bins. The numbers displayed in the plots are the average (Q^2,W) values. For simplicity we perform the calculations for values of (Q^2,W) corresponding to the first $-t$ bin. A proper binning of the curves does not change much the results [25].

At first, we consider again the reggeized π-exchange only. The value of the cut-off in the pion from factor is