transfer [Eq. (9)], and thus the logarithmic falloff from pQCD quantum loops will dominate in this regime.

It is interesting to illustrate what one expects in an augmented model which contains the standard pQCD contributions. We can use the similarity of the AdS coupling to the effective charge α_{g_1} at small scales as guide on how to join the perturbative and nonperturbative regimes. The fit to the data $\alpha_{g_1}^{fit}$ from Ref. [39] agrees with pQCD at high momentum. Thus, the $\alpha_{g_1}(Q^2)$ coupling provides a guide for the analytic form of the coupling over all Q^2. We write

$$\alpha_{Modified,g_1}^{AdS}(Q^2) = \alpha_{g_1}^{AdS}(Q^2) g_+(Q^2) + \alpha_{g_1}^{fit}(Q^2) g_-(Q^2). \tag{11}$$

Here $\alpha_{g_1}^{AdS}$ is given by Eq. (9) with the normalization (10) [continuous line in Fig. 1] and $\alpha_{g_1}^{fit}$ is the analytical fit to the measured coupling α_{g_1}. [39] These couplings have the same normalization at $Q^2 = 0$, given by Eq. (10). We use the fit from [39] rather than using pQCD directly since the perturbative results are meaningless near or below the transition region and thus would not allow us to obtain a smooth transition and analytical expression of α_{g_1}. In order to smoothly connect the two contributions (dot-dashed line in Fig. 1), we employ smeared step functions. For convenience we have chosen $g_\pm(Q^2) = 1/(1 + e^{\pm\left(Q^2 - Q_0^2\right)/\tau^2})$ with the parameters $Q_0^2 = 0.8$ GeV^2 and $\tau^2 = 0.3$ GeV^2.

V. HOLOGRAPHIC β FUNCTION

The β function for the nonperturbative effective coupling obtained from the LF holographic mapping in a positive dilaton-modified AdS background is

$$\beta_{g_1}^{AdS}(Q^2) = \frac{d}{d \log Q^2} \alpha_{g_1}^{AdS}(Q^2) = \frac{\pi Q^2}{4\kappa^2} e^{-Q^2/(4\kappa^2)}. \tag{12}$$

The solid line in Fig. 2 corresponds to the light-front holographic result Eq. (12). Near $Q_0 \simeq 2\kappa \simeq 1$ GeV, we can interpret the results as a transition from the nonperturbative IR domain to the quark and gluon degrees of freedom in the perturbative UV regime. The transition momentum scale Q_0 is compatible with the momentum transfer for the onset of scaling behavior in exclusive reactions where quark counting rules are observed. [16] For example, in deuteron photo-disintegration the onset of scaling corresponds to momentum transfer of 1.0 GeV to the nucleon involved. [41] Dimensional counting is built into the AdS/QCD soft and hard-wall models, since the AdS amplitudes $\Phi(z)$ are governed by their