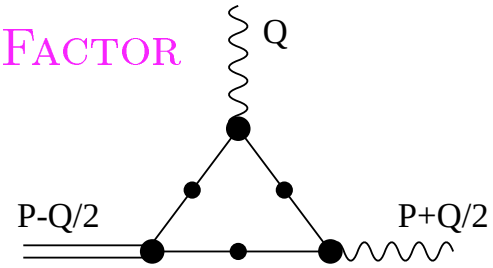
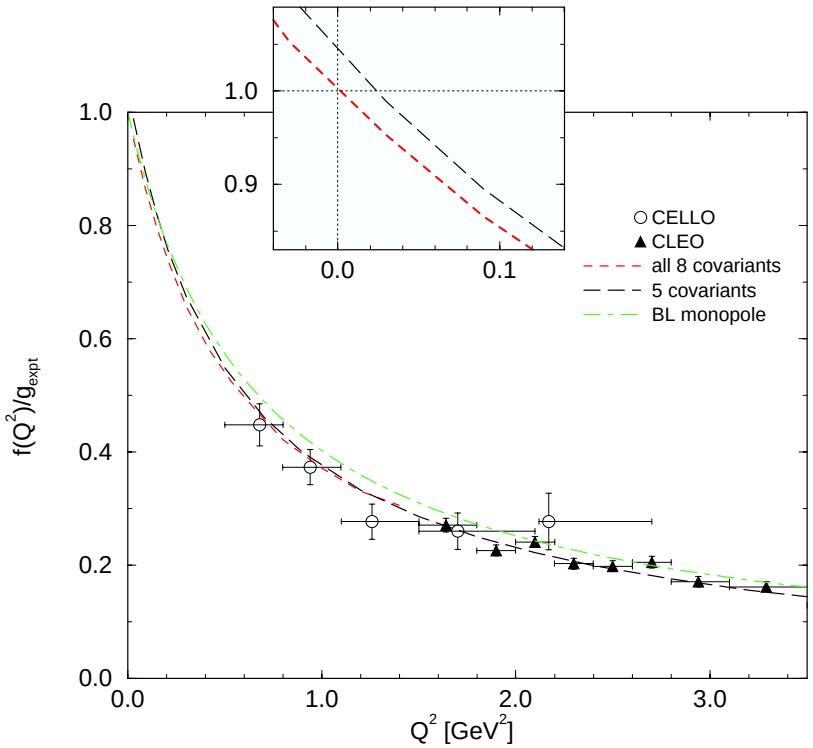
$\gamma^\star\pi^0 \to \gamma$ Transition Form Factor



$$\Lambda_{\mu\nu}(P,Q) \;=\; \frac{i\,\alpha}{\pi\, f_\pi}\epsilon_{\mu\nu\alpha\beta}\,P_\alpha\,Q_\beta\,f(Q^2)$$

- $f(0()$ governed by axial anomaly, div(AVV)
- Pion pole in axial-vector vertex
- V, AV Ward Identities $\Rightarrow$ axial anomaly
- At $m_\pi = 140$ MeV, $f^{\rm DSE}(0) = g_{\pi\gamma\gamma} = 0.50,\ \ [g^{\rm expt}_{\pi\gamma\gamma} = 0.501]$



Transition radius: DSE calc.: $r^2 = 0.39$ fm^2

expt.: $r^2 = 0.42 \pm 0.04$ fm^2

Monopole fit to DSE calc $\Rightarrow m^2 = 0.61$ GeV^2

$\gamma^\star\pi\gamma^\star$ Asymptotic Limit

Lepage and Brodsky, PRD22, 2157 (1980): LC-QCD/OPE $\Rightarrow$

$$2g\,F(Q_1^2,Q_2^2) \;\rightarrow\; 4\pi^2 f_\pi^2 \left\{ \frac{J(\omega)}{Q_1^2+Q_2^2} + \mathcal{O}(\frac{\alpha_s}{\pi}, \frac{1}{Q^4}) \right\}$$

$$J\left(\omega = \frac{Q_1^2-Q_2^2}{Q_1^2+Q_2^2}\right) = \frac{4}{3}\int_0^1 dx\, \frac{\phi_\pi(x)}{1-\omega^2(2x-1)^2}$$

J(1) LC-pQCD	2
J(1) Anikin et al. [PLB, 2000]	1.8
J(1) 1999 DSE analysis [Klabucar, Roberts, PCT]	4/3
J(1) this DSE numerical est	1.7
J(1) expt est [CELLO, CLEO]	1.6
J(0) Anikin et al. [PLB, 2000]	4/3
J(0) DSE analytic analysis	4/3
J(0) this DSE numerical calc	1.3