Tool to compare different methods: The L function

(JCC & Rogers, in preparation)

- Shape change of transverse momentum distribution comes only from b_T-dependence of $\tilde{K}$

- Write cross section as

$$\frac{\mathrm{d}\sigma}{\mathrm{d}^4 q} = \text{norm.} \times \int e^{i\boldsymbol{q}_\mathsf{T}\cdot\boldsymbol{b}_\mathsf{T}} \widetilde{W}(b_\mathsf{T}, s, x_A, x_B)\, \mathrm{d}^2\boldsymbol{b}_\mathsf{T}$$

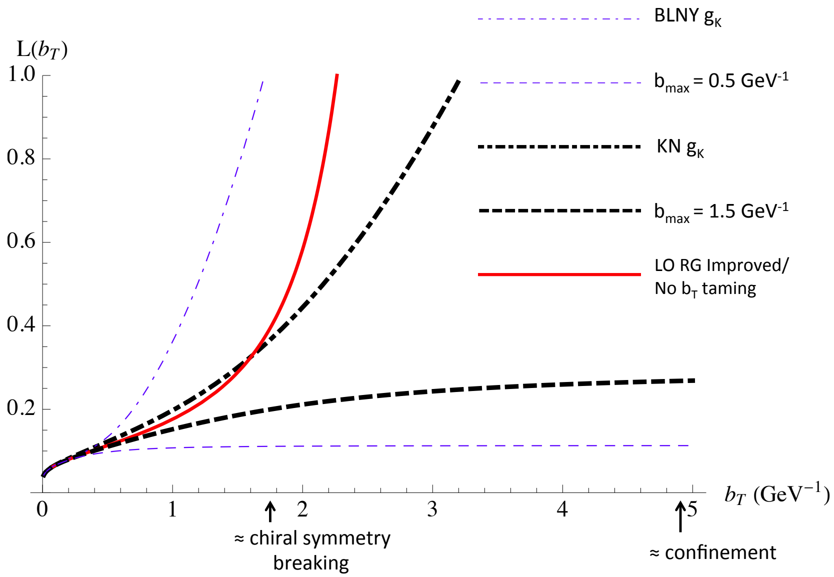
- So define scheme independent

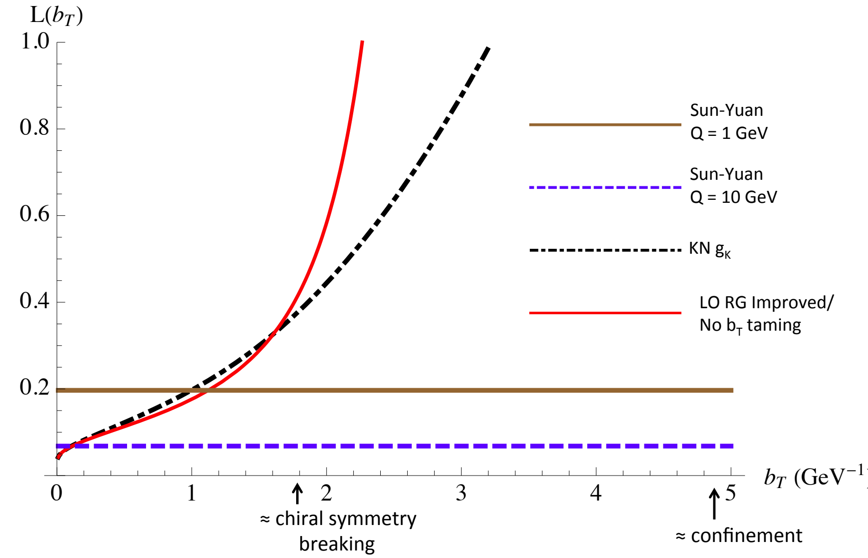
$$L(b_\mathsf{T}) = -\frac{\partial}{\partial \ln b_\mathsf{T}^2}\frac{\partial}{\partial \ln Q^2} \ln \tilde{W}(b_\mathsf{T}, Q, x_A, x_B) \overset{\text{CSS}}{=} -\frac{\partial}{\partial \ln b_\mathsf{T}^2} \tilde{K}(b_\mathsf{T}, \mu)$$

- QCD predicts it is
  - independent of Q, x_A, x_B
  - independent of light-quark flavor
  - RG invariant
  - perturbatively calculable at small b_T
  - non-perturbative at large b_T

Comparing different results using the L function

(Preliminary)





Q	Typical b_T
$2\,\mathrm{GeV}$	$3\,\mathrm{GeV}^{-1}$
$10\,\mathrm{GeV}$	$1.2\,\mathrm{GeV}^{-1}$
m_Z	$0.5\,\mathrm{GeV}^{-1}$

SY = Sun & Yuan (PRD 88, 114012 (2013)):

$$L_{\mathrm{SY}} = C_F \frac{\alpha_s(Q)}{\pi}$$

Depends on Q: contrary to QCD