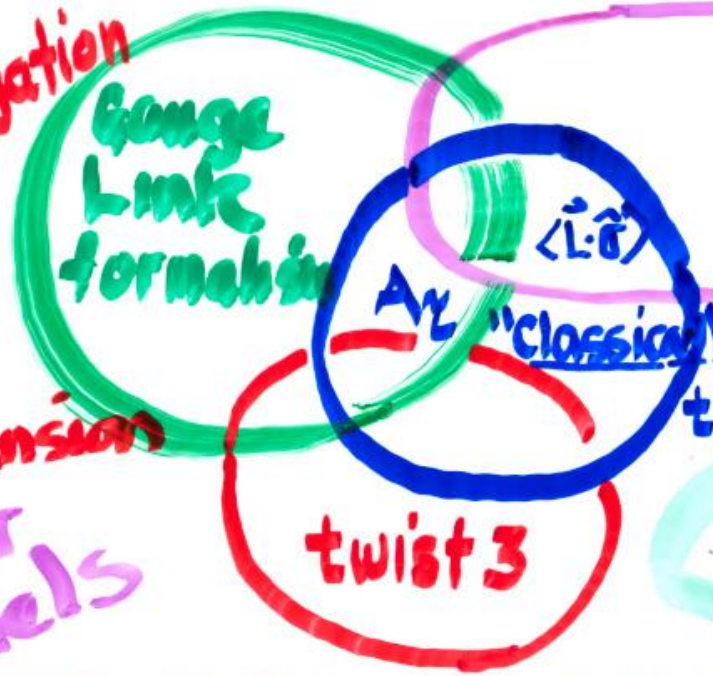
Spin / orbit dynamics



Collins Conjugation Symmetry

GPD's

DVCS

SU2

Tomography

1/N expansion

transversity amplitudes

Spectator models

ΔG

Ramsey

Diquarks

JI SUM RULE

J_z SUM RULE

BLT SUM RULE

Angular Momentum Sum Rules

[a consumer's guide]

Ji $J_i = \frac{1}{2} = \sum_q (J_{iq} + J_{ig}) = \sum_a \frac{1}{2}\{ H_a(x,0,0) + E_a(x,0,0) \}$

BRS Ratcliffe $J_z = \frac{1}{2} = \frac{1}{2}\sum_q \hat{s}_q \cdot \hat{e}_z + \hat{s}_g \cdot \hat{e}_z + \sum_a \langle \vec{L}_a \cdot \hat{e}_z \rangle$

BLT $J_y = \frac{1}{2} = \frac{1}{2}\sum_q \hat{s}_q \cdot \hat{e}_y + \sum_a \langle \vec{L}_a \cdot \hat{e}_y \rangle$

$\hat{\sigma}_p \cdot \hat{e}_y = 1$

$\hat{\sigma}_p \cdot \hat{e}_y = 1$

These contain Independent Information

Example from Georgi Manohar

azimuthal symmetry

$J_z = \frac{1}{2} = \frac{1}{2}\Delta\Sigma_0(\mu^2) + \Delta G(\mu^2) + \sum_a \langle \vec{L}_q \cdot \sigma_p(\mu^2) \rangle$ ← observable?

$J_y = \frac{1}{2} = \frac{1}{2}\Delta\Sigma_T(\mu^2) + \sum_a 2\int dx d^2k_T \Delta^N G^{\text{front}}_{a/p^\uparrow}(x, k_{Tx}(x); \mu^2)$

not direct observables (represent intrinsic props)

Orbital Ang. Momentum & $\Delta G(x,t)$

Y. Binder
G. Ramsey

$$A_0(x) = \frac{\partial/\partial t\, \Delta G(x,t)}{\partial/\partial t\, G(x,t)}$$

↶ solve LO & NLO DGLAP!

$$A(x,t) = A_0(x) + \varepsilon(x,t)$$

$$\Delta G(x,t) = A_0(x) G(x,t) + \Delta G_\varepsilon(x)$$

with $\Delta G_\varepsilon(x) = \varepsilon(x,t) G(x,t)$ scale-invariant!

$$\Delta G(x,t_1) - \Delta G(x,t_0) = A_0(x)\left[G(x,t) - G(x,t_0)\right]$$

all t-dependence and all perturbatively generated orbital angular momentum - Ratcliffe

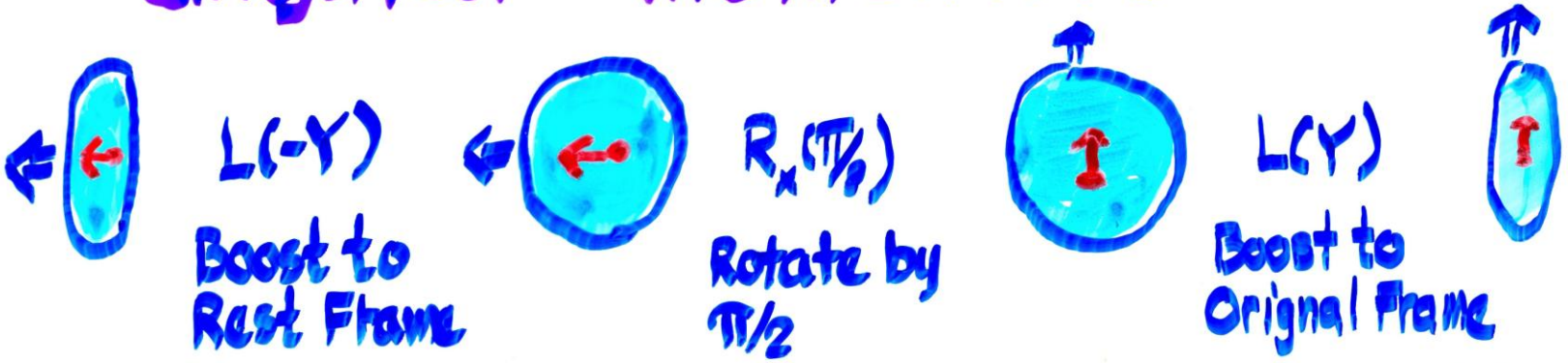
$\Delta G_\varepsilon(x)$ describes nonperturbative effects

Ratcliffe - Subtracted Sum Rule

ΔG TESTS Low-Energy Chiral Dynamics!

Transversity & Orbital angular momentum

Y. Binder
G. Ramsey



only the S-wave Component of the appropriate helicity amplitude survives!! The $L \neq 0$ components contribute to Boer/Mulders Functions instead of transversity dst'ns.

$$\langle p+|a|q+\rangle = \langle a_0\rangle + \sum_{L=1} \langle a_L + a_{-L}\rangle$$

Transversity $|a_0|^2$

Boer/Mulders $\sum |a_L|^2 (-)^L$