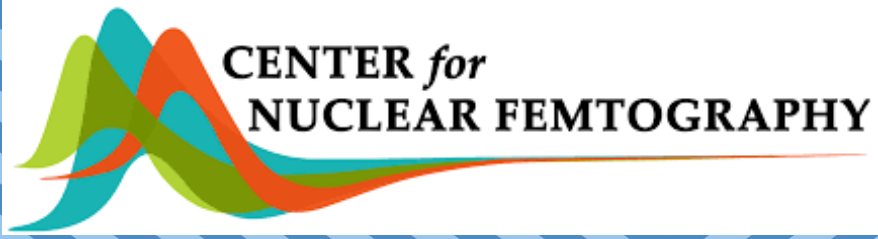

The Hard Questions in Nuclear Femtography

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Start with an easy Question:
Can we measure Compton Form Factors (CFFs)?

- All variables are kinematic
- CFF type from
  - Beam spin
  - Longitudinal target spin
  - Transverse target spin
- Flavor
  - u, d from proton/neutron targets
    - Supplement with $\boldsymbol{\rho}$, $\boldsymbol{\omega}$
  - glue from deep ϕ and J/Ψ production
  - s from deep K, etc.
- $\mathcal{R}$e & $\mathcal{I}$m parts from Energy-dependence, lepton-charge asymmetry

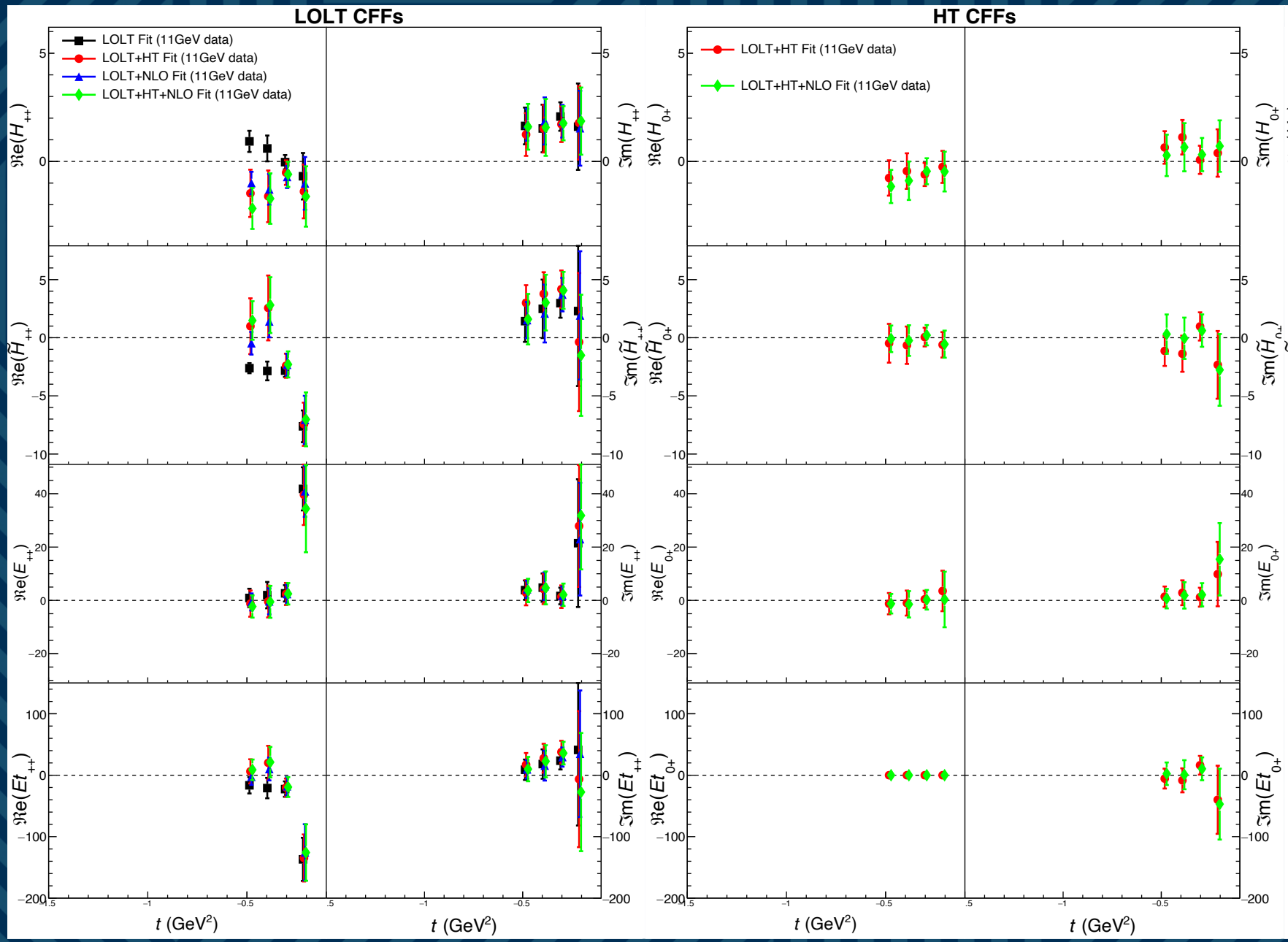
$$\mathcal{H}_f(\xi,t;Q^2),\ \mathcal{E}_f(\xi,t;Q^2),$$
$$\widetilde{\mathcal{H}}_f(\xi,t;Q^2),\ \widetilde{\mathcal{E}}_f(\xi,t;Q^2)$$
$$f = u, d, s, \text{glue}$$

Measuring Compton Form Factors

- Leading twist formalism exists!
  - It is almost a Linear Algebra problem to extract CFFs from [a sufficiently large set of] data!
- Major caveats (frequently ignored)
  - Theory uncertainties
    - Kinematic and Dynamic higher twist amplitudes
      - Formalism depends on choice of light cone definition (finite $-t/Q^2$)
      - Only real tool is Q^2-dependence, but $1/Q$, $1/Q^2$, and $\log(Q^2)$ separation requires high precision
    - Meson amplitudes have strong corrections to naïve asymptotic DA, & SCHC.
  - Experimental limits
    - Low-x_B means modest Q^2
    - Hi-x_B means modest statistics and/or large $-t/Q^2$ corrections

CFFs from data: 12 GeV Hall A DVCS

- $x_B = 0.36$, four t-bins
- Simultaneous fit to data at three Q^2 values
- Statistically significant, but systematically ambiguous.
- Strongly correlated error bars.



CENTER for NUCLEAR FEMTOGRAPHY

Can we measure Compton Form Factors?

This is a HARD question which the CNF should try to answer!

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