

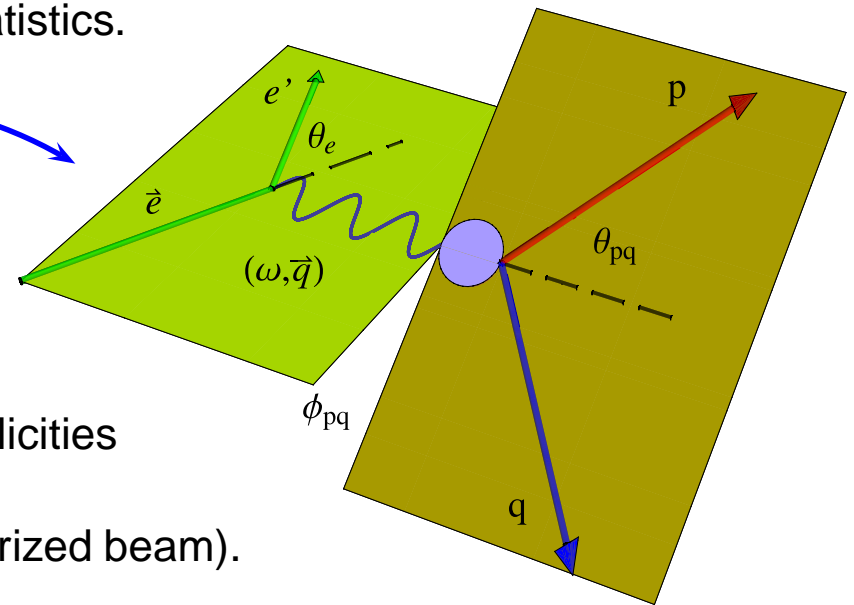
# Measuring the Fifth Structure Function in $D(\vec{e}, e'p)n$

- Establish a baseline for the hadronic model to unravel mix of relativistic corrections (RC), meson-exchange currents (MEC), final-state interactions (FSI), and isobar configurations (IC).
- Measure the imaginary part of the LT interference term (the fifth structure function) to study FSI in quasielastic kinematics.
- World's data is sparse and with limited statistics.

Kinematic quantities.

The cross section is

$$\frac{d^3\sigma}{d\omega d\Omega_e d\Omega_p} = \sigma^\pm = \sigma_L + \sigma_T + \sigma_{LT} \cos(\phi_{pq}) + \sigma_{TT} \cos(2\phi_{pq}) + h\sigma'_{LT} \sin(\phi_{pq}) \quad h = \pm 1 \quad \text{beam helicities}$$



- Use the helicity asymmetry (requires polarized beam).

$$A'_{LT} = \frac{\sigma'_{LT}}{\sigma_L + \sigma_T} = \langle \sin \phi_{pq} \rangle_+ - \langle \sin \phi_{pq} \rangle_- \quad \vec{p}_m = \vec{q} - \vec{p} \quad \text{missing momentum}$$

- Use E5 data set with  $E = 2.56$  GeV with normal and reversed torus polarity settings (4.23 GeV data set has very limited statistics).

# Results and Status

- Analysis is well advanced; analysis note near completion.
- QE events selected with a  $W$  cut and neutrons selected with missing mass.
- Complete or nearly so: momentum corrections, fiducial cuts, radiative corrections, consistency checks, simulations,...
- Systematic uncertainties typically less than half the statistical ones.
- Preliminary results (blue) and systematic uncertainties (blue bars) and comparison with calculations by Arenhoevel (black), Laget (green), and Jeschonnek and Van Orden (red).

Row	Quantity	$\delta A'_{LT}$
1	$MM^2$ cut	< 0.004
2	$W$ cut	< 0.005
3	EC track coordinate cut	< 0.007
4	EC sampling fraction	< 0.002
5	EC pion threshold	< 0.002
6	Number of Photoelectrons	< 0.005
7	Beam Polarization	< 0.001
8	Beam charge asymmetry	< 0.002
9	RC correction	< 0.004

