DVMP on polarized neutron

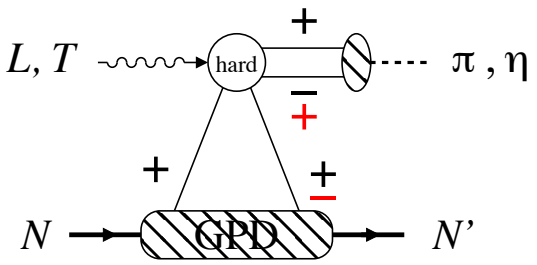
C. Weiss (JLab), informal comments, CLAS Collaboration Meeting, 20-23 Oct 2015

- What physics can be addressed with hard exclusive meson production on a **longitudinally polarized quasi-free neutron?**

  $\gamma^* + \vec{n} \to M + n$ neutral

  $\gamma^* + \vec{n} \to M + p$ charged

- Pseudoscalar meson production $M = \pi^0, \eta$ or π^-



GPD-based description
Goldstein, Liuti 08; Kroll, Goloskokov 11

Twist-2	$\widetilde{E}, \widetilde{H}$	hel-cons	mostly L
Twist-3	$H_T, E_T, \bar{E}_T$	hel-flip	mostly T

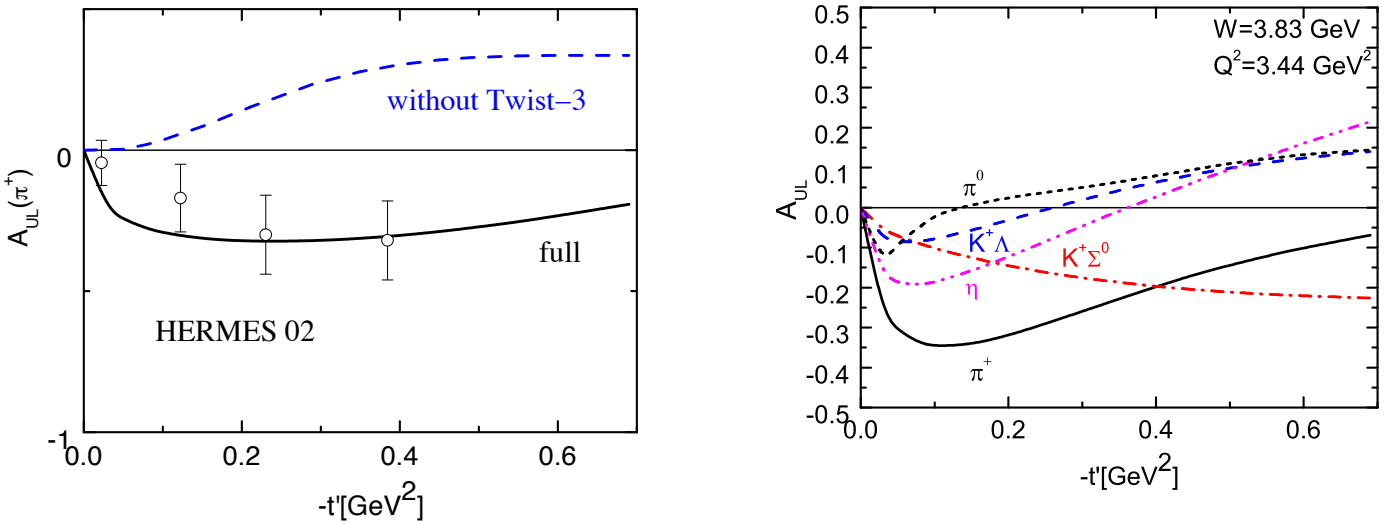
Agrees with pattern of CLAS 6 data
First flavor decomposition of hel-flip GPDs
Detailed study with CLAS12 E12-06-108
Stoler, Kubarovsky et al.; see summary talk Sabatie

- Longitudinal target spin asymmetry

  $A_{UL} \sim \mathrm{Im}\, \mathcal{M}_{0-,0+}\, \mathcal{M}^*_{0-,++} \sim$ LT

  Interference cross section, sensitive to both Twist-2 and Twist-3 amplitudes

- Numerical estimates



Kroll, Goloskokov, `http://arxiv.org/abs/0906.0460v2`, `http://arxiv.org/abs/1106.4897v1`

Large asymmetries seen/predicted. Very sensitive to GPD composition

- Polarized neutron measurement of π^0, η for flavor decomposition

  Strengthen results obtained from π^0–η comparison on proton
  Large isovector structures seen in data and dynamical models
  Clear context: Theoretical picture seems to work, quantitative estimates

- Polarized neutron measurement of π^-, K^- equally interesting

- Challenges in quasi-free scattering on deuteron

  Identify events with scattering on neutron — spectator tagging? exclusive final state?
  Correct for scattering on proton with charge exchange?
  Partly common to DVCS and DVMP, so can be addressed jointly

Further measurement with polarized deuteron

- Vector meson production on quasi-free neutron (unpolarized or polarized)

  Separate $I = 0$ and $I = 1$ exchange mechanisms. Common to Regge or GPD

  Important for unraveling reaction mechanism.

- Spin structure of short–range NN correlations in deuteron

  Isolate D–wave through proton tagging at $p_{\rm spectator} \gtrsim 300$ MeV,
  reveal neutron polarization through scattering process on neutron

  Theory input needed

  Would requires high luminosity