

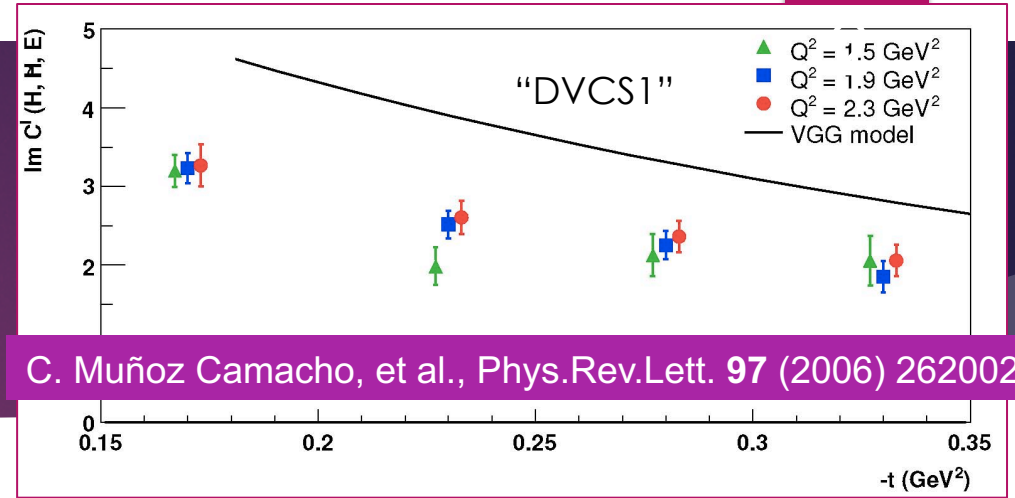
Deep Virtual Compton scattering
Hall C proposal for Hall A jeopardy
experiment E12-06-114

CHARLES HYDE (CONTACT)

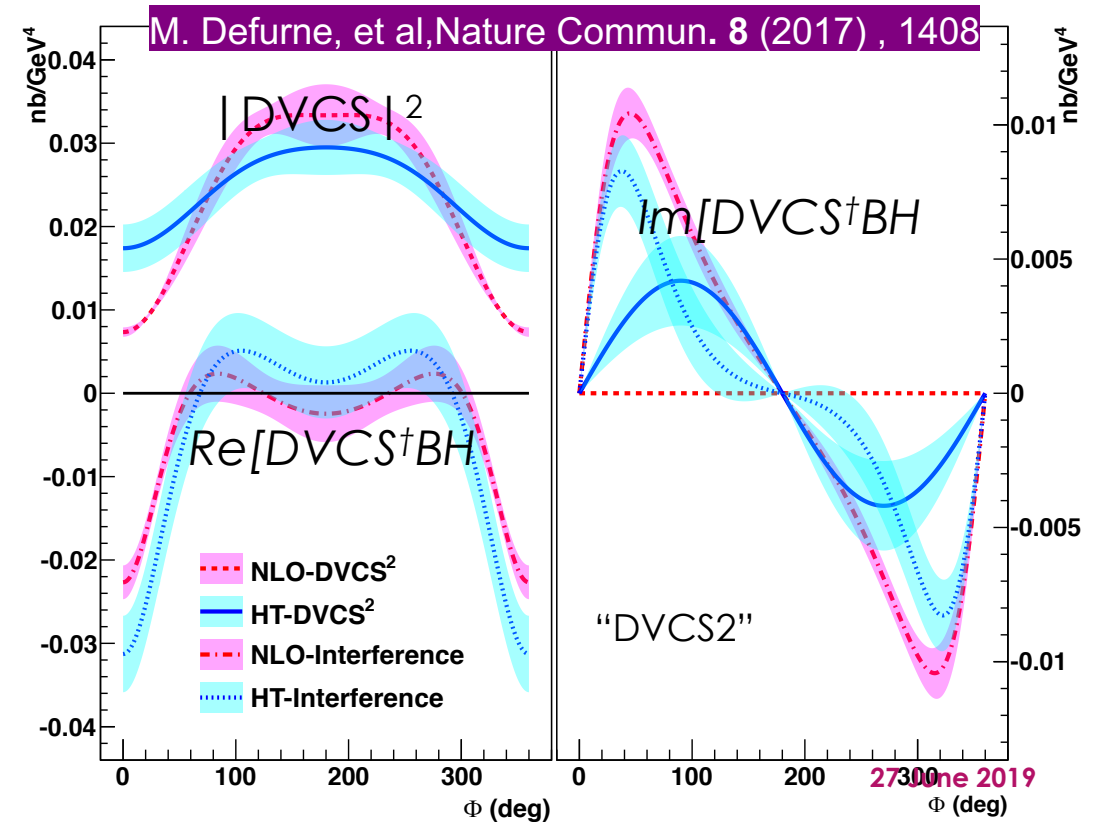
A. CAMSONNE, C. MUÑOZ CAMACHO, J. ROCHE,
CO-SPOKESPERSONS

Hall A DVCS Impact

- ▶ Q^2 -dependent cross sections are primary proof of factorization and quantifier of higher-twist effects
- ▶ Energy Dependence at fixed $Q^2, x_B, t \rightarrow$ Generalized Rosenbluth separation of $|DVCS|^2$ and $Re[DVCS^\dagger BH]$
- ▶ $\sigma_T \gg \sigma_L$ for Deep Virtual π^0 production
 - ▶ Chiral Sym. Break. \otimes Transversity GPDs
- ▶ 7 publications, 1 submitted, 1 in preparation (12 GeV, "DVCS3")

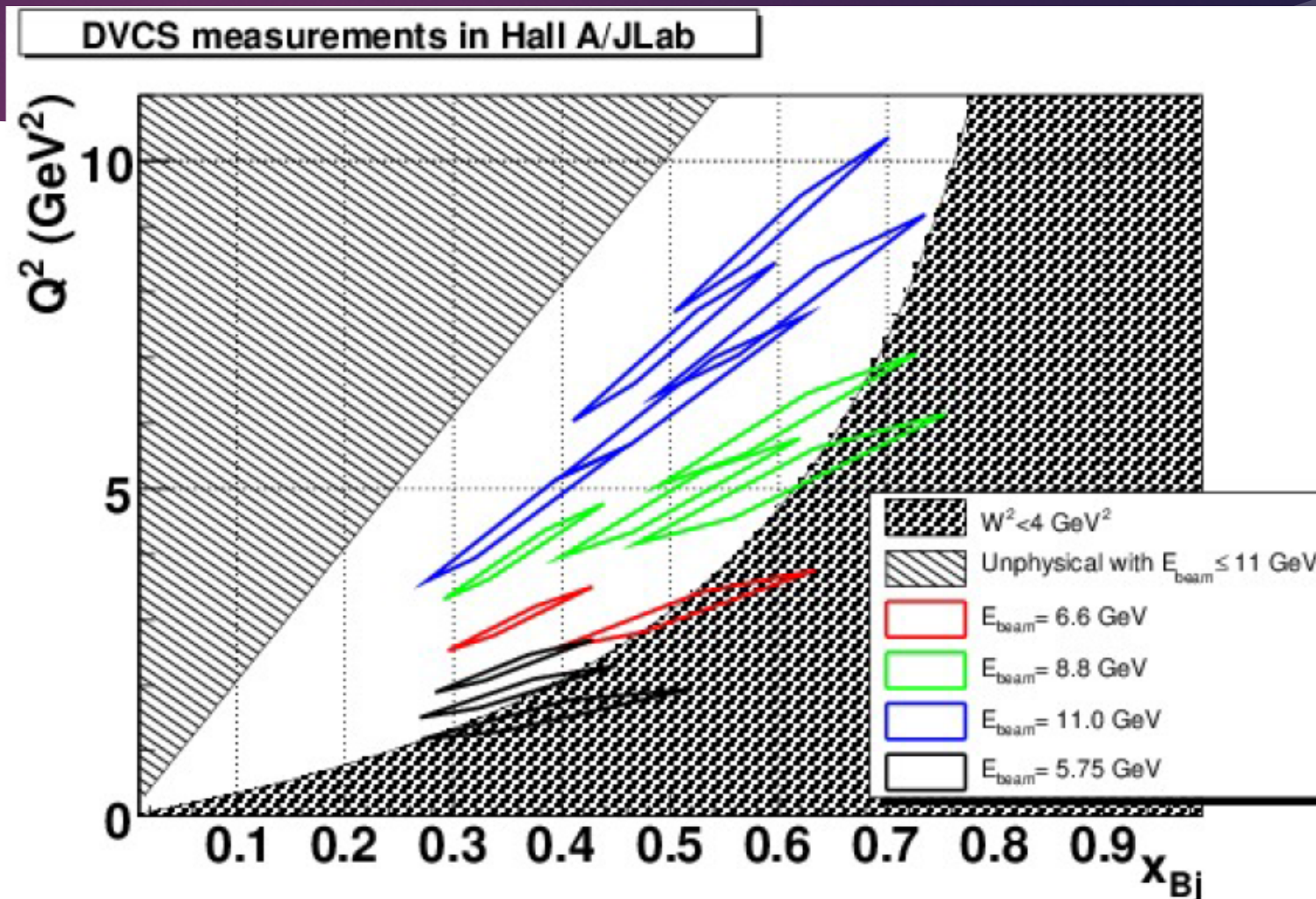


C. Muñoz Camacho, et al., Phys.Rev.Lett. 97 (2006) 262002



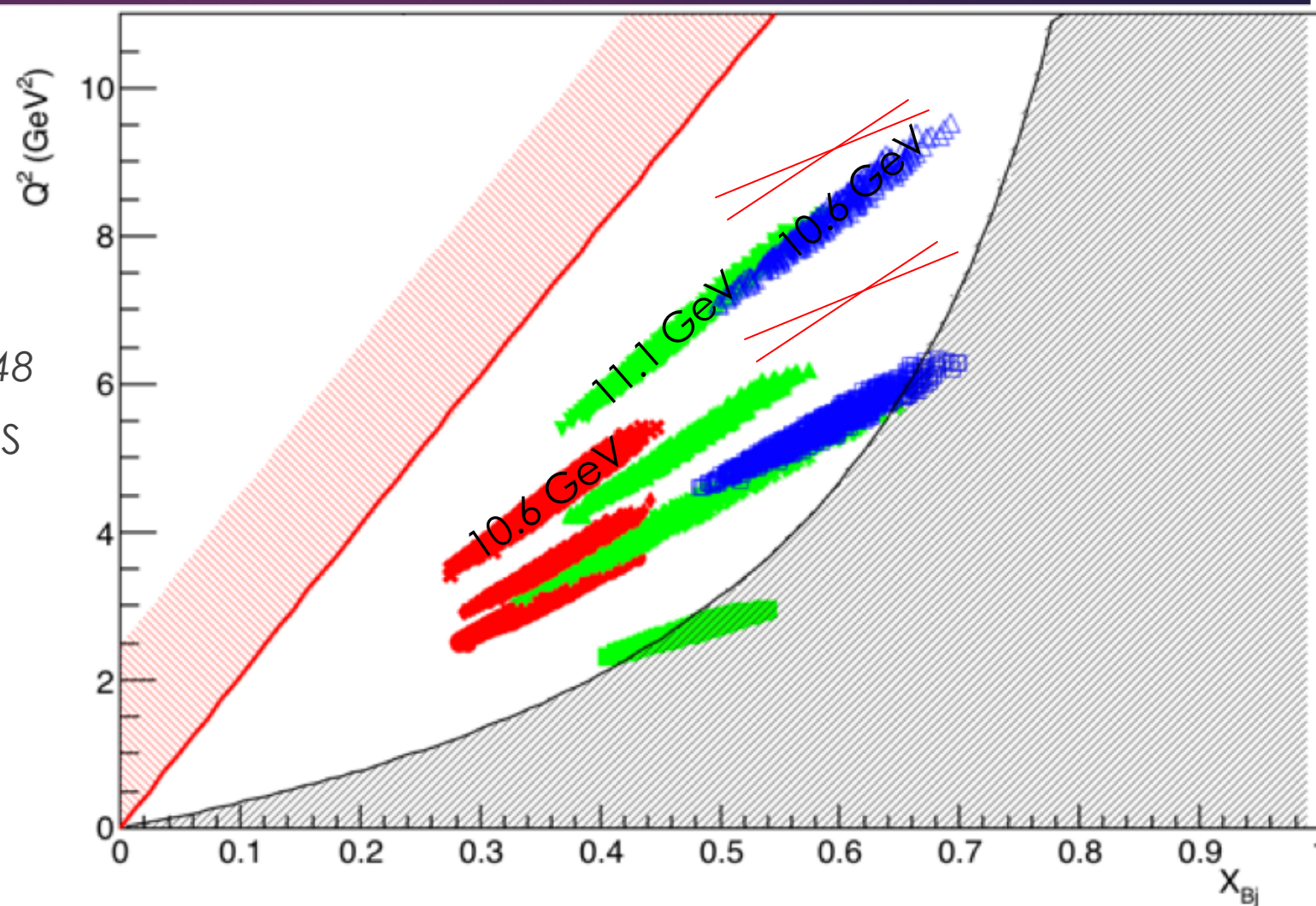
Hall A E12-06-114 Approved

- ▶ 100 PAC days
 - ▶ 70 days high priority
- ▶ Goals
 - ▶ High precision (4% systematic) cross sections
 - ▶ Factor of two Q^2 range
 - ▶ $x_B = 0.36, 0.48, 0.60$

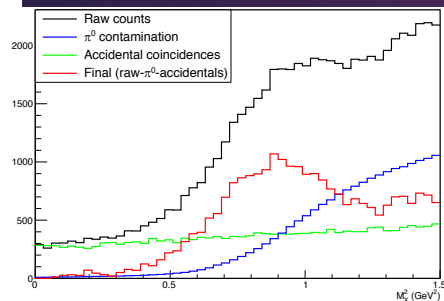


2014–2016 Hall A Run

- ▶ 50 PAC days
 - ▶ 1 setting @ 11 GeV
 - ▶ Reduced statistics @ $x_B = 0.48$
 - ▶ Reduced momentum of HRS
 - ▶ Kinematics shifted
 - ▶ Two settings omitted



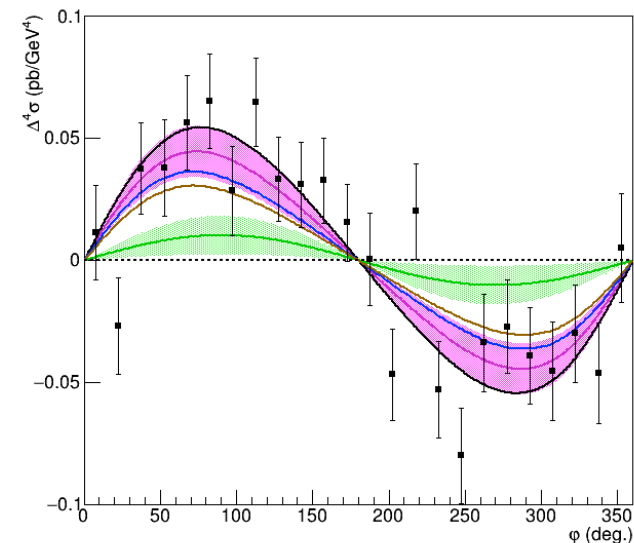
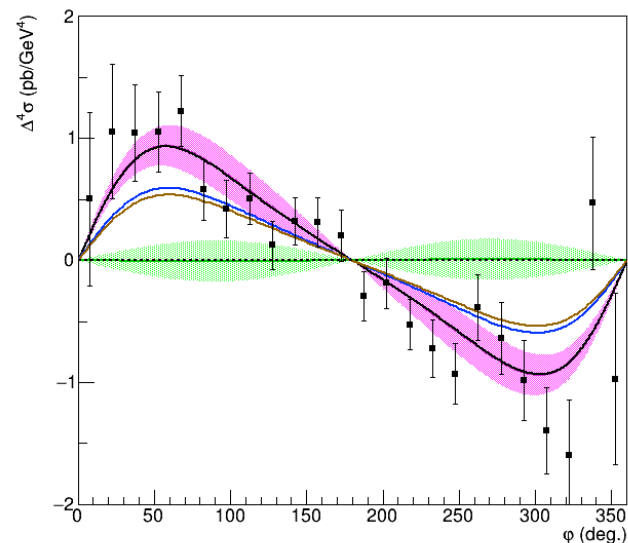
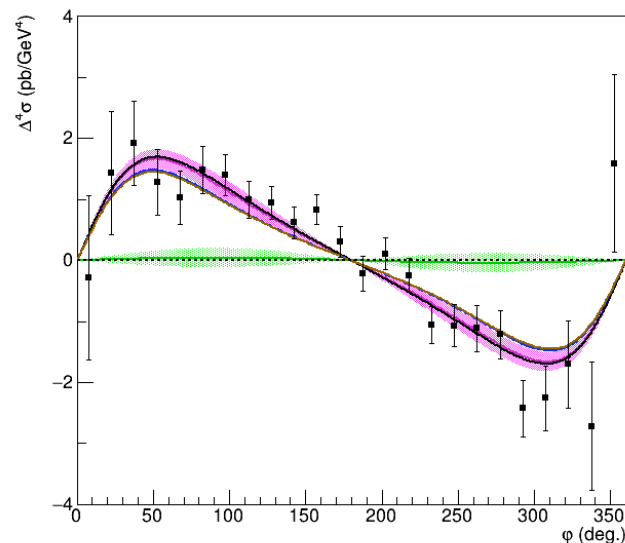
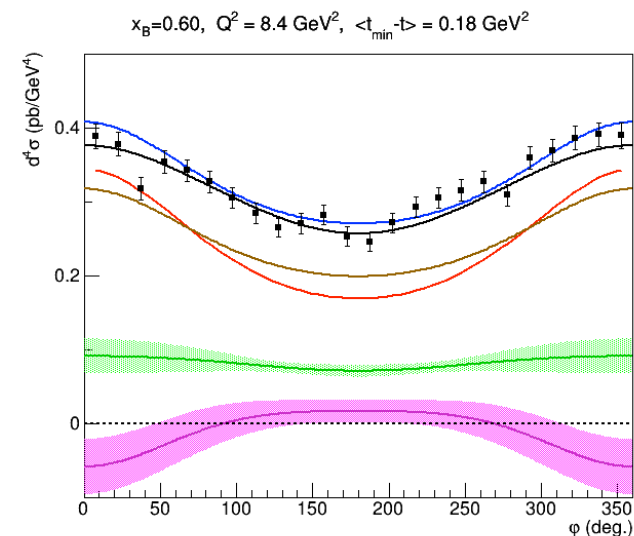
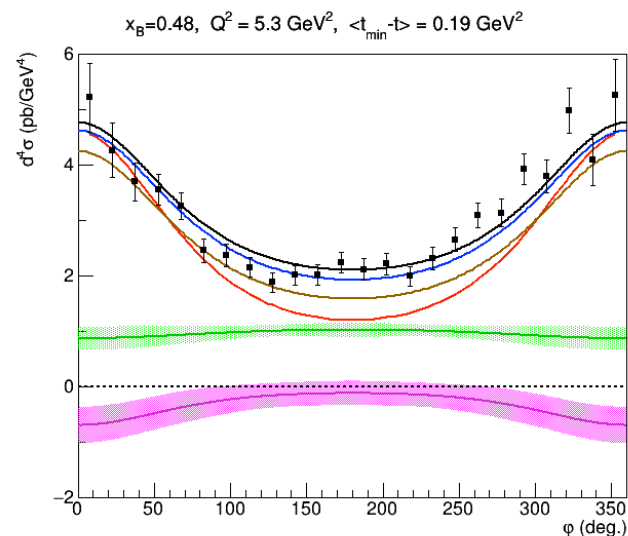
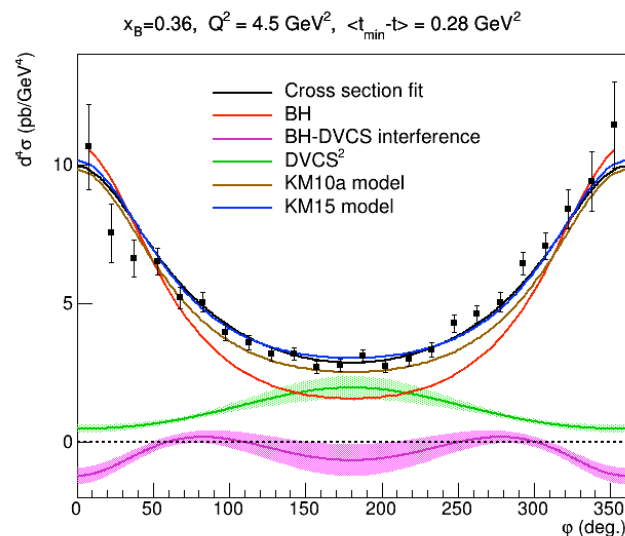
Hall A DVCS run 2014—2016



► Global fits to all Q^2 at fixed (x, t)

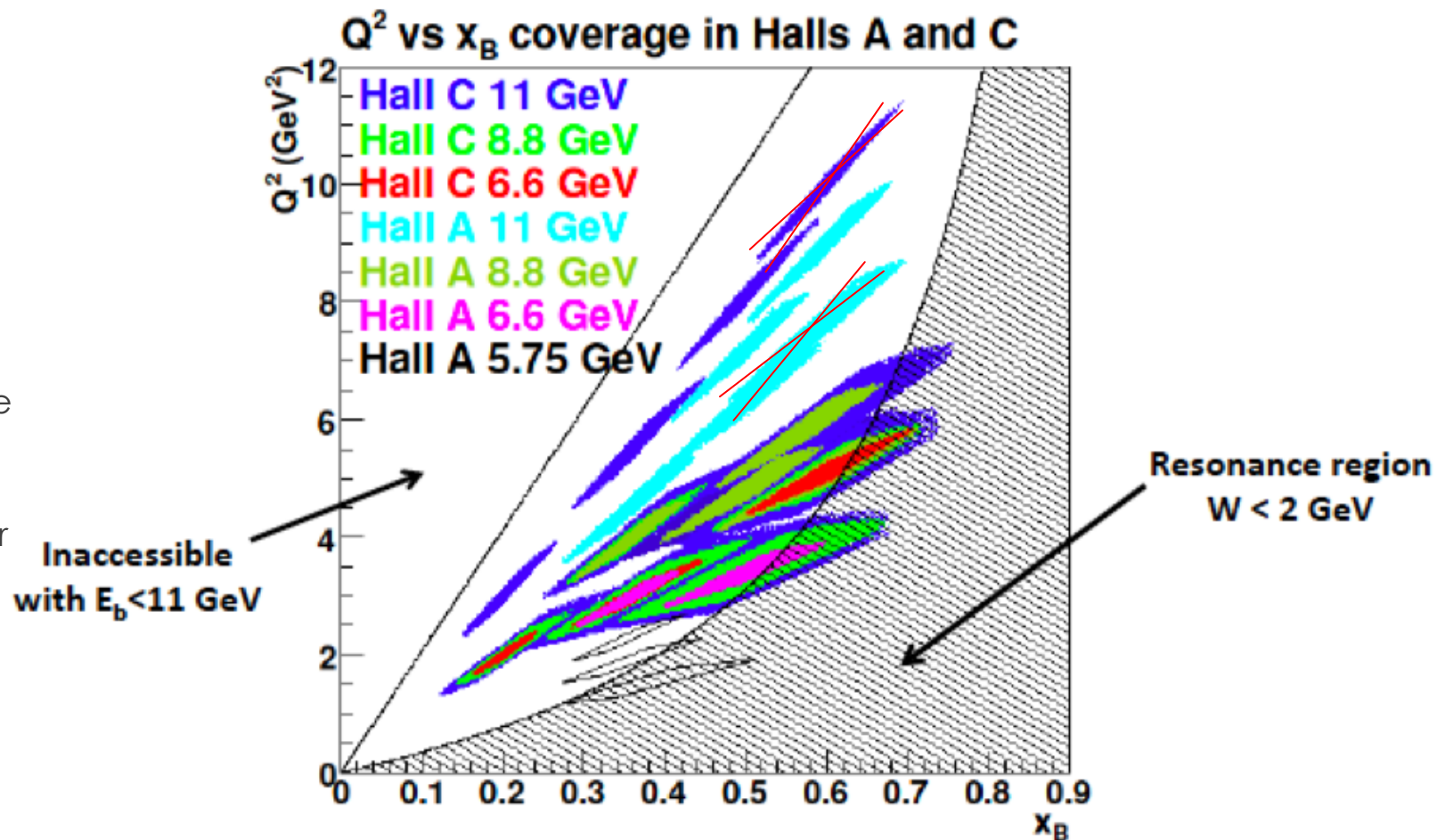
► Leading Order CFF + Dynamic Twist-3 + Kinematic Twist-4

C. Hyde: DVCS Jeopardy



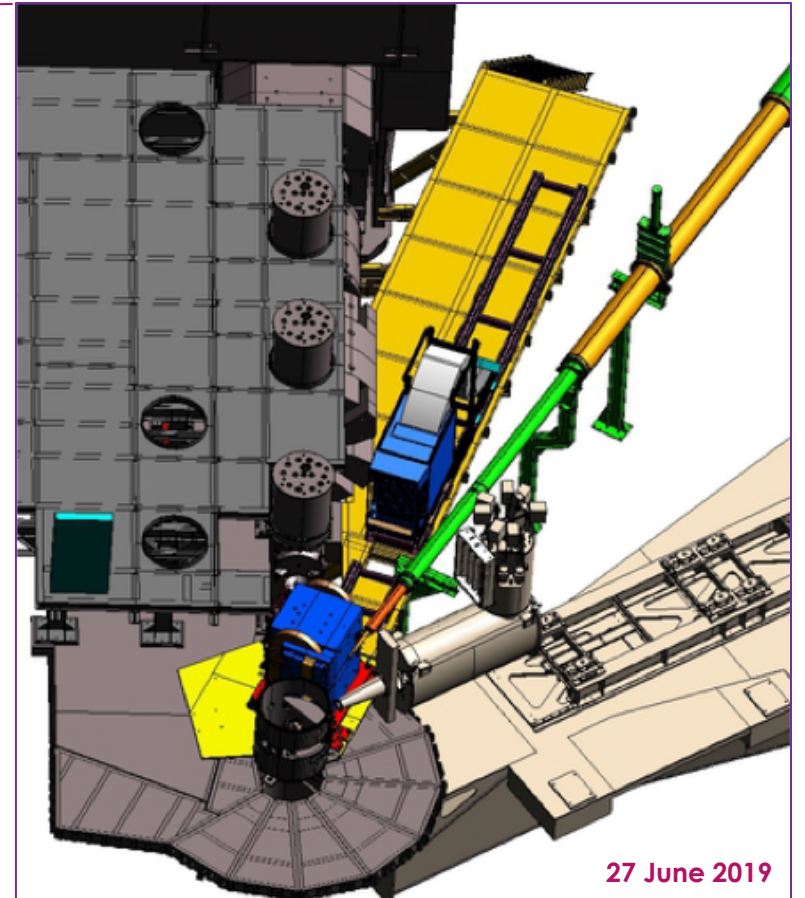
The Hall A/C DVCS Program

- ▶ Hall C / NPS adds reach
 - ▶ Low x , hi- Q^2 ,
 - ▶ Variable energy at fixed (x, Q^2, t)
 - ▶ New Calorimeter
 - ▶ PbWO_4 : Higher resolution
 - ▶ To be mounted on SHMS carriage
 - ▶ Sweep magnet
 - ▶ Replaces SHMS Horizontal Bender
 - ▶ Enables smaller angles, higher luminosity
- ▶ Ready by FY2021



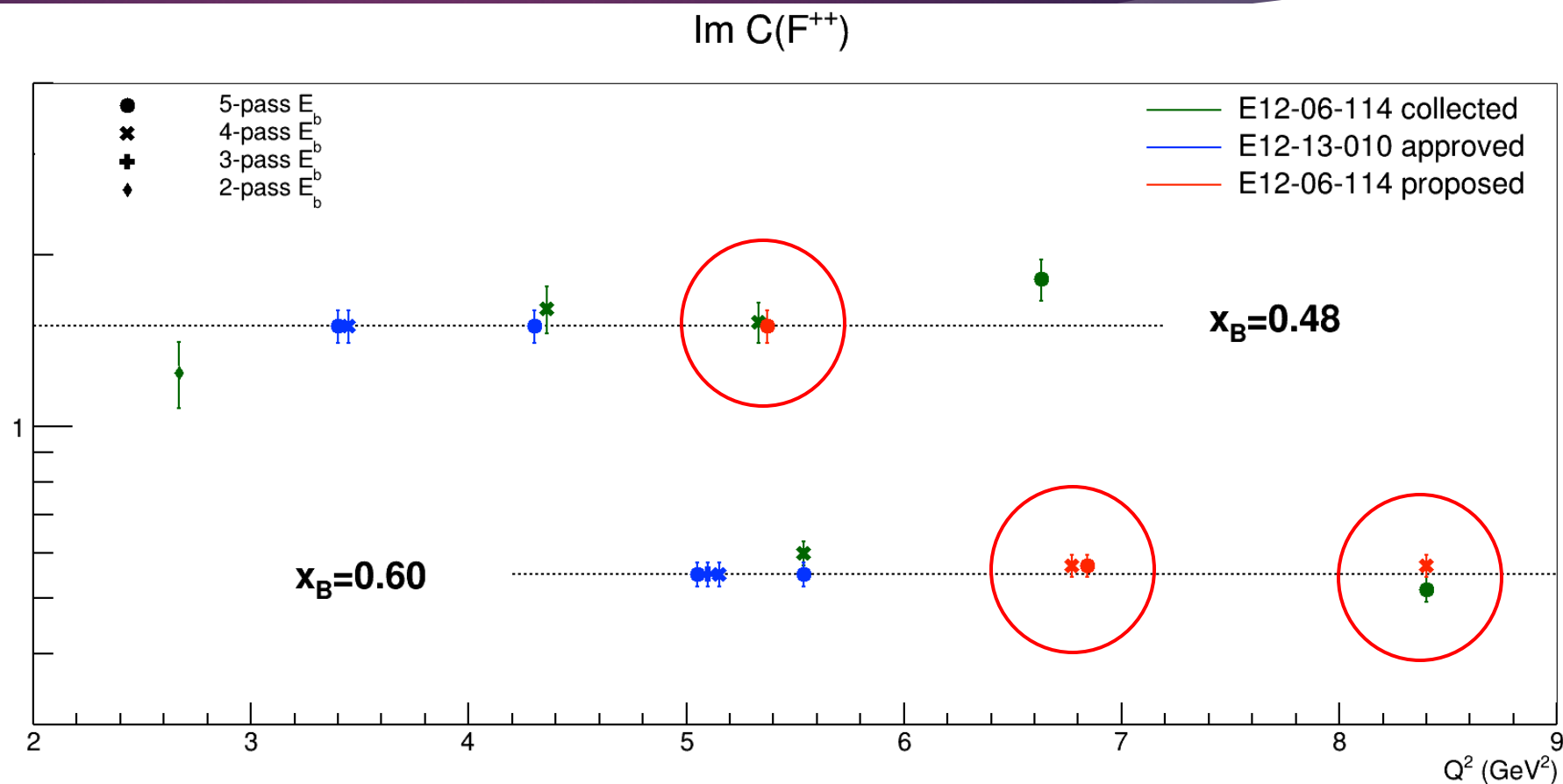
Jeopardy Proposal (50 days/20 days High Impact)

- ▶ Two Options
- ▶ Complete the program for Hall A ($x_B = 0.6$)
 - ▶ ☺ Ready to run with 6 months advance notice, 1 month setup in Hall A
 - ▶ ☹ Calorimeter has suffered multiple radiation/curing cycles
 - ▶ ☹ Calo PMTs past expected lifetime (very rough calculation)
 - ▶ ☹ No obvious scheduling opportunity
- ▶ Add 30 days to Hall C / NPS
 - ▶ Emphasis on extending the Q^2 range of multi-energy running. Generalized Rosenbluth separations of $Re[DVCS^{\dagger}BH]$ from $|DVCS|^2$



Hall C Jeopardy option/proposal

- ▶ Add energy-scan to three (x_B, Q^2, t) settings



▶ KM15 model

▶ Non-PARTONS executable in PARTONS container

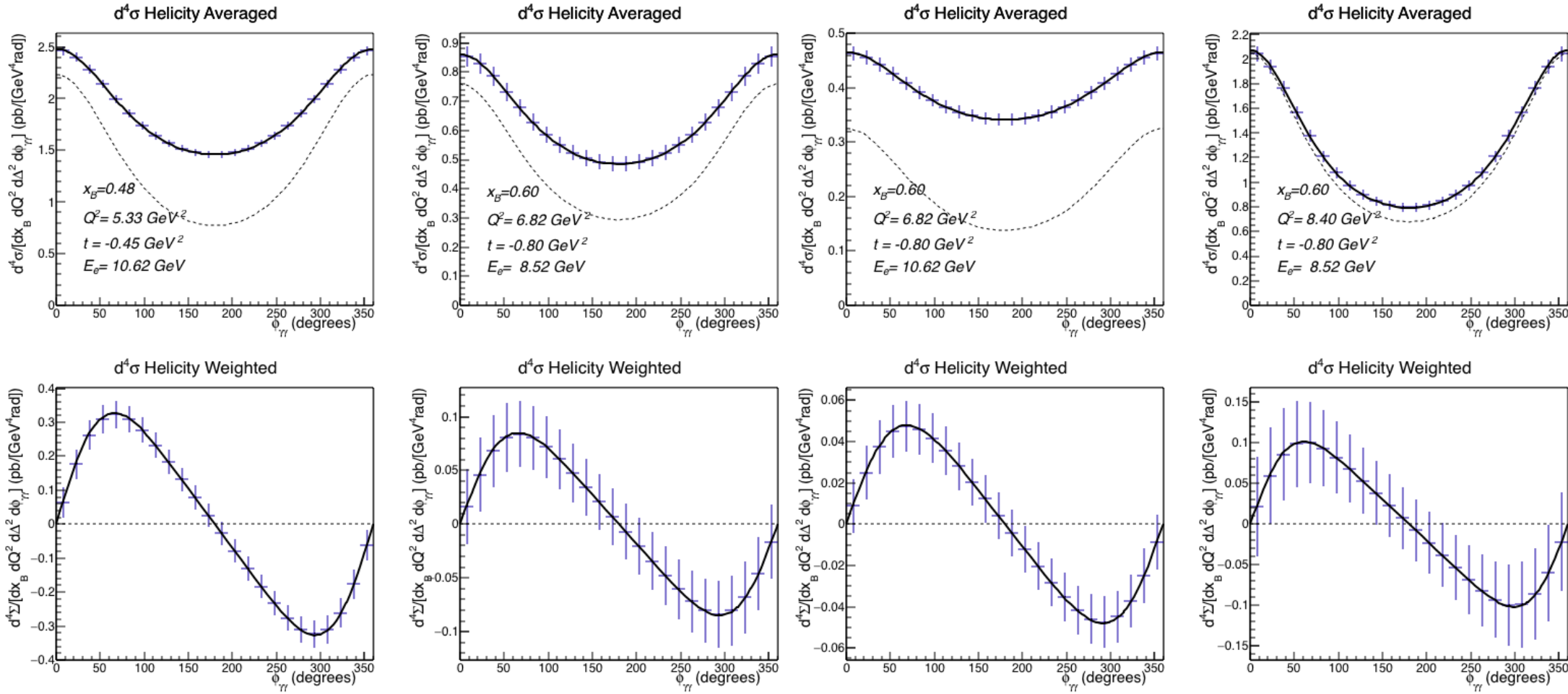


Fig. 7: Estimated cross sections and statistical uncertainties for settings Kin48_J1 and Kin60_J1–J3 (left to right). For each setting, only one t -value is shown. Each cross section is averaged over the HMS acceptance and a bin of $\Delta t = 0.05 \text{ GeV}^2$. For Kin60_J3, the t -bin width is 0.10 GeV^2 . The cross sections are obtained from the KM15 model [13], and the dashed lines are the pure Bethe-Heitler cross sections.

High Impact Request

- ▶ Essential to calibrate different the GPD to DVCS formalisms
- ▶ Quark/Gluon Imaging is the subject of the [Center for Nuclear Femtography](#), which has attracted strong interest from interdisciplinary Data Science, Computer Science, Data Visualization communities.
- ▶ Yesterdays Colloquium: Colloquium: [Black Hole Imaging](#) by Kazunori Akiyama illustrates the common challenge of forming images from sparse data:
 - ▶ Astrophysics
 - ▶ Femtography
 - ▶ Medical Imaging

