

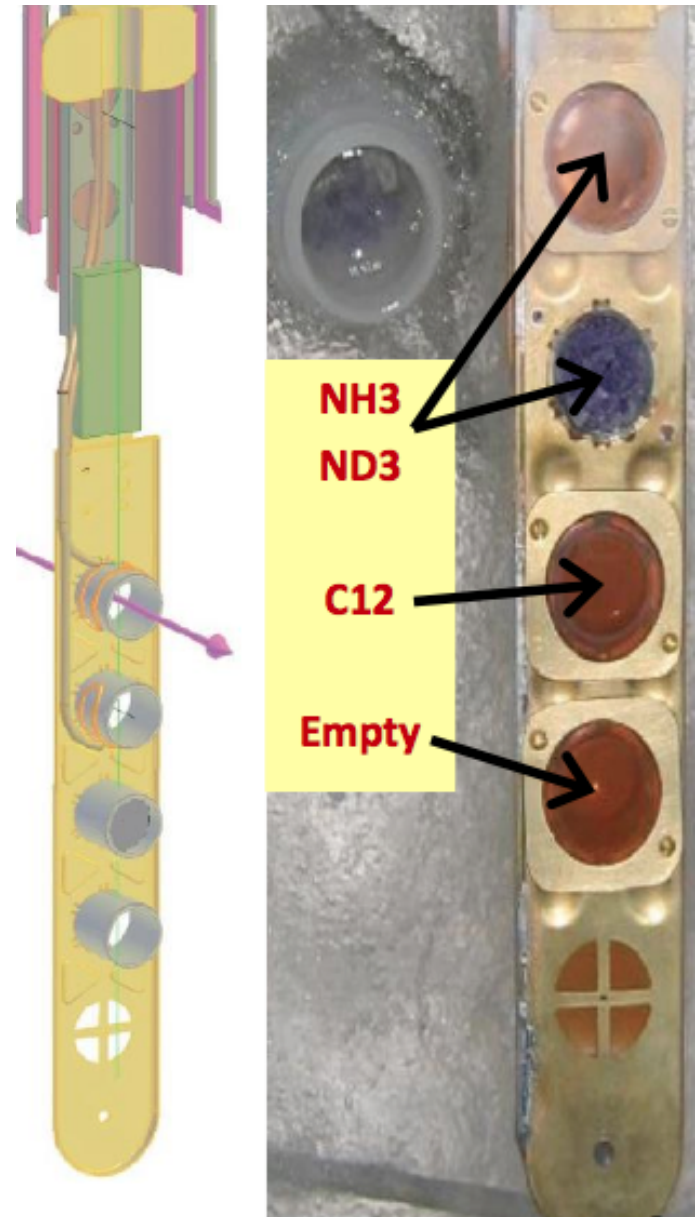
Status of EG1-DVCS analysis

JAMBoree, JLab

July 22, 2014

EG1-DVCS Experiment

- Data collected between February and September of 2009
- Polarized electron beam (>80%)
- Dynamically polarized targets: NH_3 (~80%) and ND_3 (~25%)
- Target polarization is monitored by the Nuclear Magnetic Resonance (NMR) System
- Data also taken with ^{12}C and ^4He targets for background evaluation



EG1-DVCS Experiment

Part A

Target:
2 NH₃ cells

Beam energy:
5.892 GeV
4.735 GeV

Luminosity:
22.7 fb⁻¹

Part B

Target:
2 NH₃ cells

Beam energy:
5.967 GeV

Luminosity:
50.7 fb⁻¹

Part C

Target:
NH₃ and ND₃

Beam energy:
5.764 GeV

Luminosity:
25.3 fb⁻¹

NH₃

~ 70% of running time

ND₃

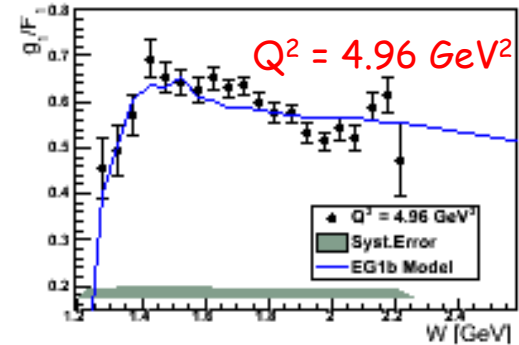
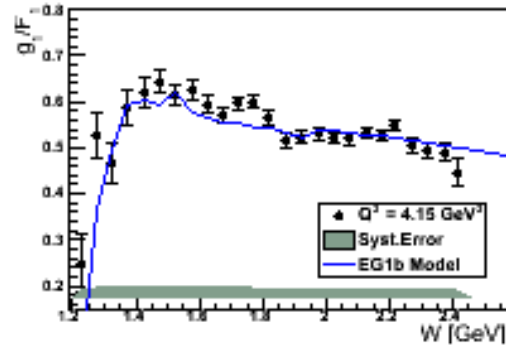
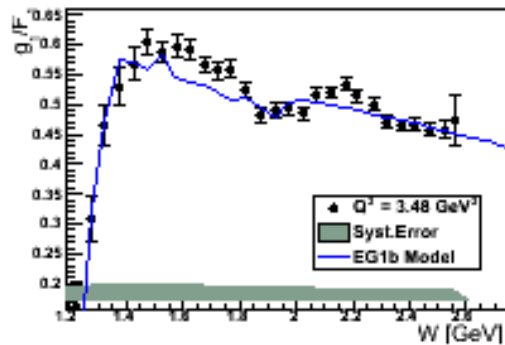
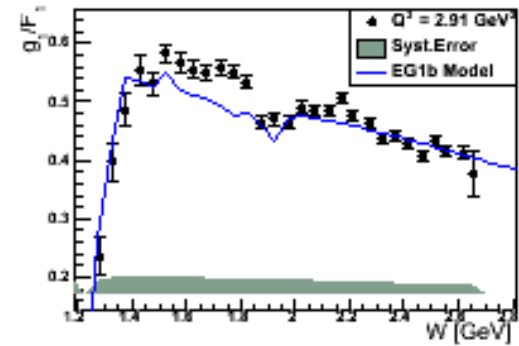
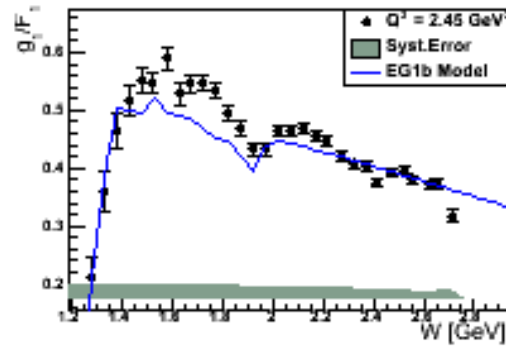
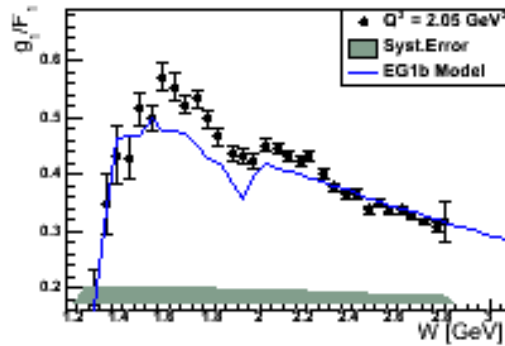
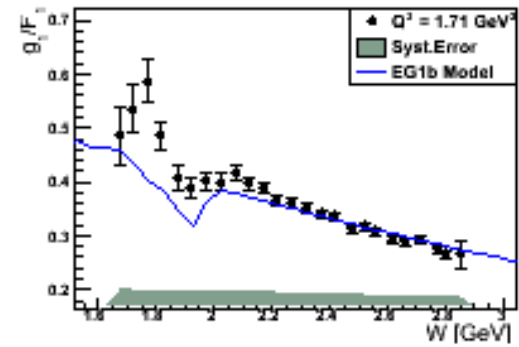
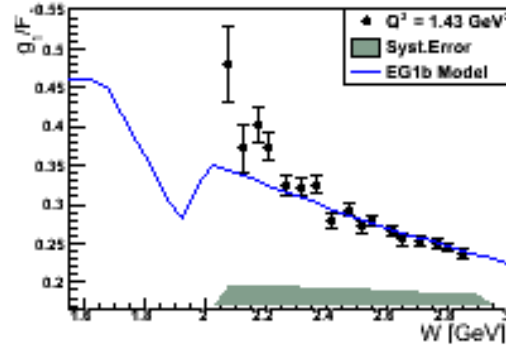
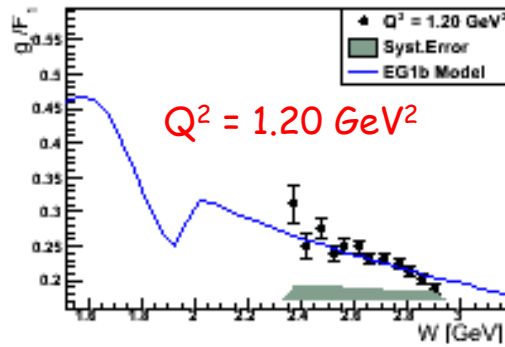
~ 20% of running time

Reference targets ~ 10% of running time

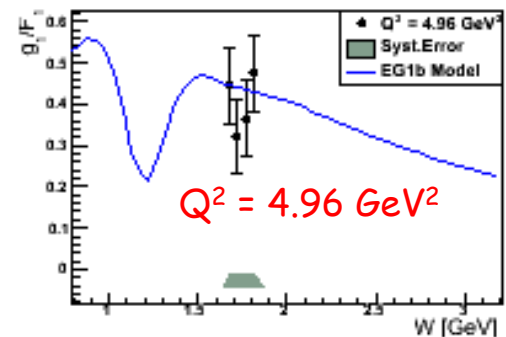
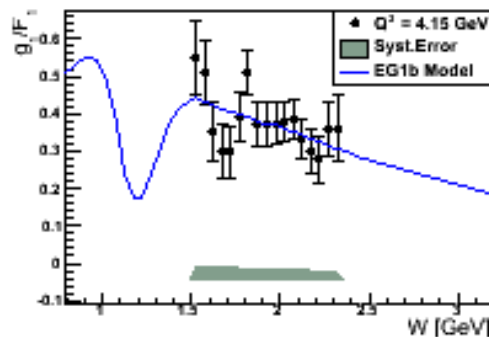
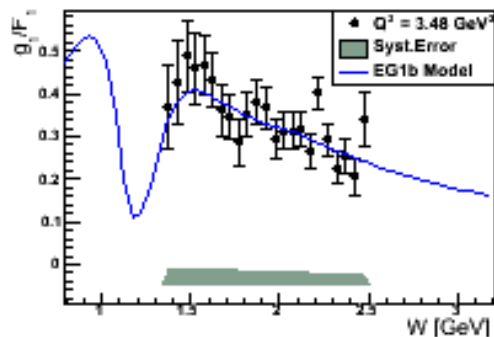
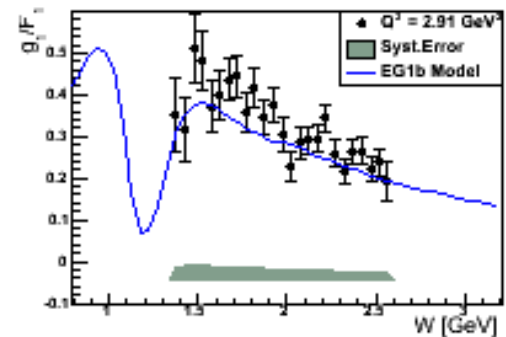
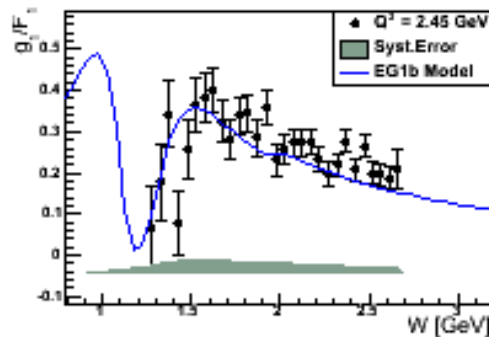
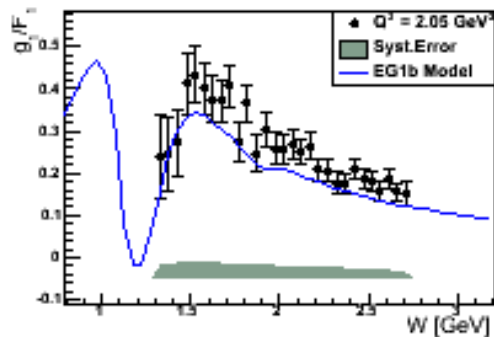
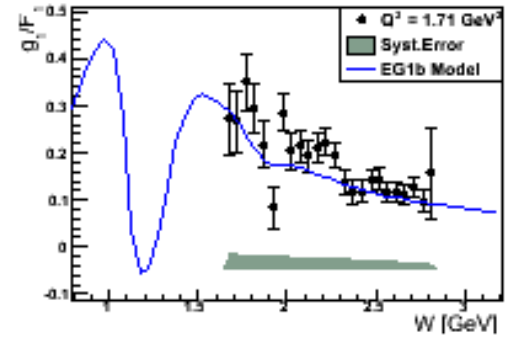
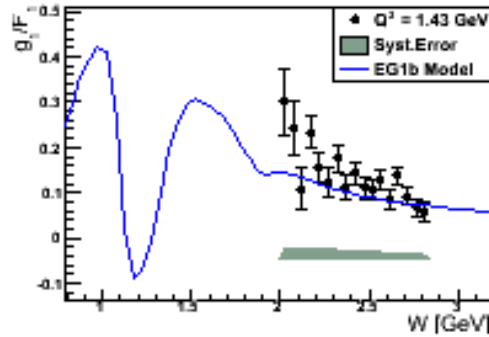
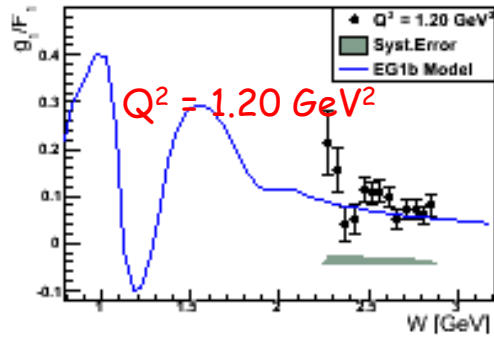
Systematic Errors

Factor	Proton	Deuteron
f	2.3%	2.3%
$P_b P_t$	1.4%	7%
C_s	0-3%	0-3%
C_1	0.3%	1.4%
C_2	n/a	5-10%
R.C.	0.5%	0.5%
Cg_2	0.2- 4%	1-4%
D'	0.5-1%	0.5-1%
Total	2.9-5.8%	8.3-12.7%

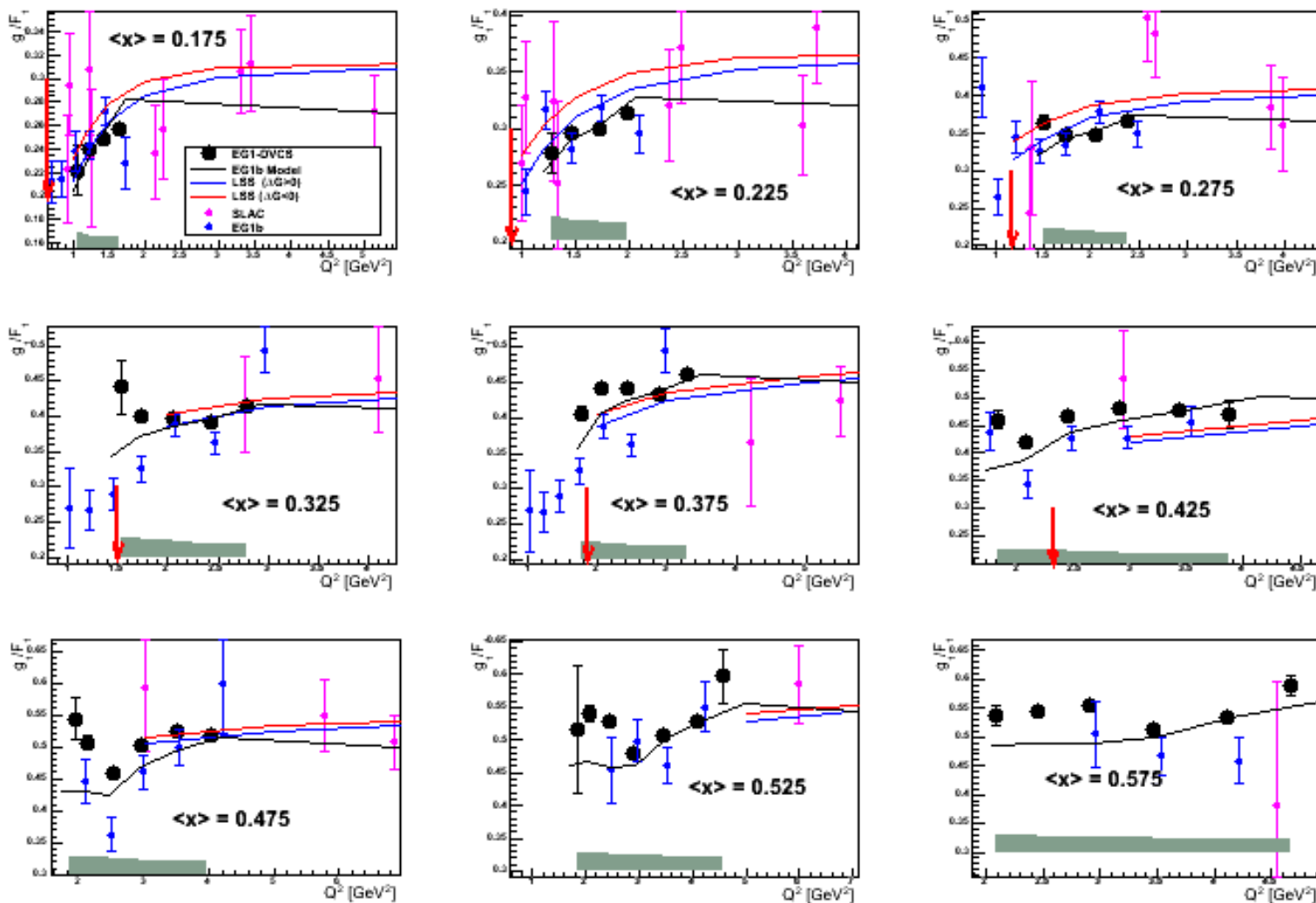
g_p^1/F_p^1 as a function of W , in bins of Q^2



g_1^d/F_1^d as a function of W , in bins of Q^2



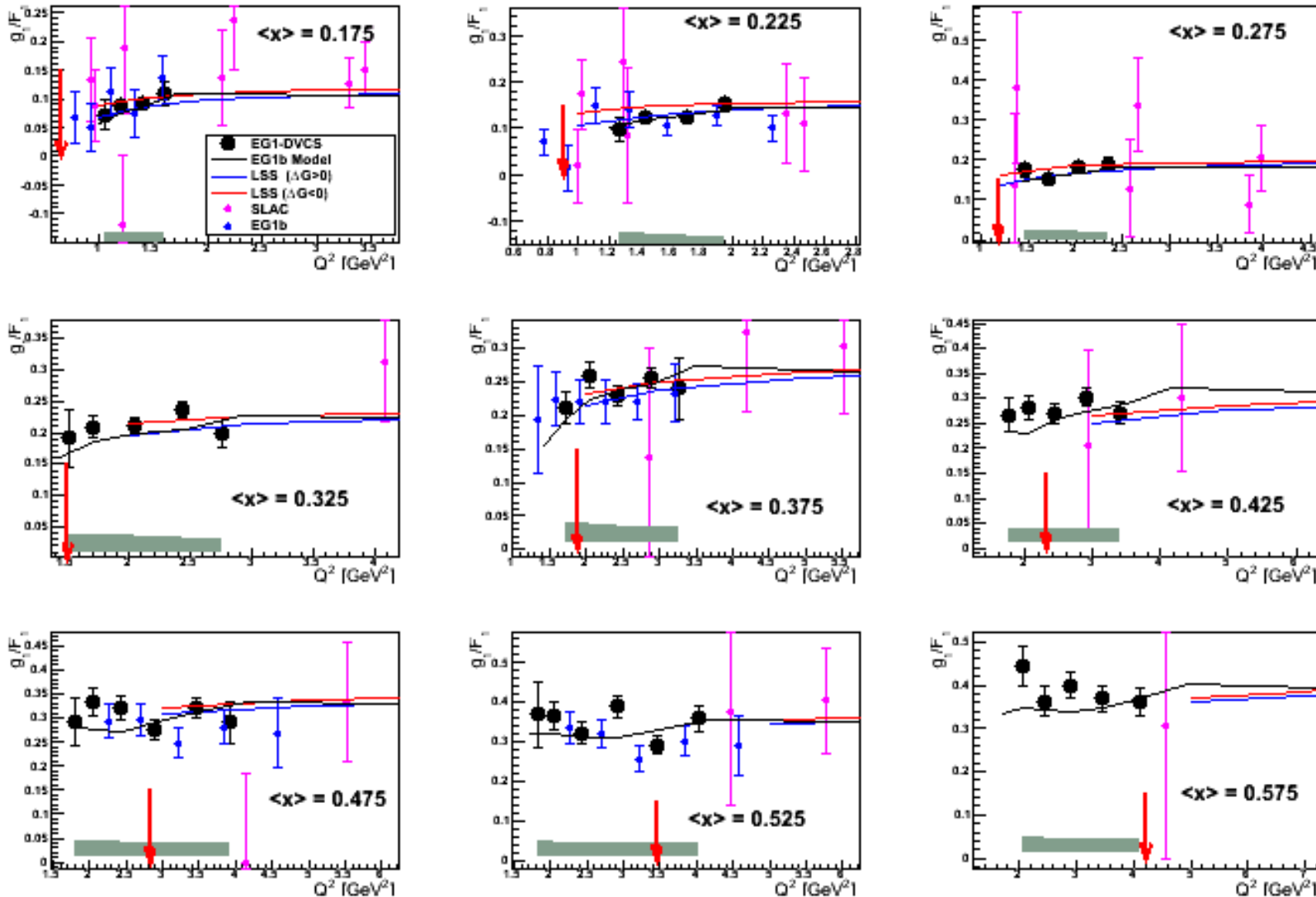
g_p^1/F_p^1 as a function of Q^2 , in bins of x



Red Curve - LSS with $\Delta G < 0$, Blue curve - LSS with $\Delta G > 0$

Data : Black - EGI-DVCS, Blue - EGIb, Purple - SLAC, HERMES, COMPASS

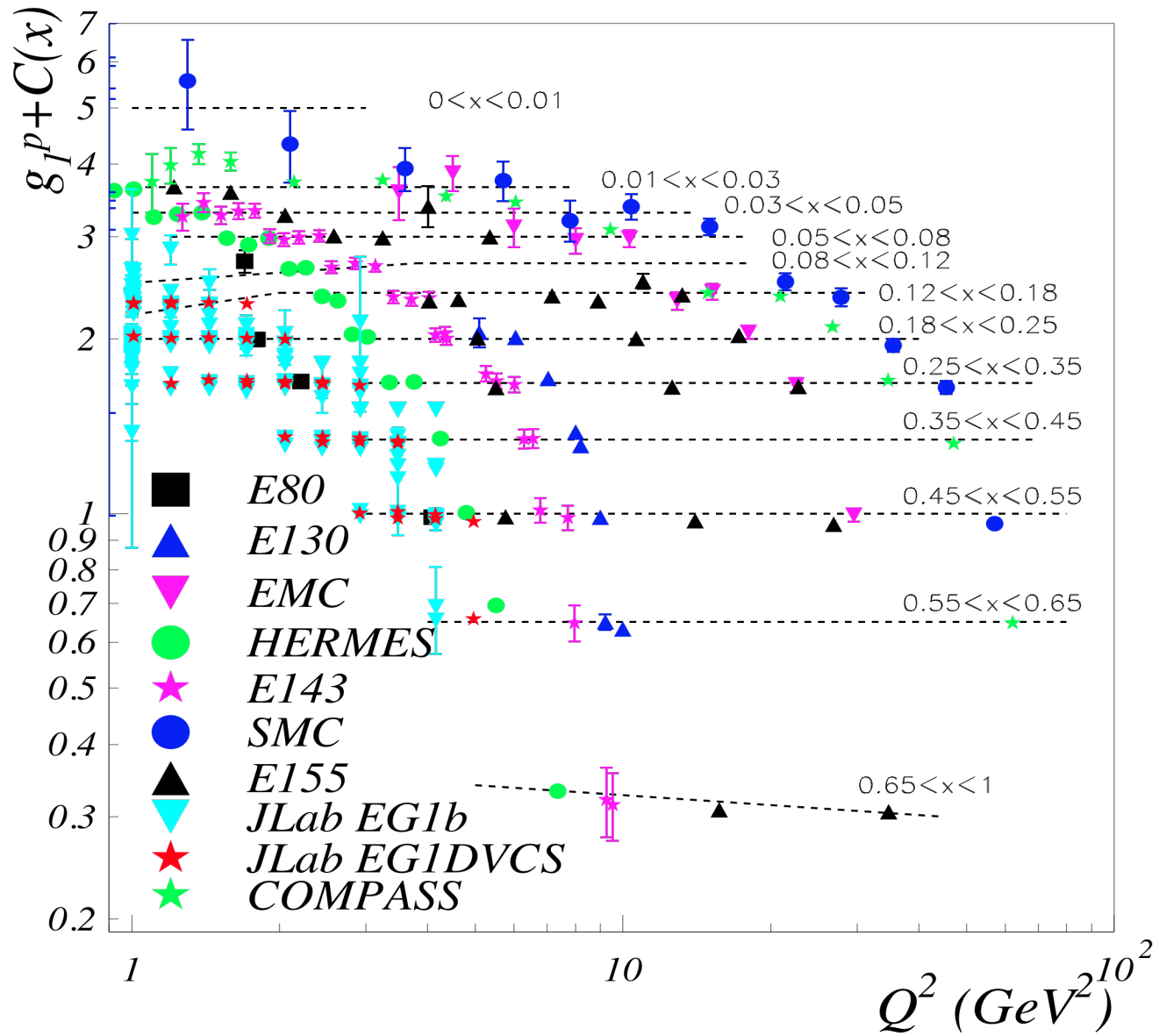
g_1^d/F_1^d as a function of Q^2 , in bins of x



Red Curve - LSS with $\Delta G < 0$, Blue curve - LSS with $\Delta G > 0$

Data : Black - EG1-DVCS, Blue - EG1b, Purple - SLAC, HERMES, COMPASS

Status of $g_1(x, Q^2)$ for the proton (DIS)



Plot
courtesy of
Alexandre Deur

Summary

- The most precise measurements of g_1^p and g_1^d have been made in the kinematic range available with 6 GeV electron beam
- The results show a resonant structure in the three well known resonance regions and a possible new structure near $W = 1.9$ GeV
- The results also show almost complete lack of any significant Q^2 -dependence of the ratio g_1/F_1 in the $0.15 < x < 0.55$ region
- "Precision measurements of g_1 of the proton and of the deuteron with 6 GeV electrons" by Y. Prok et.al. submitted to the PRC
- "High precision determination of the Q^2 evolution of the Bjorken sum" by A. Deur and Y. Prok et. al. published in PRD