

E12-06-110 as a possible 12 GeV Hall C Early Experiment

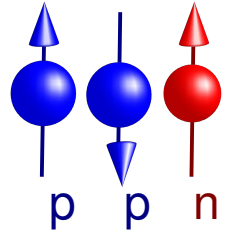
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E12-06-110 Measurement of A_1^n using SHMS+HMS

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• Measure A_1^n in DIS from ${}^3\vec{He}(\vec{e}, e')$ using $\vec{{}^3He} \approx \vec{n}$

➤ 11 GeV beam, $P_{beam}=80\%$ (dP/P=1% Compton, Moller)

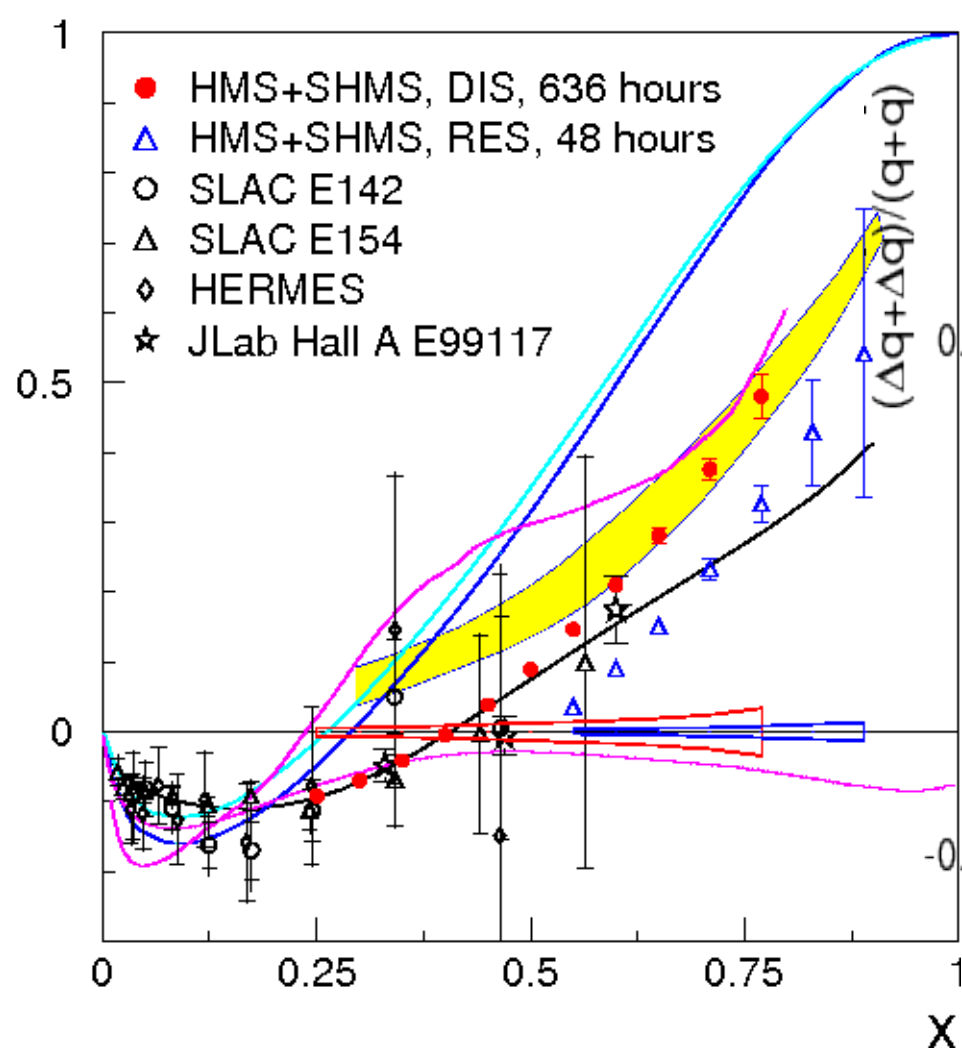
➤ a 60-cm long target chamber, 12 amg density, up to 60uA beam with 60% polarization

➤ HMS+SHMS to detect e' , measure both $A_{||}$ and A_{\perp} :

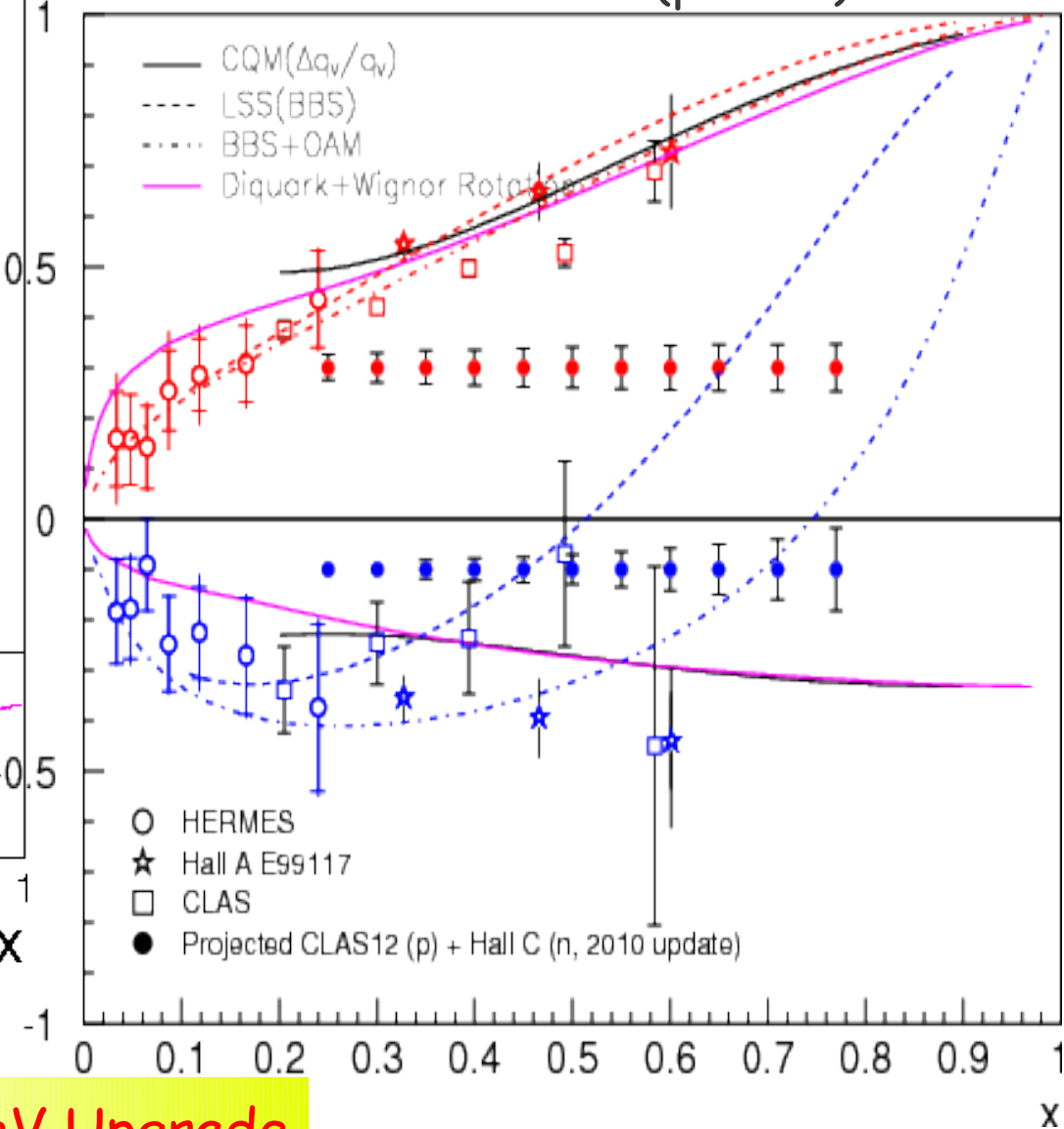
➤ Total: 843h (35 days) + Target Installation

Expected Results

A_1^n



● Combined with Hall B (proton) 11 GeV



Flag-ship Experiment of the 12 GeV Upgrade

Discussions

- Should be considered as an “early” experiment
- The $A1n$ results are needed by the CLAS12 proton spin measurements to extract $\Delta q/q$ (and vice versa)
- Welcome additional hall users and staff to participate; Possible contributions: PID analysis of detectors? Optics calibrations?
- Readiness:
 - currently R&D for the polarized ^3He target (also for E12-06-122 which will likely to be the #1/#2 of Hall A 12 GeV program);
- History:
 - The two 6 GeV experiments $A1n$, $g2n$ ran well in 2001 (but was not the first time this target was used in Hall A)
 - The 6 GeV $A1n$ ran June-July 2001, prel. results on $A1n$ presented in DNP2001; in April 2002 (Spin2002) already indicated $\Delta d/d < 0$; radiative corrections took a while; PRL draft submitted Aug2003 and published early 2004.

Discussions (cont.)

- Requirement on SHMS:
 - Good PID for electrons (high pion rejection)
 - moderate on the angle and momentum resolutions
 - moderate on detector efficiencies
- Requirement on the beam:
 - moderate on the energy resolution
 - high on the polarization (>80%)
- Also commission polarized ^3He target in Hall C.
 - Hall A will likely run this target first (2014?), so the technique will be ready
 - High demands on working (high polarization) cells
 - Build two targets or use the same (fast de-installation in Hall A followed by installation in Hall C)?
 - Difficult to commission two major equipment at the same time - unlikely to be the first two experiments to run for Hall C 12 GeV.

Summary

- Flagship experiment for the 12 GeV Upgrade (the earlier, the better).
- Pros:
 - Moderate requirements on the SHMS resolutions, efficiencies, need good electron PID (require high pion rejection); Could contribute to PID analysis, optics studies (?)
 - Moderate requirement on the beam energy, but require high polarization
 - Asymmetry measurement → possible fast physics output
- Cons: Difficult to commission all three: the polarized ^3He target, the SHMS, and the beam.
- Suggest to run as an early, but not the commissioning experiment.