

E12-10-002

F_2 structure function at large x

Spokespersons: E. Christy, C. Keppel, S. Malace, I. Niculescu*

11 PAC days at 11 GeV (10 hours at 6 GeV)

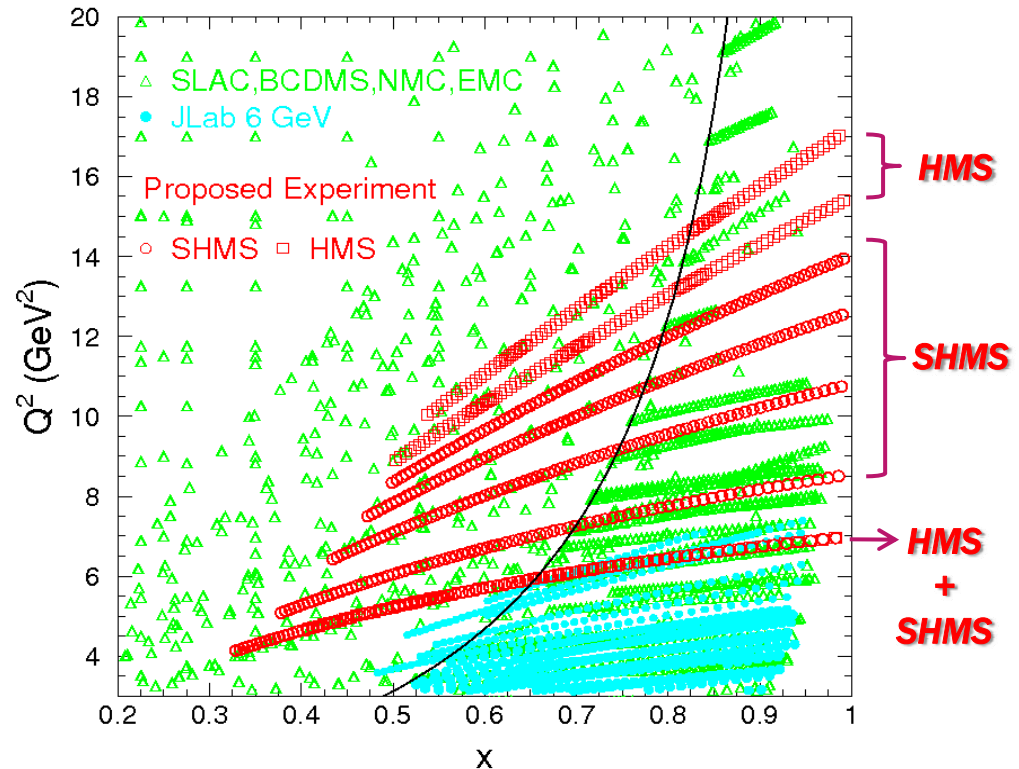
** Contact person*

Measure precision cross sections and F_2 structure functions at large x and low to intermediate Q^2 on proton and deuteron

■ Data will be included in the CTEQ-JLAB PDF global fits

■ Improve large- x precision with larger DIS data set

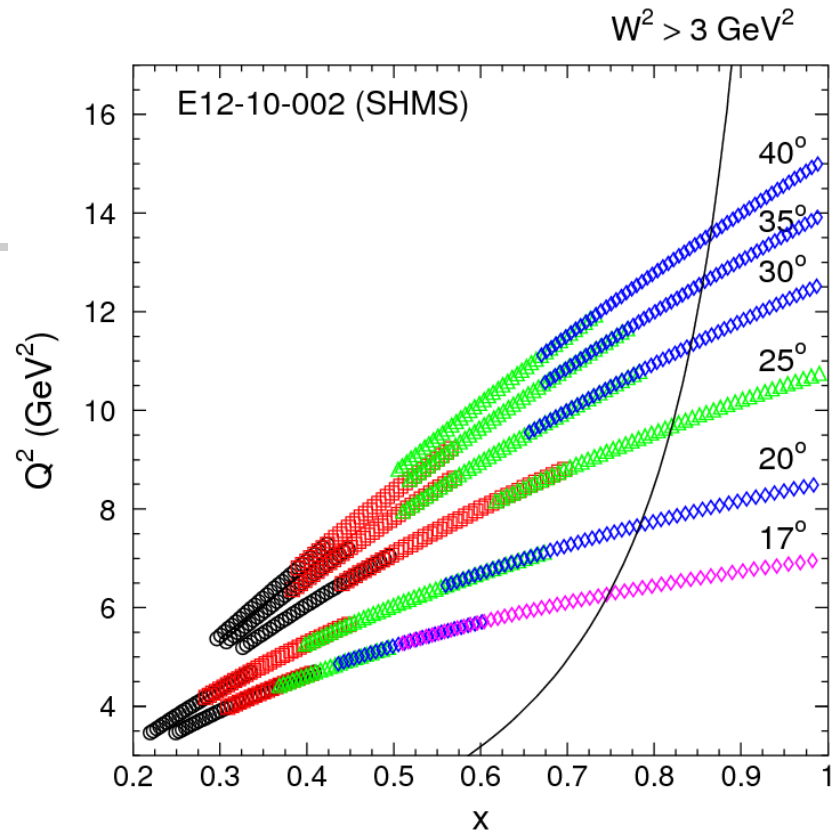
■ Extend Q-H duality studies to larger Q^2



E12-10-002: Kinematics

SHMS kinematics 11 GeV

Angle (deg)	Momentum (GeV/c)	Target
17	4, 4.5, 5, 5.5, 6.1	H, D, Al
20	2.9, 3.5, 4.4, 5.4	H, D, Al
25	2.8, 3.5, 4.4	H, D, Al
30	2, 2.4, 3, 3.6	H, D, Al
35	1.5, 1.9, 2.4, 2.95	H, D, Al
40	1.9, 2.4	H, D, Al



+ There is significant overlap between scans at fixed angles to test the modeling of the acceptance corrections – commissioning

+ Inclusive experiment: straightforward, non-demanding

E12-10-002: Running Parameters & Equipment

Beam:

- Energy : 11 GeV & 6.6 GeV
- Current: 65 μ A

Targets:

- 10 cm Hydrogen
- 10 cm Deuterium
- 4 cm Hydrogen – acceptance studies
- 1-foil C 0.5% r.l. – acceptance studies
- 2-foil C – acceptance studies
- 2 foils Al – background measurement

Spectrometers:

- SHMS: for most of the production run (17, 20, 25, 30, 35, 40 deg)
- HMS: production at 50 deg + 17 deg for commissioning
- Detectors: only base equipment needed

E12-10-002 Collaboration

- ✚ Hampton U, JLab, James Madison U, South Carolina, Yerevan, Regina, Ohio U, Florida International, Catholic U.
- ✚ Includes all the institutions who built the new SHMS detectors
- ✚ 40+ collaborators most of them were involved in

JLab 6 GeV experiments: E-00-002, E-00-116, E-94-110, E-06-009

✚ Publications:

- ✚ Phys. Rev. Lett. 85, 1186 (2000)
 - ✚ Phys. Rev. Lett. 85, 1182 (2000)
 - ✚ Phys. Rev. C 80, 035207 (2009)
 - ✚ Phys. Rev. Lett. 104, 102001 (2010)
- ✚ Scheduled for 26 days (March 6 to April 1, 2017) 78 shifts
 - ✚ If 3 people/shift then about 6 shifts/collaborator
 - ✚ Will work with E12-10-008 as one experiment

E12-10-002 Analysis Readiness

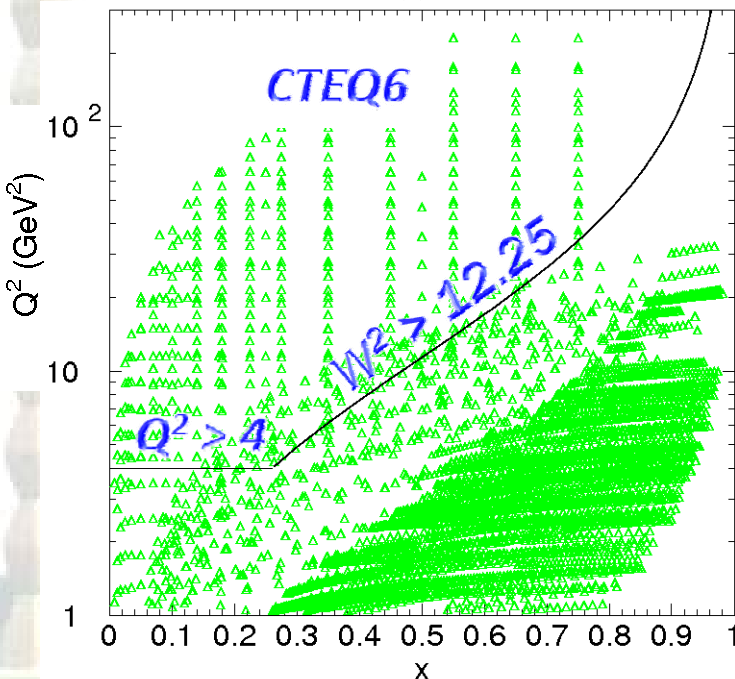
- # **Students:** Deb Biswas (Hampton U.)
- # **Coordinators:** E. Christy (on sabbatical), S. Malace
- # **Parallel Analysis:** I. Niculescu, G. Niculescu (JMU)
- # **Software:**
 - # hcana, Hall C root-based analyzer
 - # C stand-alone codes for calibrations, online monitoring
 - # C stand-alone codes for efficiency calculations, dead times
 - # Single arm Hall C Monte Carlo simulation (acceptance corrections)
 - # Radiative correction code available
 - # Stand-alone C code to extract background (positron) cross sections
 - # Cross section analysis/extraction: C analysis package (Rosen07)



Backup slides

Standard Extraction of PDFs in QCD: Uncertainties..

- ✚ Factorization, Evolution
- ✚ Data: DIS (l-n, l-N), neutrino DIS dimuon production, vector boson production, hadronic jet production
- ✚ pQCD => leading-twist calculation (small non-pert. corr.)
- ✚ Kinematic cuts
- ✚ Data is very scarce above 0.8...



PDFs: large errors at large x

