

PRECISION MEASUREMENT OF THE NEUTRON ASYMMETRY

A_1^n AT LARGE x_{Bj} USING TJNAF AT 6 GeV

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In this proposal we plan to carry out a determination of the deep inelastic neutron asymmetry A_1^n in the large x region ($0.33 \leq x \leq 0.63$) and at reasonably high Q^2 ($3.2 \leq Q^2 \leq 5.3$), from a measurement using a high pressure polarized ^3He target and the polarized beam at the highest available JLab energy 6 GeV. The precision attainable at JLab is unchallenged by any of the world high energy facilities (SLAC, CERN, DESY) engaged in the measurement of this quantity. All measurements carried out to-date display a poor statistical uncertainty for $x \geq 0.4$. At JLab we are in a unique position to obtain a measurement of A_1^n with much higher precision for $x \geq 0.5$ than previously possible. All present data is consistent with $A_1^n < 0$. However, as first pointed out by Feynman [1] and Close [2], very general arguments based on the quark structure of the nucleon predict that as $x \rightarrow 1$, $A_1^n(x) \rightarrow +1$. Moreover, for $x > 0.4$, A_1^n should be positive and model independent as recently shown by Isgur [3]. Our experiment has the sensitivity to determine if this dramatic prediction is valid.

References

- [1] R. Feynman, *Photon Hadron Interactions*, (Benjamin New York, 1972), p. 150.
- [2] F. Close, Phys. Lett. **B43**, 422 (1973); Nucl. Phys. **B80**,269 (1974) and *An introduction to Quarks and Partons* (Academic Press, N. Y., 1979), p. 197.
- [3] N. Isgur, Phys. Rev. **D59** (1999) 034013.

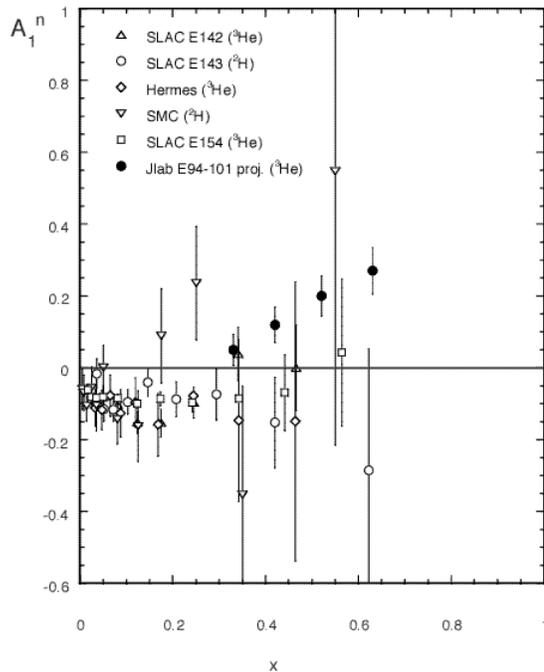


Figure 1: The World data of A_1^n neutron versus x and the projected data from this proposal. The projected data on the figure assume a central value of Isgur's model [3].