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Inelastic Electron Scattering From ^{3}H and ^{3}He

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INELASTIC ELECTRON SCATTERING FROM ^{3}H AND ^{3}He†

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Electrons ranging from 65 to 789 MeV were scattered from ^{3}H and ^{3}He in a single arm high precision experiment at forward and backward angles over a broad range of inelasticity at the Bates Linear Electron Accelerator. The target system[1] contained two identical gas cells of ^{3}H and ^{3}He in an arrangement that allowed easy switching and the occasional substitution of H_2 for ^{3}He. A substantial body of data was taken during the experiment covering the elastic[1], threshold breakup, y-scaling, quasielastic, dip and delta production regions.

Fully corrected preliminary spectra are shown in Figure 1 for ^{3}H and ^{3}He. The quasielastic and delta production peaks are pronounced. The two protons in ^{3}He dominates in the quasielastic peak region making ^{3}He higher than ^{3}H. In the delta region the neutrons and protons are expected to contribute equally. The experimental ^{3}H and ^{3}He cross sections in the delta region are almost identical.

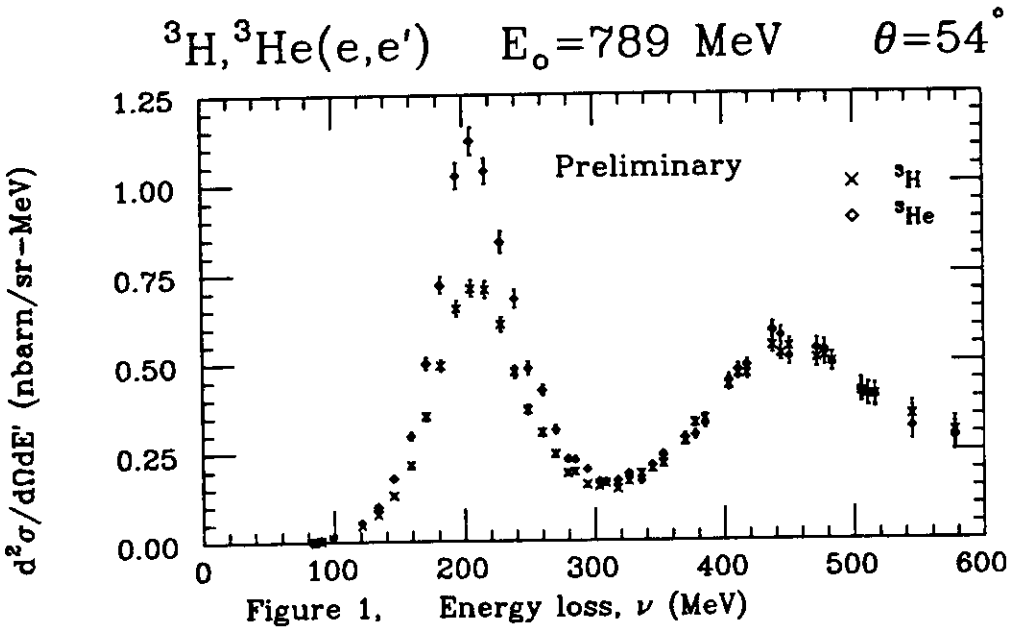

Figure 1.

Preliminary longitudinal and transverse separations have been made for the quasielastic peak region and into the dip region. The detailed comparisons of these results will provide information on the nuclear three-body wave functions. An integration of the longitudinal response functions (see Figure 2) has been

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performed, providing a comparison to theoretical sum rules. Ref. 2 and 3 do not include ground state correlations between the two protons in ^{3}He. Ref. 4 includes these effects which are seen in the ^{3}He data. When the analysis is complete, error bars will be reduced and more experimental points will be available.

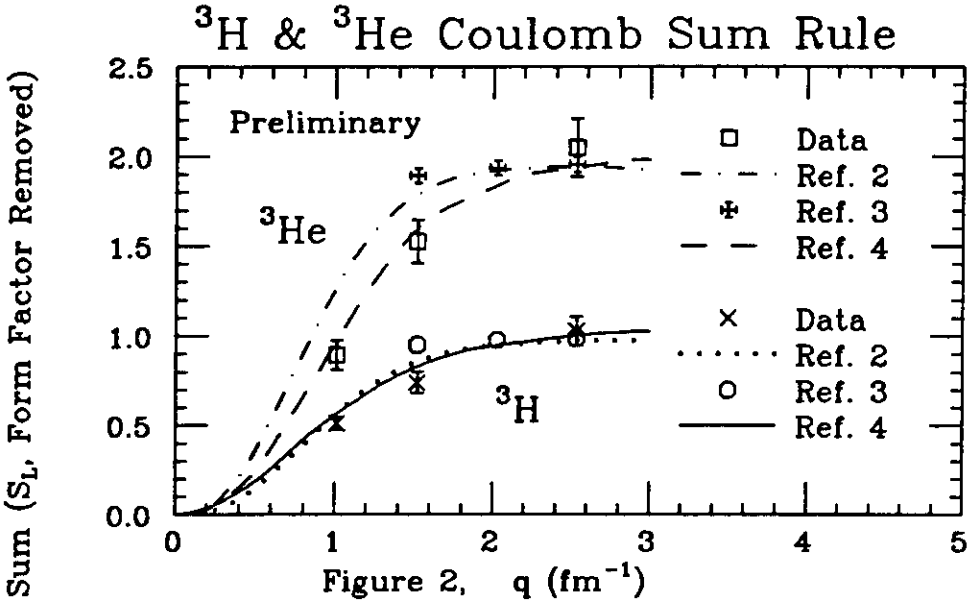

Figure 2.

Final cross sections and separations are anticipated by the time of this conference. Information will also be available on the threshold breakup, y-scaling and dip regions.

References

1. D. Beck, Ph.D. Thesis, MIT 1986.
2. S. Dytman, private communication.
3. H. Meier-Hajduk, et al., Nuc. Phy. A395, 332 (1983).
4. R. Schiavilla, et al., Univ. Illinois Preprint 1986.

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