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Subject: MCEEP simulation for $^3He(e,e'p)$ quasielastic scattering, comparison between 2 mm(point) and 8 cm targets.
Date: May 02, 2000

Work Completed:

(A) The $^3He(e,e'p)$ (*two body breakup*) cross section $\frac{d^5\sigma}{d\Omega_e d\Omega_p dE_e}$ for 2 mm (point) and 8 cm target lengths have been simulated by MCEEP, and plotted with respect to missing momentum p_m. A comparison has been made; (see Figure 1)

(B) The $^3He(e,e'p)$ (*continuum*) cross section $\frac{d^5\sigma}{d\Omega_e d\Omega_p dE_e}$ for 2 mm (point) and 8 cm target lengths have been simulated by MCEEP, and a comparison has been made after a cut in missing energy $7 < E_m < 20$ MeV (see Figure 2);

Conclusion:

Difference in $Q^2 \sim \omega$ distribution of 8cm target and 2mm target can help to explain the peaks around 40 MeV/c $< p_m <$ 60 MeV/c in the difference of cross sections:
A Q^2 vs. ω plot after cut in missing momentum 40 MeV/c $< p_m <$ 60 MeV/c has been made to both 8 cm target and 2 mm target. It can be shown that the $Q^2 \sim \omega$ regions are different for different z positions, which indicate that the differences are caused by different $Q^2 \sim \omega$ regions, e.g. different kinematic settings of each interaction position (see Figure 3,4,5).

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Figure 4. $Q^2 - \omega$ region for electron beam 675 MeV, 8cm target, after different cuts in the position of interaction point
Figure 5. $Q^2 - \omega$ region for electron beam 855 MeV, 8cm target, after different cuts in the position of interaction point

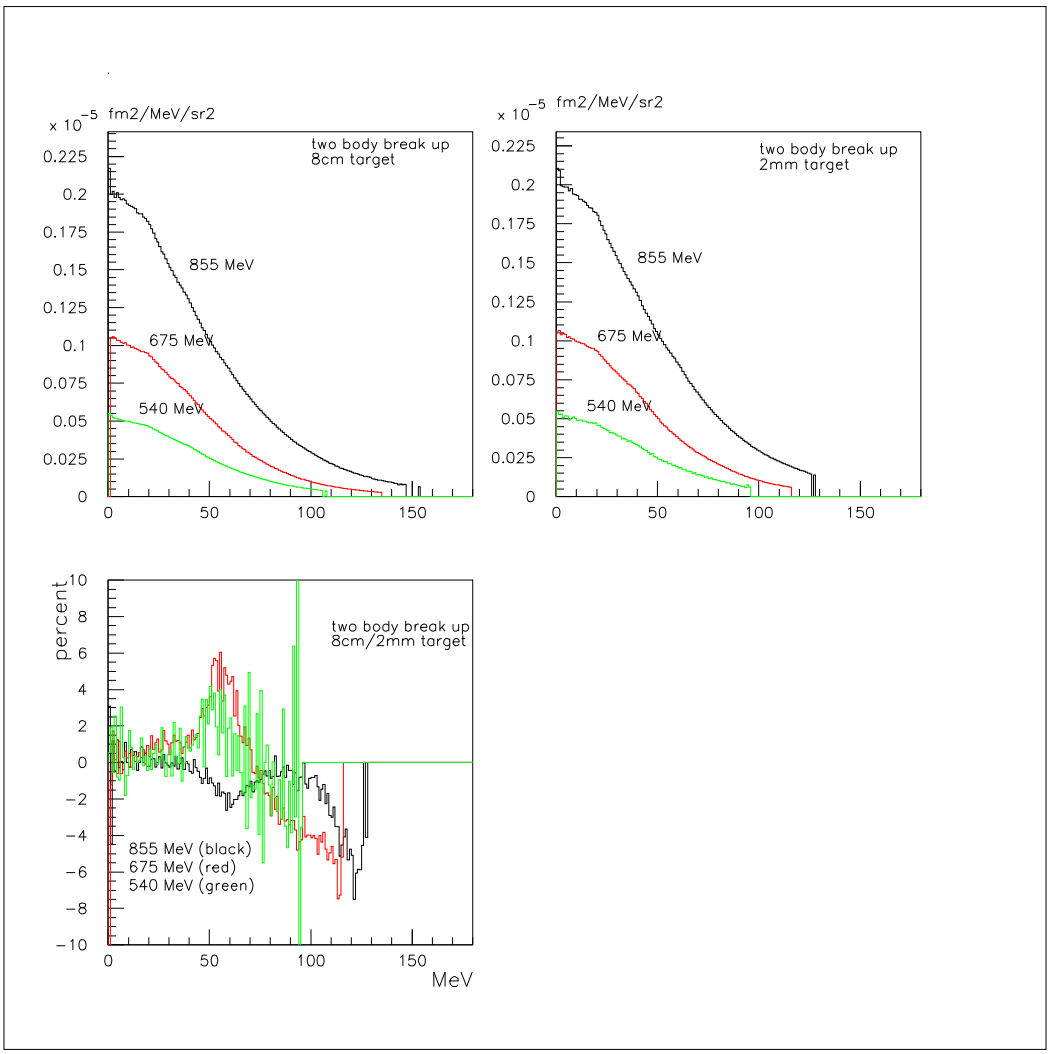

Figure 1: Comparison of cross section between 8 cm and 2 mm targets, two-body breakup

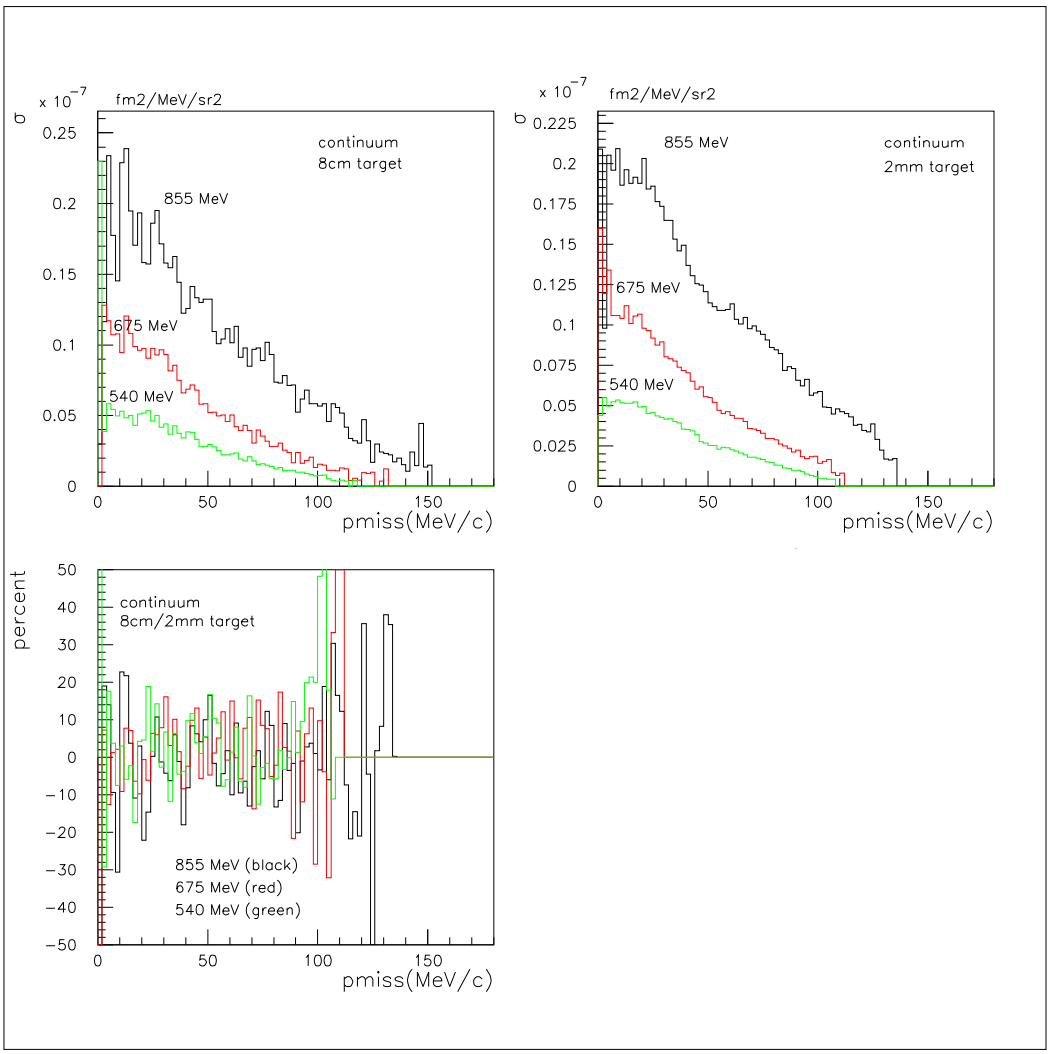

Figure 2: Comparison of cross section between 8 cm and 2 mm targets, continuum

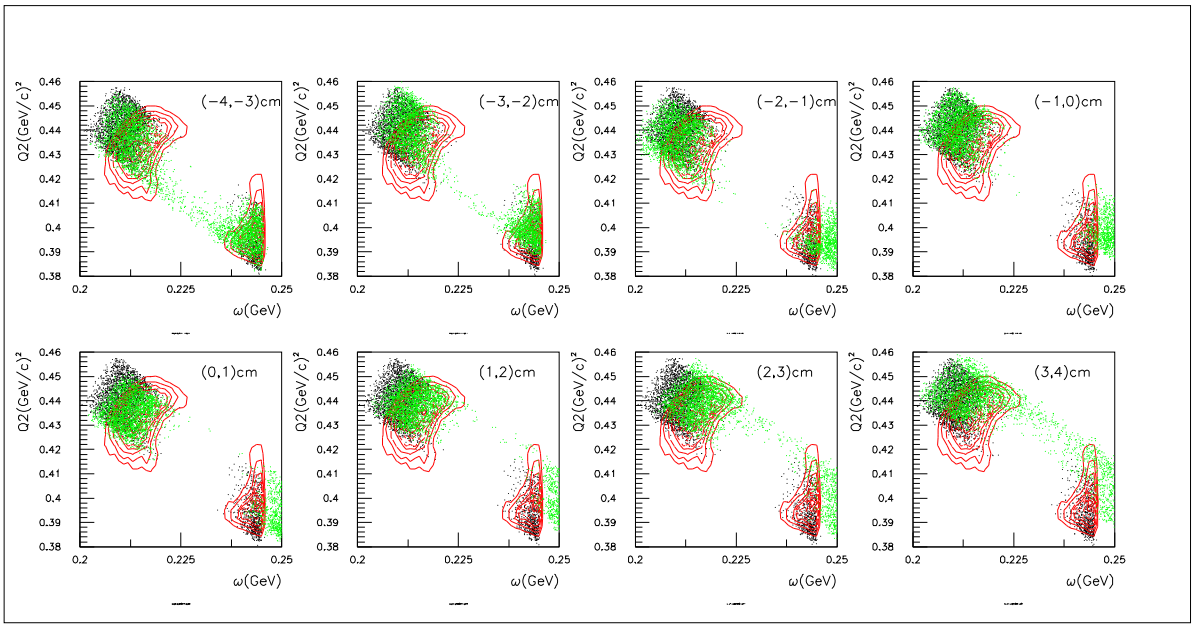

Figure 3: $Q^2 - \omega$ region for electron beam 540 MeV, 8cm target, after different cuts in the position of interaction point. (black: 2mm target; red: 8cm target after cut 40 MeV/c $< p_{miss} <$ 60 MeV/c; green: 8cm target after cut 40 MeV/c $< p_{miss} <$ 60 MeV/c and different cuts in the position of interaction point z) .

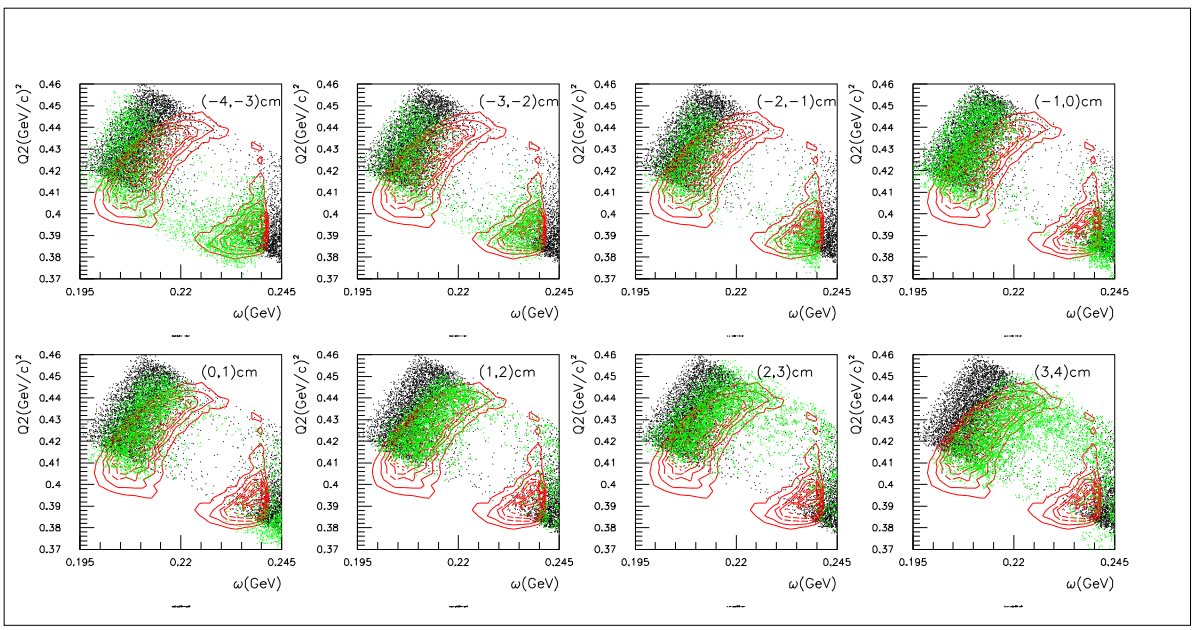

Figure 4: $Q^2 - \omega$ region for electron beam 675 MeV, 8cm target, after different cuts in the position of interaction point

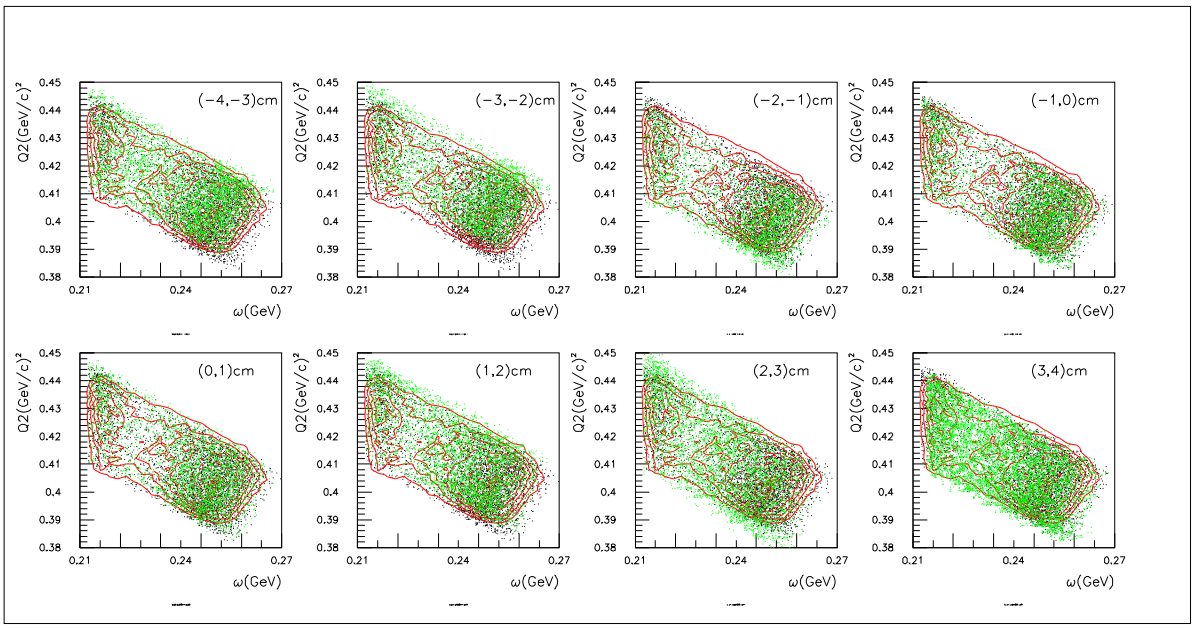

Figure 5: $Q^2 - \omega$ region for electron beam 855 MeV, 8cm target, after different cuts in the position of interaction point