E_{beam}=7.40GeV, E'=3.20GeV

$\theta_{HRS}=33.4^{o}$

$Q^2 = 4EE'\sin^2(\theta_{HRS}/2) = 7.82\ GeV^2$

Integrated beam charge: BC = 2099 C

Used target Length: $L_T = \frac{\Delta e.y}{\sin(\theta_{HRS})}$=9.08 cm

Target density: ρ_T=0.0709 g/cm^3

Angular acceptance: $\Delta\theta$=0.090 rad, $\Delta\phi$=0.023 rad

(θ is the out-of-plane angle, ϕ is the in-plane angle)

Solid angle acceptance: $\Delta\Omega = \Delta\theta\Delta\phi$ = 2.07e-03 sr

N_{good}=1826 (N_{good} is the number of detected one-track electrons)

LIvetime: LT=0.971

Total efficiency for detection: $\epsilon_{det}=\epsilon_T\epsilon_{PID}\epsilon_R\epsilon_{track}$ = 0.998

ϵ_T is the trigger efficiency, ϵ_{PID} is the particle identification efficiency, ϵ_R is the trajectory reconstruction efficiency

and ϵ_{track} is the ratio of one-track trajectories of all trajectories, assume ϵ_T=1, ϵ_{PID}=1 and ϵ_R=1

Integrated luminosity: $L\Delta t = \frac{BC}{e^-}\rho_t l_t \frac{N_A}{A_Z}$ = 5.09e+43 cm^{-2}

$$\left(\frac{d\sigma}{d\Omega}\right)_{measured} = \frac{N_{good}}{\Delta\Omega\ L\Delta t\ LT\ \epsilon_{det}} = 1.79e\text{-}38\ cm^2/sr = 0.000\ nb/sr$$

considering the effect of internal and external bremsstrahlung

$$\left(\frac{d\sigma}{d\Omega}\right)_{measured} = \left(\frac{d\sigma}{d\Omega}\right)_{Born}\exp(\delta_{inf}+\delta_t)$$

$$\delta_{inf}=(-2\alpha/\pi)[\ln(Q^2/m^2-1)\ln(E'/\Delta E')]$$

$$\delta_t = -4/3\{ [t_{iw}+1/2T]\ln\left(\frac{E}{(E/E')^2\Delta E'}\right) + [t_{fw}+T']\ln\left(\frac{E'}{\Delta E'}\right) \}$$

$\Delta E'$=0.019 GeV

($\Delta E'$ is the maximum energy loss of the electron from the elastic peak)

Al cylinder: upstream window 4 mil = 0.0102cm thick, downstream window 4 mil = 0.0102cm, wall 7 mil = 0.0178cm.

LH_2 15cm thick, cell diameter 2.5 inches

Air after the target: T_{air} = 62.6 cm (estimate)

$$T' = 1/2 \text{ X } 2.5 / \sin(28^o) \text{ x } 2.54 \text{ cm} = 6.76 \text{ cm}$$

$$t_{iw} + 1/2T = \frac{4 \text{ x } 0.00254\text{cm}}{8.9\text{cm}} + 1/2 \text{ x } \frac{15\text{cm}}{866\text{cm}} = 1.14 \text{ x } 10^{-3} + 8.66 \text{ x } 10^{-3} = 9.80 \text{ X } 10^{-3}$$

$$t_{fw} + T' = \frac{7 \text{ x} 0.00254\text{cm} / \sin(28^o)}{8.9\text{cm}} + \frac{62.6}{30420} + \frac{6.76\text{cm}}{866\text{cm}} = 4.26\text{x } 10^{-3} + 2.06\text{x } 10^{-3} + 7.81\text{x } 10^{-3} = 1.41 \text{ x } 10^{-2}$$

$$\delta_t = (-4/3) \{ 9.80 \text{ x } 10^{-3} \ln(\frac{4.89}{(4.89/3.04)^2 \text{x } 0.019}) + 1.41\text{x } 10^{-2} \ln(\frac{3.04}{0.019})\} = (-4/3)(3.82 \text{ x } 10^{-2} + 6.16 \text{ x } 10^{-2}) = -0.152$$

$$\delta_{inf} = \frac{-2}{137\text{x}3.14} \text{ x } (\ln\frac{3.48}{(0.511\text{x}10^{-3})^2} - 1) \ln(\frac{3.04}{0.019}) = -0.367$$

$$(\frac{d\sigma}{d\Omega})_{Born} = (\frac{d\sigma}{d\Omega})_{measured} \exp\{-\delta_{inf} - \delta_t\} = 0.000 \text{ nb/sr x } \exp\{0.367 + 0.152\} = 0.000 \text{ nb/sr}$$

$$(\frac{d\sigma}{d\Omega})_{expected} = 0.177 \text{ nb/sr}$$ (from Bosted fitting: P.E.Bosted, Phys. Rev. C 51, 409 (1995))

$$(\frac{d\sigma}{d\Omega})_{Born} / (\frac{d\sigma}{d\Omega})_{expected} = 0.00$$

Expected cross section calculation

$$\tau = \frac{Q^2}{4m_p^2} = 2.22$$

$$\in = \frac{1}{1+2(1+\tau)\tan^2(\theta_{HRS}/2)} = 0.63$$

$$\sigma_{mott} = (\frac{\alpha \cos(\theta/2)}{2E \sin^2(\theta/2)})^2 \frac{E'}{E} = 1.42\text{e-}05\text{GeV}^{-2} = 5.55\text{e+}00 \text{ nb}$$

Bosted fitting: P.E.Bosted, Phys. Rev. C 51, 409 (1995)

$$G_E^p(Q^2) = \frac{1}{1+0.62Q+0.68Q^2+2.80Q^3+0.83Q^4}$$

$$G_M^p(Q^2 = \frac{\mu_p}{1+0.35Q+2.44Q^2+0.50Q^3+1.04Q^4+0.34Q^5}$$

$$G_M^p = 1.82\text{e-}02$$

$$G_E^p = 8.33\text{e-}03$$

$$(\frac{d\sigma}{d\Omega})_{Born} = (\frac{d\sigma}{d\Omega})_{mott} \frac{\in(G_E^P)^2 + \tau(G_M^P)^2}{\in(1+\tau)} = 0.002\text{nb/sr}$$