Muon Photoproduction Cross Section

Michael Roberts

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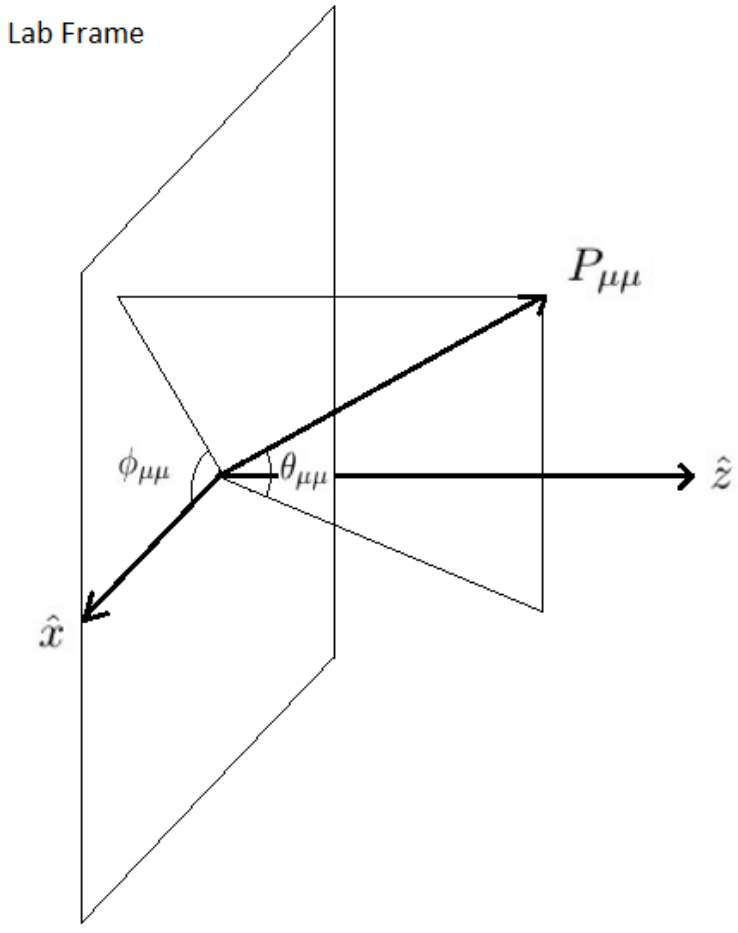
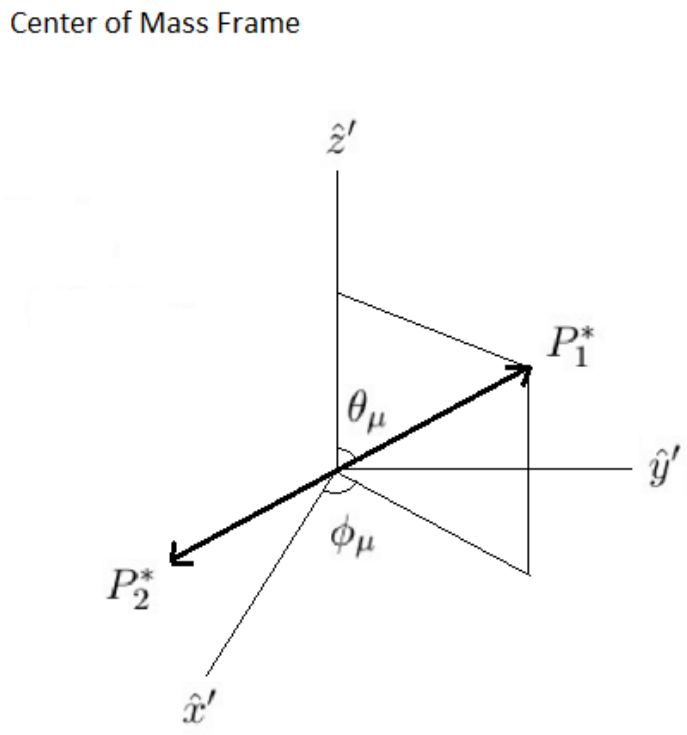
Kinematics


Lab Frame
$P_{\mu\mu}$
$\phi_{\mu\mu}$
$\theta_{\mu\mu}$
$\hat{z}$
$\hat{x}$


Center of Mass Frame
$\hat{z}'$
P_1^*
θ_μ
$\hat{y}'$
ϕ_μ
P_2^*
$\hat{x}'$

Cross Section

$$
\begin{aligned}
d\sigma &= \frac{2\alpha\nu^2}{\pi^2}\left[W_{unp} + \xi_3 W_{pol}\cos(2\phi)\right] dx d^2p_1 d^2p_2 \\
W_{unp} &= \left[x^2 + (1-x)^2\right] |\overrightarrow{J}_T|^2 + m^2 |J_S|^2 \\
W_{pol} &= -2x(1-x)|\overrightarrow{J}_T|^2
\end{aligned}
$$

Form Factor

Coulomb Form Factor:

$$F(q^2) = 1 \tag{1}$$

Nuclear Form Factor:

$$F(q^2) = \frac{\Lambda^2}{\Lambda^2 + q^2} = 1 - \frac{q^2}{\Lambda^2} + O\left(\left(\frac{q^2}{\Lambda^2}\right)^2\right) \tag{2}$$

Phase Volume

$$dx d^2p_1 d^2p_2 \qquad \Rightarrow \qquad dW_{\mu\mu} d\Omega_{\mu\mu} d\Omega_{\mu}$$

The Jacobian of this transformation is required to give the cross section in terms of the lab scattering angle and center of mass solid angle.