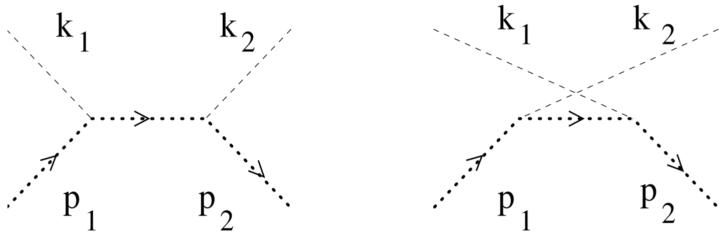
The differential cross section for Compton scattering is calculated in Appendix A

$$\left(\frac{d\sigma}{d\Omega}\right)^{\rm Compton}_{\rm lab} = \frac{|T|^2}{64\pi^2}\frac{1}{[m+k_1(1-\cos\theta)]^2} \tag{0.1}$$

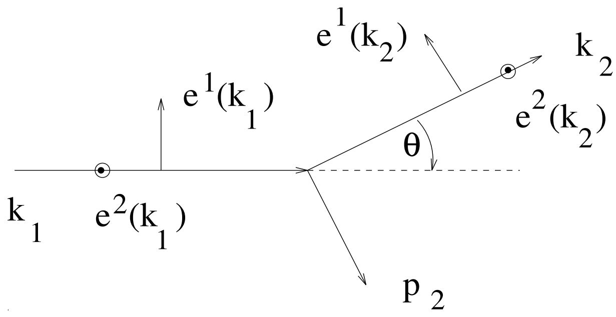
The diagrams are shown in Fig. 66 from the lecture notes:



and the transition matrix is given by Eq. (5.95)

$$T^{\lambda_1\lambda_2}(p_2,k_2;p_1,k_1) =$$
$$e^2\left(\tfrac{4(e^{\lambda_1}(k_1)\cdot p_1)(e^{\lambda_2}(k_2)\cdot p_2)}{m^2-s-i\epsilon} + \tfrac{4(e^{\lambda_2}(k_2)\cdot p_1)(e^{\lambda_1}(k_1)\cdot p_2)}{m^2-u^2-i\epsilon} + 2e^{\lambda_2}(k_2)\cdot e^{\lambda_1}(k_1)\right) \tag{0.2}$$

If we choose the polarizations as shown in Fig. 90 of the lecture notes we have the



property

$$e^{(2)}(k_i)\cdot p_j = 0, \quad e^{(1)}(k_i)\cdot p_1 = 0 \tag{0.3}$$

(and of course $e^{(i)}(k_1)\cdot k_1 = e^{(i)}(k_2)\cdot k_2 = 0$). Thus, the only non-zero term in the r.h.s. of Eq. (**??**) is the last one and we get

$$\begin{aligned} T^{11} &= -2e^2\cos\theta, \quad T^{12}=T^{21} = 0, \quad T^{22} = -2e^2 \\ \Rightarrow T^{++}=T^{--} &= -e^2(1+\cos\theta), \quad T^{-+}=T^{+-} = e^2(1-\cos\theta) \end{aligned} \tag{0.4}$$

The differential cross sections are

$$\begin{aligned} \left(\frac{d\sigma}{d\Omega}\right)_{++} = \left(\frac{d\sigma}{d\Omega}\right)_{--} &= \frac{e^4(1+\cos\theta)^2}{64\pi^2}\frac{1}{[m+k_1(1-\cos\theta)]^2}, \\ \left(\frac{d\sigma}{d\Omega}\right)_{+-} = \left(\frac{d\sigma}{d\Omega}\right)_{-+} &= \frac{e^4(1-\cos\theta)^2}{64\pi^2}\frac{1}{[m+k_1(1-\cos\theta)]^2} \end{aligned} \tag{0.5}$$

which coincides with Eq. (5.120) from the lecture notes.