Exercises in Experimental Physics 4

Seminar 2
submission deadline: 21.04.20

1. The total energy E of a relativistic particle with the rest mass m_0 is $E = mc^2$ ($m = m_0/\sqrt{(1-(v/c)^2}$). Its kinetic energy is $K = E - E_0$, where E_0 is the energy at rest ($E_0 = m_0c^2$). Find K for $v << c$. (2p)

2. Find the number of electrons emitted per second from an electrode due to the photoeffect if the saturation current I is 10^{-10} A. (1p)

3. Find the maximal wavelength so that the photoeffect can be observed for silver with the work function $A = 4.28$ eV. (1p)

4. A photon with the wavelength λ scatters off a free electron and deviates by an angle θ. Find the energy E'_e and the momentum p'_e of the electron. Evaluate these quantities if $\lambda = 0.02$ nm and $\theta = 90°$. (2p)

5. By using the drawing in Figure 1 find the angle φ in the preceding task. (2p)

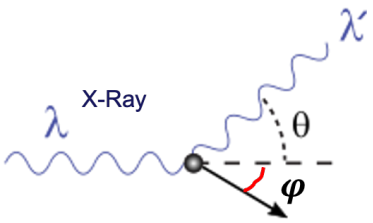

Figure 1: A photon scattered off an electron.