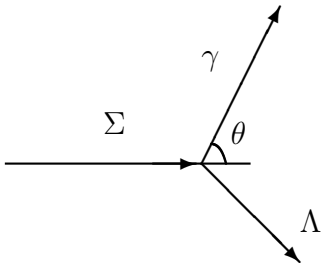
Problems Week 8

1. An excited atom has mass m. It emits a photon and goes into its ground state with mass m_0. Calculate the energy of the photon in the initial rest frame of the atom (center-of-mass frame).

2. From the point-of-view of a certain observer the energy of a Σ-particle is E_Σ. It decays into a Λ-particle and a photon. The masses m_Σ and m_Λ are known. Calculate the energy of the photon as a function of θ, defined by the following picture (in the observers orthogonal space)



3. In Compton scattering a photon scatters off an electron at rest. Relate the energies E_γ and E'_γ to θ: