UNIVERSITÄT LEIPZIG

Experimental Physics IV IPSP

Problem Set 9

Deadline: Thursday, 09.06.2011, before the lecture

Problem 25: 3+2 points

The excited state of an electron decays exponentially with a certain life time τ by emitting a photon:

$$A(t) = e^{-|t|/\tau} .$$

a) Calculate the shape of the spectral intensity $F(\omega)$ of an emitted photon by using Fourier transformation.

b) Calculate the half width frequency $\omega_{1/2}$ where the spectral intensity drops to $\frac{1}{2}F_{\max}$.

Problem 26: 5+1 points

Derive the energy levels and the normalized wave functions of the bound states ($E < 0$) of the SE with a δ-potential (see problem 24). What is different compared to the finite potential well?