Homework 10 due 5pm 14 Nov 2007
Physics 462/507 posted 8 November 2007

1) HM problem 10-19. As part of section b of this problem, define the saturation field E_{sat} as the field strength at which the quantity $y = p_0 E_{sat} / kT = 1$. For room temperature, calculate the saturation field strength in V/m and the corresponding saturation time-average intensity in W/m^2. As the incident intensity approaches I_{sat}, nonlinear effects become important.

2) HM problem 10-20

3) HM problem 10-21

4) Calculate the Fourier transform of the function $\cos^2(\omega_0 t)$. Sketch the result. If you have a delta function $\delta(\omega)$, show it as a spike with unit height, $a\,\delta(\omega)$ would be a spike with height a.

5) Use the convolution theorem and any other theorems to calculate the Fourier transform of the function $E(t) = E_0 \sin^2 \omega_0 t \exp(-a t^2)$. Show all your work: you shouldn't have to do any integrals; make use of the theorems and transform pairs. Sketch or plot the spectrum ($|E(\omega)|^2$)in the limit that $\omega_0 >> a$.