

## Homework 1

1. Plot real and imaginary parts of  $\chi_r$ ,  $\epsilon_r$ ,  $n$ , and absorption coefficient as a function of wavelength for a material with  $N=10^{15} \text{ cm}^{-3}$ , resonance wavelength  $\lambda_0=1500\text{nm}$  and three values of broadening  $\gamma=10^{12} \text{ s}^{-1}$ ,  $\gamma=10^{13} \text{ s}^{-1}$ ,  $\gamma=10^{14} \text{ s}^{-1}$
2. Plot the dipole radiative lifetime as a function of wavelength for  $100\text{nm}<\lambda_0=2000\text{nm}$