Due: Thursday, 04/06

13. Consider a Hanle-effect experiment with a J'=1 state excited with linearly x polarized light as shown in the figure. Suppose that flourescence is detected that results from the decay of the J'=1 state to a J=0 state. What is the polarization state of the light emitted in the z direction (along which the magnetic field is applied) at different values of the magnetic field ? On the basis of your result, comment on whether it is appropriate to call the Hanle effect *magnetic depolarization*.

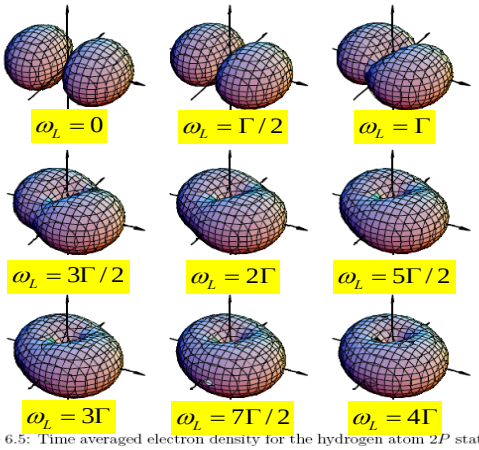

Figure 6.5: Time averaged electron density for the hydrogen atom $2P$ state in a magentic field. The atoms are continuously excited by a linearly polarized light from the $1S$ state. For these figures ω_L/Γ linearly increases from 0 (first figure) till 4 (last figure).

14. Briefly explain why static electric polarizability for an atomic state can be subdivided into *scalar* and *tensor* polarizability, what these mean, and why there is no static *vector* polarizability.

15. For the first plot on the figure above, using the Mathematica package introduced in class, draw a corresponding angular-momentum probability surface. Also, draw a similar surface for the case of ω_L=∞.