Answer on Question #69912, Physics / Optics

An atomic system consisting of two energy levels,with population of higher energy level less than that of the lower level,is in the thermal equilibrium. show that the absorption of radiation dominates stimulated emission if radiation of appropriate frequency is introduced into the system.comment on the consequences of this fact for laser action .

Solution:

In 1917, A. Einstein showed that emission of light may be stimulated by radiation incident on an excited atom. It is happening when an electron is in an excited state E and a photon whose energy is equal to the difference between energy E and the energy of a lower lying level E_0 is incident on the atom.

The higher energy state N_2 has a greater population than the lower energy state N_1: $N_2 > N_1$. Therefore, the emission process dominates. We can write: $N_2/N_1 > 1$. In this way, a population inversion is required for laser operation. We assume that $E_1 < E_2 < E_3$; that is, the energy of level *Population inversion* lies between that of the ground state and level 2.