

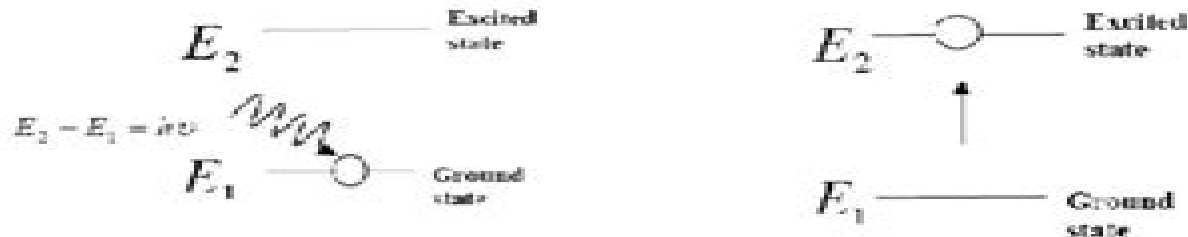
# Lasers- Engineering Physics

## ➤ Laser

Light Amplification by Stimulated Emission of Radiation (LASER) is a term that refers to how light is amplified when it is stimulated. Albert Einstein supplied the theoretical platform for the creation of the laser in 1917. T.H. Mainmann invented the first laser apparatus in 1960.

## ➤ Stimulated absorption

Let  $E_1$  and  $E_2$  be the energies of an atom's ground and excited states, respectively. If a photon with the energy  $E_2 - E_1 = h\nu$  combines with an atom in the ground state, the atom will be stimulated from the ground state  $E_1$  to the excited state  $E_2$ . This is known as stimulated absorption.



The number of atoms present in the lowest energy level, and also the energy density photons, determine the rate of stimulated absorption. Quantity of atoms in the ground state at the stimulated absorption level Photon density is a measure of how many photons are present in a given area.

## ➤ Spontaneous emission

Bohr proposed the idea of spontaneous emission. Let  $E_1$  and  $E_2$  be the energies of an atom's ground and excited states, respectively. If a photon with the energy  $E_2 - E_1 = h\nu$  combines with an atom in the ground state, the atom will be excited from the ground state  $E_1$  to the excited state  $E_2$ .

# Engineering Physics Laser Notes

**Marco Casella**



## Engineering Physics Laser Notes:

**Lasers and Optical Engineering** P. Das, Pankaj K. Das, 1991 A textbook on lasers and optical engineering should include all aspects of lasers and optics however this is a large undertaking The objective of this book is to give an introduction to the subject on a level such that under graduate students mostly juniors seniors from disciplines like electrical engineering physics and optical engineering can use the book To achieve this goal a lot of basic background material central to the subject has been covered in optics and laser physics Students with an elementary knowledge of freshman physics and with no formal courses in electromagnetic theory should be able to follow the book although for some sections knowledge of electromagnetic theory the Fourier transform and linear systems would be highly beneficial There are excellent books on optics laser physics and optical engineering Actually most of my knowledge was acquired through these However when I started teaching an undergraduate course in 1974 under the same heading as the title of this book I had to use four books to cover the material I thought an electrical engineer needed for his introduction to the world of lasers and optical engineering In my sabbatical year 1980 1981 I started writing class notes for my students so that they could get through the course by possibly buying only one book Eventually these notes grew with the help of my undergraduate and graduate students and the final result is this book

Lasers and Optical Engineering Pankaj K. Das, 2012-12-06 A textbook on lasers and optical engineering should include all aspects of lasers and optics however this is a large undertaking The objective of this book is to give an introduction to the subject on a level such that under graduate students mostly juniors seniors from disciplines like electrical engineering physics and optical engineering can use the book To achieve this goal a lot of basic background material central to the subject has been covered in optics and laser physics Students with an elementary knowledge of freshman physics and with no formal courses in electromagnetic theory should be able to follow the book although for some sections knowledge of electromagnetic theory the Fourier transform and linear systems would be highly beneficial There are excellent books on optics laser physics and optical engineering Actually most of my knowledge was acquired through these However when I started teaching an undergraduate course in 1974 under the same heading as the title of this book I had to use four books to cover the material I thought an electrical engineer needed for his introduction to the world of lasers and optical engineering In my sabbatical year 1980 1981 I started writing class notes for my students so that they could get through the course by possibly buying only one book Eventually these notes grew with the help of my undergraduate and graduate students and the final result is this book

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