

LASER FUNDAMENTALS FOR THE APPLICATIONS IN PHOTOSCIENCE

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Brief explanation is given about the fundamentals of the laser including laser sources, beam characteristics, beam manipulation, beam transport, beam detection, light-material interaction, and some examples of laser applications. Principles of laser light emission is reviewed and the types of lasers are summarized. Laser beam is characterized by its wavelength, bandwidth, power, phase, energy, polarization, degree of coherence, divergence, uniformity, pulse length, repetition rate, and so on. Laser beam is transported through the open space or through the optical fiber. It is possible to manipulate the laser beam by making changes in spectral, spatial, and temporal characteristics of the beam. Detection of the light signal is encountered at every corner of the photoscience research; therefore it is desirable to know about the detection mechanism, types and characteristics of the photodetectors. Interaction of light with material is reviewed in the limited scope such as Doppler shift in the scattering, electronic excitation including ionization, rotational or vibrational transition, nonlinear harmonic generation, and down conversion. Some examples are introduced in the applications of the laser to physical, chemical, and biological sciences.