

Uses of a Laser Beam

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Abstract:

This article is about the applications of a laser beam in various fields such as communication science, biology, medicine etc.

In Technical and Industrial Fields:

The laser beam is used for cutting fabrics for clothing in one hand, and steel sheets on the other. It can drill minute holes in paper clips, single hair strand and hard materials including teeth and diamond. Extremely fine wires in cables are drawn through diamond hole. Laser welding melts and joins metallic rods. Laser heat treatment can harden surfaces of engine crankshafts and the cylinder walls. Laser beam is used to vaporize unwanted materials during manufacture of electronic circuits on semiconductor chips.

In the **medical field**, the laser beam is used for 'spot weilding' of detached retina, in grafting cornea, in drilling holes in bones, in destroying specific cancerous areas within tissues, in bloodless surgery like vocal cord

operation, stomach ulcers, kidney stones, during brain operation small blood vessels that are cut and require sealing and while performing microsurgery on cells and chromosomes.

In **Science and Research**, laser is a incredibly helpful tool. In Raman spectroscopy, Hg-arcs are being fast replaced by He-Ne lasers. In spectroscopy, multi-photon processes are being studied in determining the symmetry of wave functions involved in various transitions, with laser. Experiments with Michelson's interferometer using laser show that fringes are obtained even with path difference of 9m, confirming the temporal coherence of laser. Laser is also being used in ionization and dissociation studies of gases, in kinetic studies of fast reactions, in spectrochemical analysis of solids in conjunction with mass and emission spectrometer and in investigation of energy transfer by exciting a specific vibration level and observing its decay in polyatomic molecules. Using laser pulses lasting a few femtoseconds chemists can follow the detailed evolution of chemical reactions.

Other uses are : 'inertial confinement' of plasma, optical radar, detection and

destroying missiles of enemies and aiming at the night at potential enemies, laser rifles, laser pistols and laser bombs are also being made; detection of nuclear explosions and earthquakes, vaporization of solid fuel of rockets and study of the surfaces of distant planets and satellites accurate measurements of very long distances.

Reference:

Modern atomic and nuclear physics—
A.B. Gupta.

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