

## FROM THE HISTORY OF LASERS

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A **laser** is a quantum-mechanical device that produces coherent radiation. A laser is composed of an active laser medium, or gain medium, and a resonant optical cavity. The gain medium transfers external energy into the laser beam. It is a material of controlled purity, size, concentration, and shape, which amplifies the beam by the quantum mechanical process of stimulated emission, predicted by Albert Einstein, while he studied the photoelectric effect. The gain medium is energized, or pumped, by an external energy source.

Some types of lasers, such as dye lasers and vibronic solid-state lasers can produce light over a broad range of wavelengths; this property makes them suitable for generating extremely short pulses of light, on the order of a few femtoseconds ( $10^{-15}$  s).

It is understood that the Acronym Light Amplification by Stimulated Emission of Radiation is typically used in the expansive sense, as photons of any energy; it is not limited to photons in the visible spectrum. Hence there are infrared lasers, ultraviolet lasers, X-ray lasers, etc. For example, a source of atoms in a coherent state can be called an atom laser. Because the microwave equivalent of the laser, the maser, was developed first, devices that emit microwave and radio frequencies are usually called masers. In early literature, particularly from researchers at Bell Telephone Laboratories, the laser was often called the optical maser. This usage has since become uncommon, and as of 1998 even Bell Labs uses the term laser.

The term "laser" was first introduced to the public in Gould's 1959 conference paper "The LASER, Light Amplification by Stimulated Emission of Radiation". The first working laser was made by Theodore H. Maiman in 1960 at Hughes Research Laboratories in Malibu, California, beating several research teams including those of Townes at Columbia University, Arthur L. Schawlow at Bell Labs, and Gould at a company called TRG (Technical Research Group). Maiman used a solid-state flashlamp-pumped synthetic ruby crystal to produce red laser light at 694 nanometres wavelength. Maiman's laser, however, was only capable of pulsed operation due to its three energy level pumping scheme.

When lasers were invented in 1960, they were called "a solution looking for a problem". Since then, they have become ubiquitous, finding utility in thousands of highly varied applications in every section of modern society, including consumer electronics, information technology, science, medicine, industry, law enforcement, entertainment, and the military.

In addition to movies and popular culture, laser misconceptions are present in some popular science publications or simple introductory explanations.

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