

Welcome to LaserFest!



www.LaserFest.org



Light Amplification by Stimulated Emission of Radiation

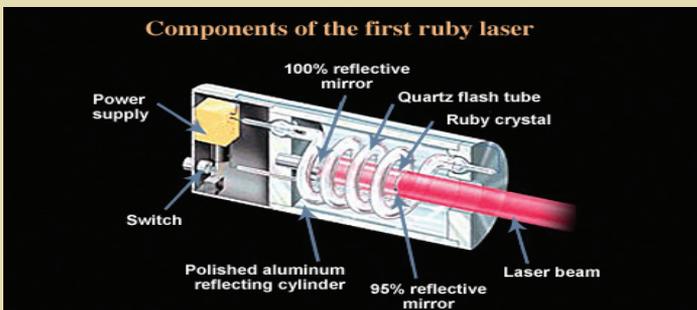
LASER



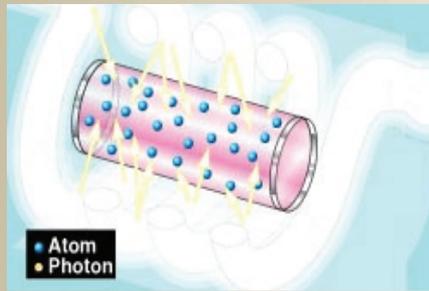
THE WORLD'S FIRST RUBY LASER was invented by Theodore Maiman in 1960. Ruby crystal is composed of aluminum oxide, where some of the aluminum atoms have been replaced with chromium atoms. Chromium gives the ruby its vibrant red color. In a ruby laser, a ruby crystal is formed into a cylinder. A fully reflecting mirror is placed on one end and a partially reflecting mirror on the other. A high-intensity lamp is spiraled around the ruby cylinder to provide a flash of white light that triggers the laser action.

The green and blue wavelengths in the flash excite electrons in the chromium atoms to a higher energy level. Upon returning to their normal state, the electrons emit their characteristic ruby-red light. The mirrors reflect some of this light back and forth inside the ruby crystal, stimulating other excited chromium atoms to produce more red light, until the light pulse builds up to high power and drains the energy stored in the crystal—this produces what we typically think of as “laser light”.

Although many different types of lasers have been invented since Maiman's device, the ruby laser is still used, mainly as a light source for medical and cosmetic procedures, and also in high speed photography and pulsed holography.



How the Ruby Laser Works



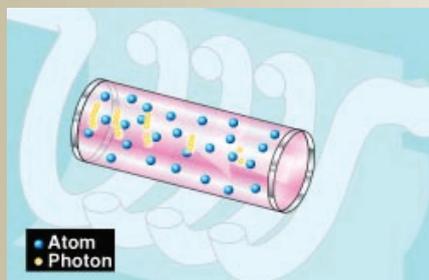
1.

High-voltage electricity causes the quartz flash tube to emit an intense burst of light, exciting some of the atoms in the ruby crystal to higher energy levels.



2.

At a specific energy level, some atoms emit particles of light called photons. At first the photons are emitted in all directions. Photons from one atom stimulate emission of photons from other atoms and the light intensity is rapidly amplified.



3.

Mirrors at each end reflect the photons back and forth, continuing this process of stimulated emission and amplification.



4.

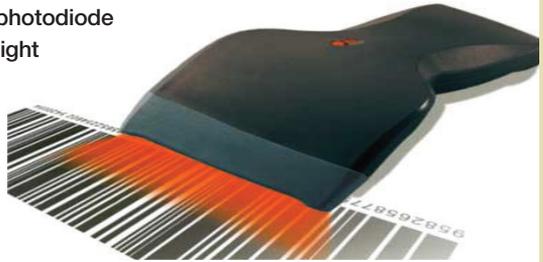
The photons leave through the partially silvered mirror at one end. This is laser light.



**LIGHT
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THEN . . .

In 1974, the first public laser was introduced in the BarCode scanner found at supermarkets. BarCode scanners use a laser beam that is scanned back and forth so rapidly that it appears as a line to the human eye. A photodiode measures the intensity of the light reflected back from the black and white BarCode pattern, generating a signal that is used to measure the widths of the bars and spaces in the BarCode.



A 10-pack of Wrigley's chewing gum was the first product logged in a grocery store by a BarCode scanner, on June 26th 1974.

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**For more information about
the 50th anniversary of the laser,
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