OSA Publishing Applied Optics Volume 1 Issue 3 Page 339

High-Speed Sequence Photography of a Ruby Laser

E. S. Dayhoff and B. Kessler

Applied Optics Vol. 1, Issue 3, pp. 339-341 (1962) • https://doi.org/10.1364/AO.1.000339

Abstract

The sequence of phenomena occurring when a ruby laser crystal is flashed is studied on a microsecond time scale by means of a high-speed framing camera making about 500,000 frames per second. Two runs of photographs are presented. The individual bursts of light constituting the laser flash show the following characteristics: Each burst involves the whole active volume of the crystal; each burst shows a grainy or flocculated distribution of light across the face of the crystal, and this distribution changes in fine detail from frame to frame; the grains of brightness are often arranged in stripes and bands in patterns which change from frame to frame; there are some permanently dark regions; there are some pinholes in the silver coating which scatter an appreciable amount of light out of the main beam.

Full Article | PDF Article

A ruby-laser is a solid-state laser that employs a synthetic ruby crystal as its gain medium. The first ruby laser was developed by Theodore H. "Ted" Maiman at Hughes Research Laboratories in 1960. It produces pulses of red visible light at a wavelength of 694.3 nm. The active laser medium, synthetic ruby is energized by optical pumping through a xenon flashtube. In a ruby laser, a ruby crystal is formed into a cylinder. Although several lasers have been discovered since Maiman's device, the ruby laser is still used, commonly in high speed photography and pulsed holography, and as a light source for medical and cosmetic procedures. Laser Properties. Laser Properties. Ruby lasers are useful for high-speed photography and pulsed holography, for example, in a spinning-disk holographic device developed at North Dancer Labs (Shelburne, VT) that imaged projectile impacts at 500 kHz (see Laser Focus World, August 1999, p. 16). A ruby laser built by Continuum (Santa Clara, CA) and Physical Sciences (PSI; Andover, MA) was used to photograph munitions impacts at 1 MHz, although the follow-on laser, which had a 100-MHz capability, was an Nd:YAG (see Laser Focus World, June 2002, p. 40). ■ Atmospheric particles measured via laser photography. ■ Radiation source provides high-intensity light. ■ Blue-green laser