

Laser Q-Switching, Mode Locking, and Frequency Doubling

Module 2-1

of

Course 2, *Laser Systems and Applications*

2nd Edition



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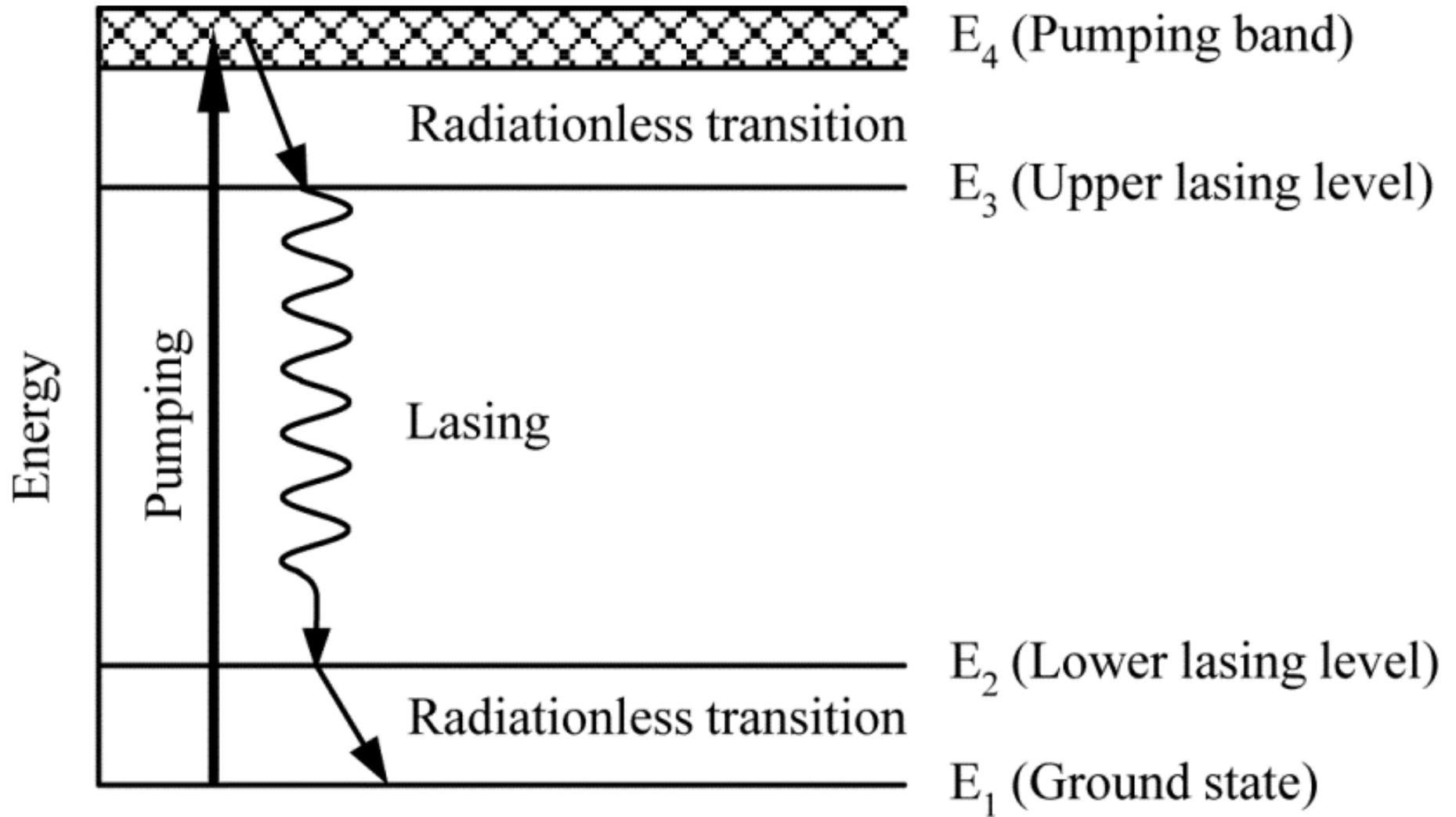


Figure 1-1 *Simplified energy-level diagram of four-level solid state laser*

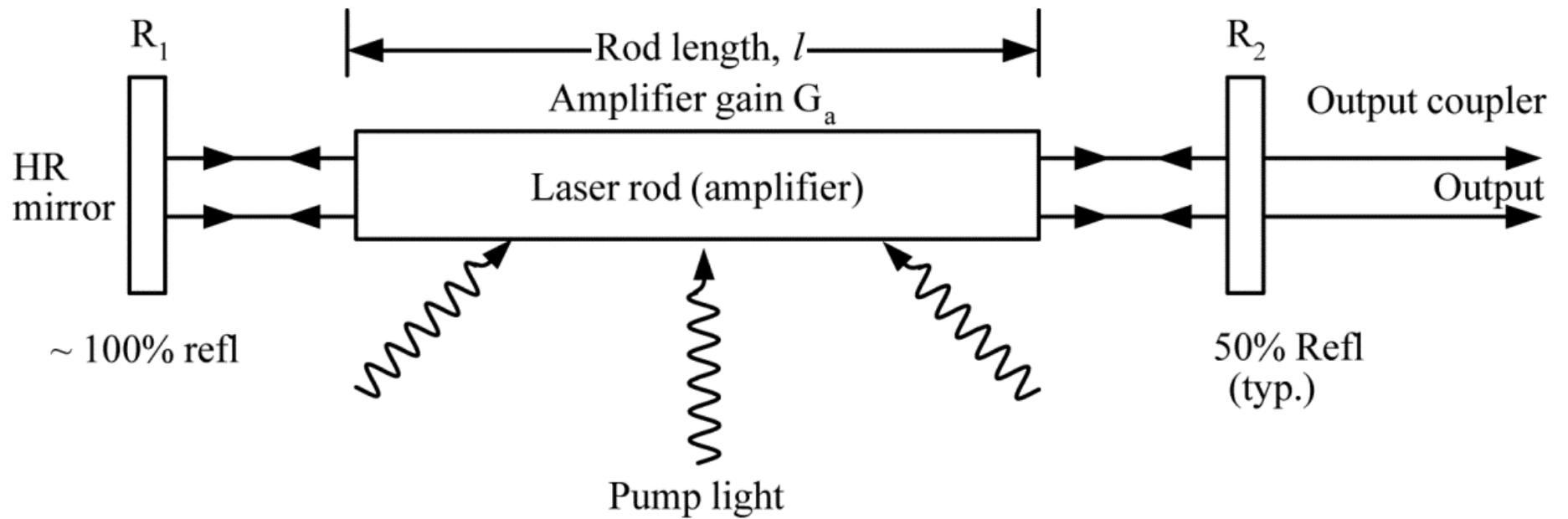


Figure 1-2 *Diagram of a normal mode, pulsed laser*

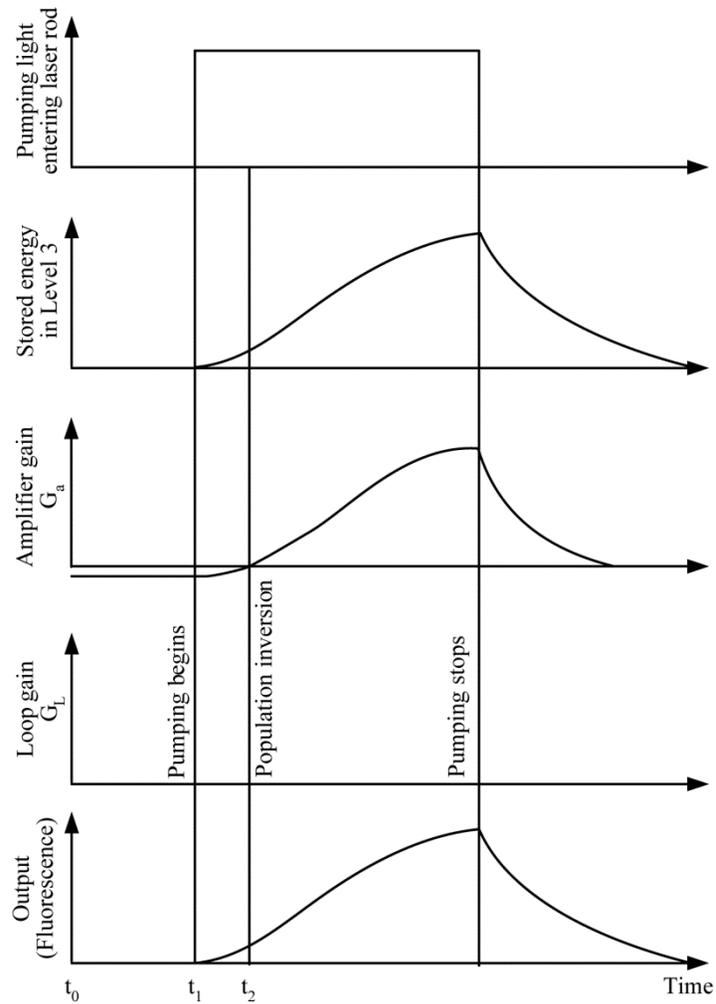


Figure 1-3 *Time history of laser parameters during pulse pumping; no feedback mirrors in laser*

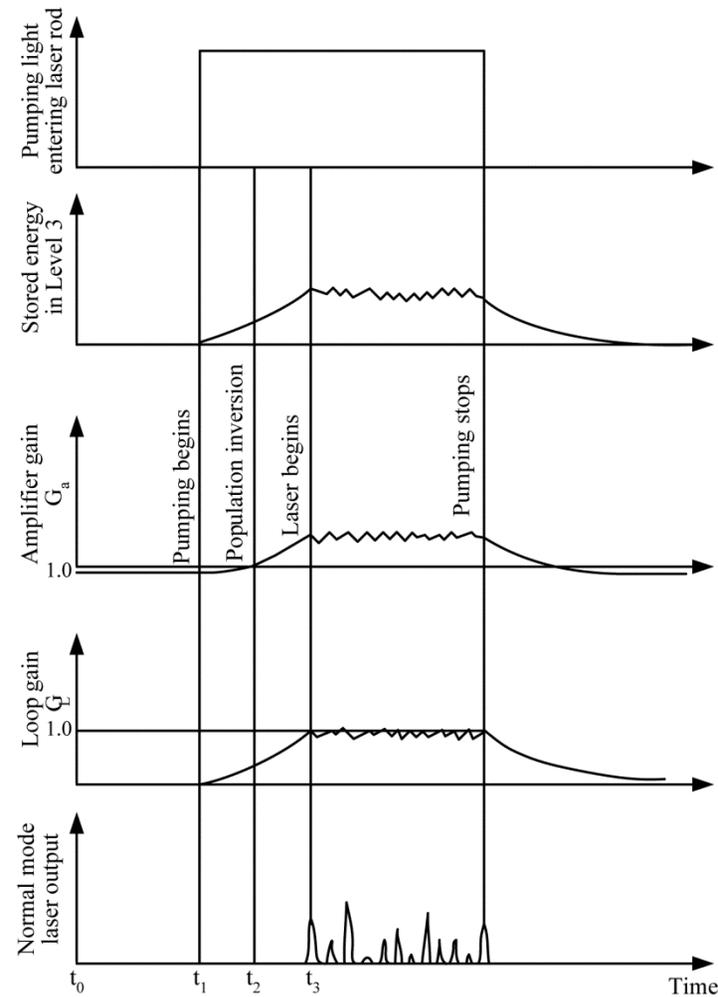


Figure 1-4 *Time history of laser parameters during pulse pumping, normal mode operation—three-level laser material*

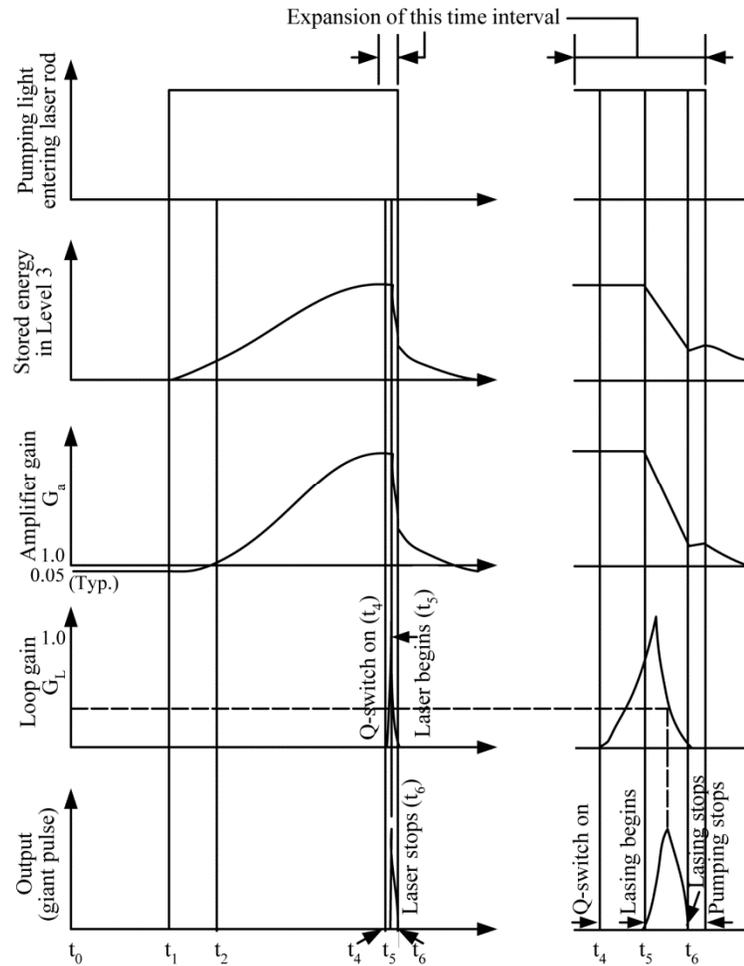


Figure 1-5 *Time history of laser parameters during pulse pumping and Q-switching*

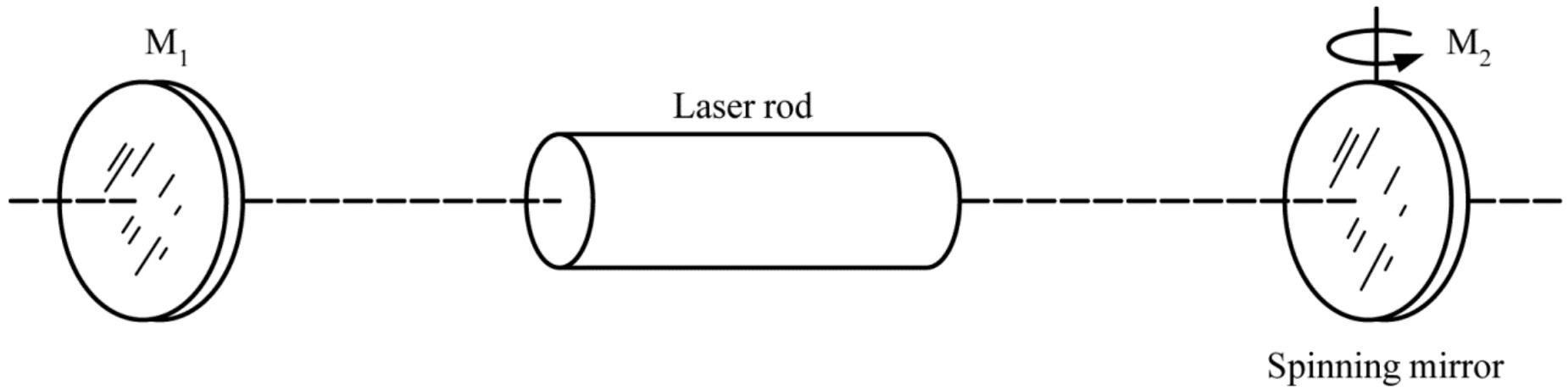


Figure 1-6 *Mechanical Q-Switch (spinning mirror)*

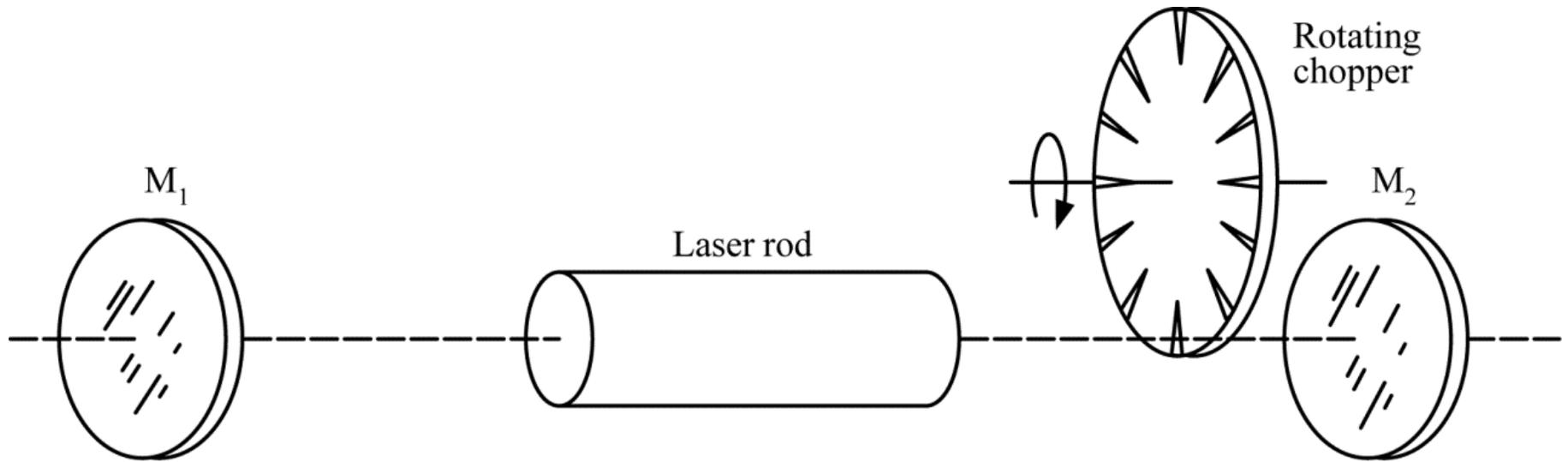


Figure 1-7 *Mechanical Q-Switch (rotating chopper)*

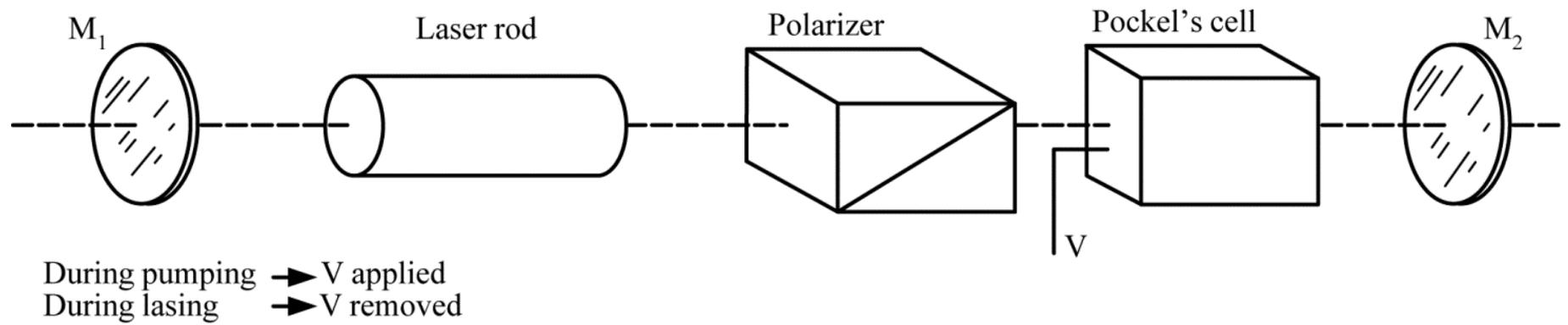


Figure 1-8 *Electro-optic Q-switch*

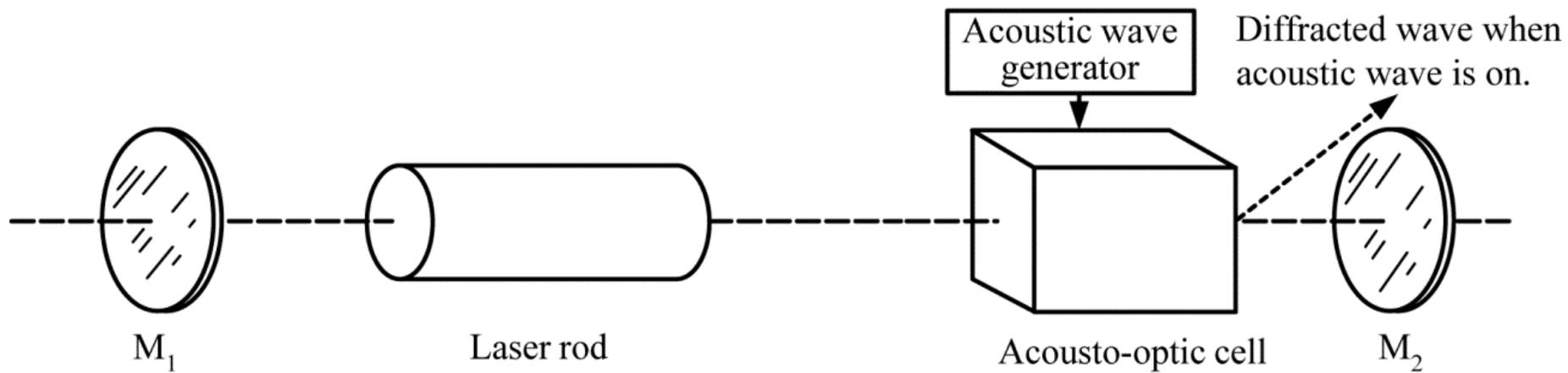


Figure 1-9 *Acousto-optic Q-switch*

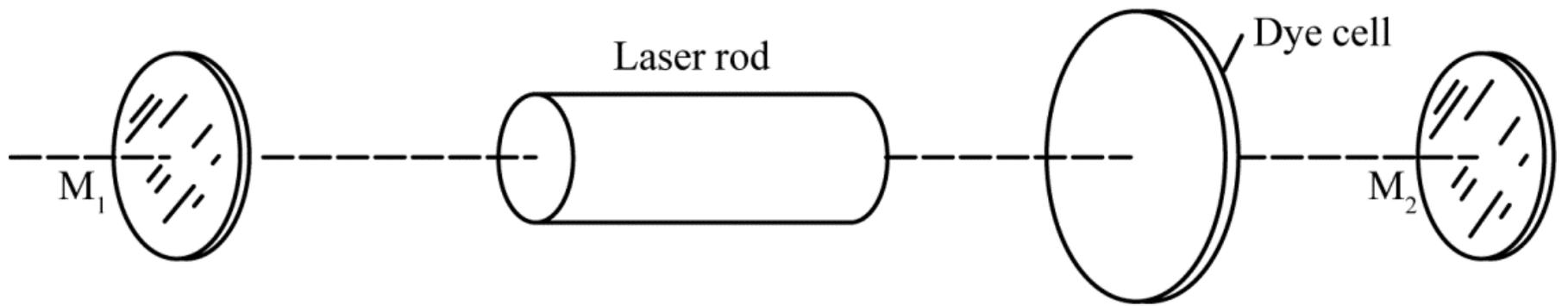


Figure 1-10 *Bleachable-dye Q-switch*

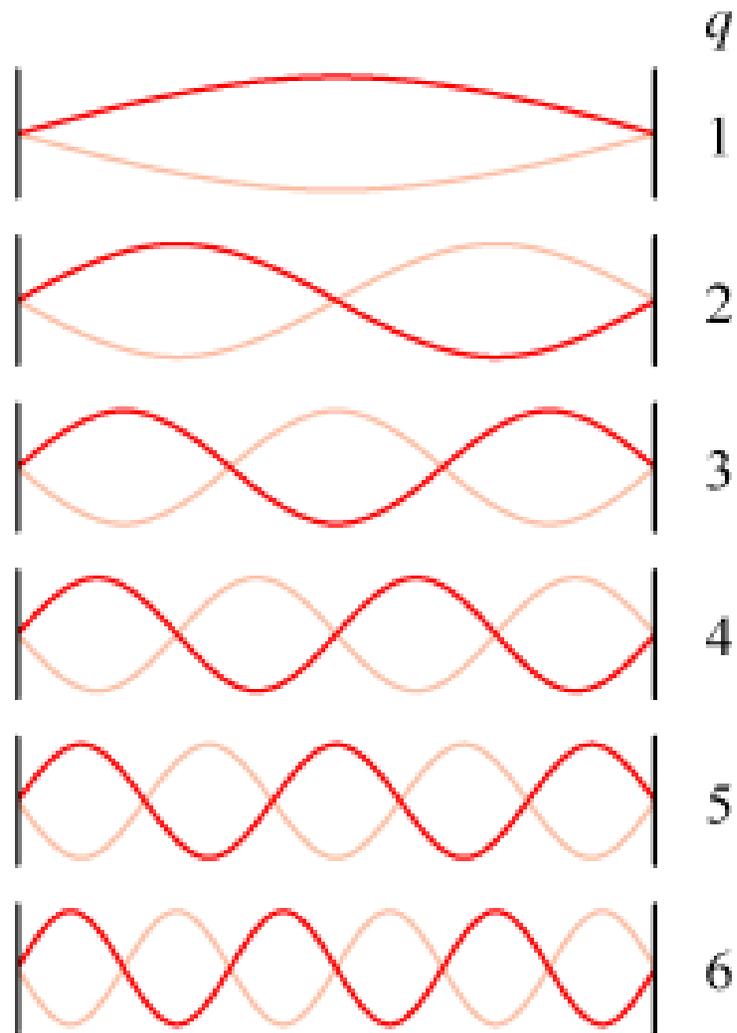


Figure 1-11 *Longitudinal modes in a cavity*

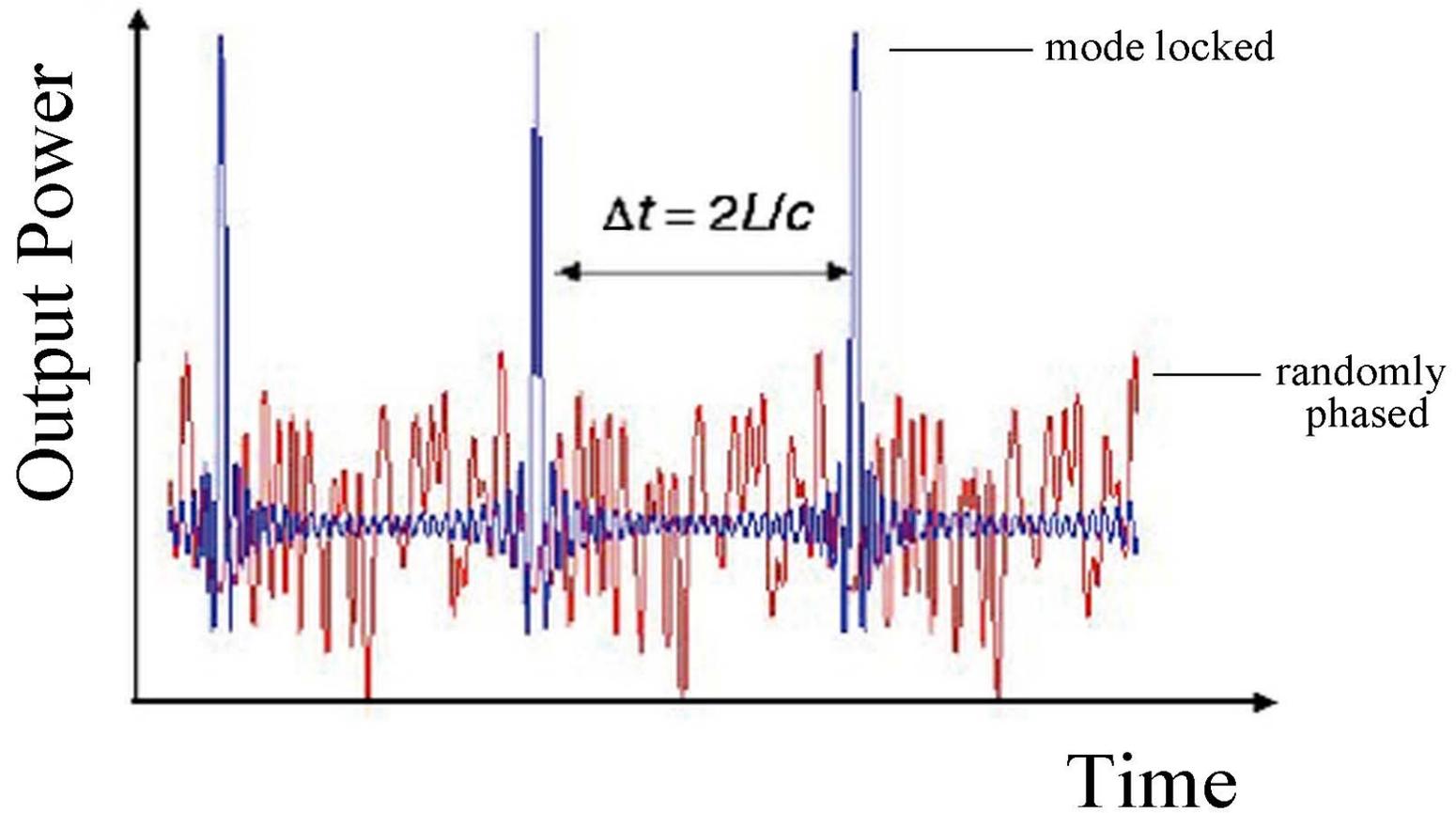


Figure 1-12 *Mode locked and random phased laser output*

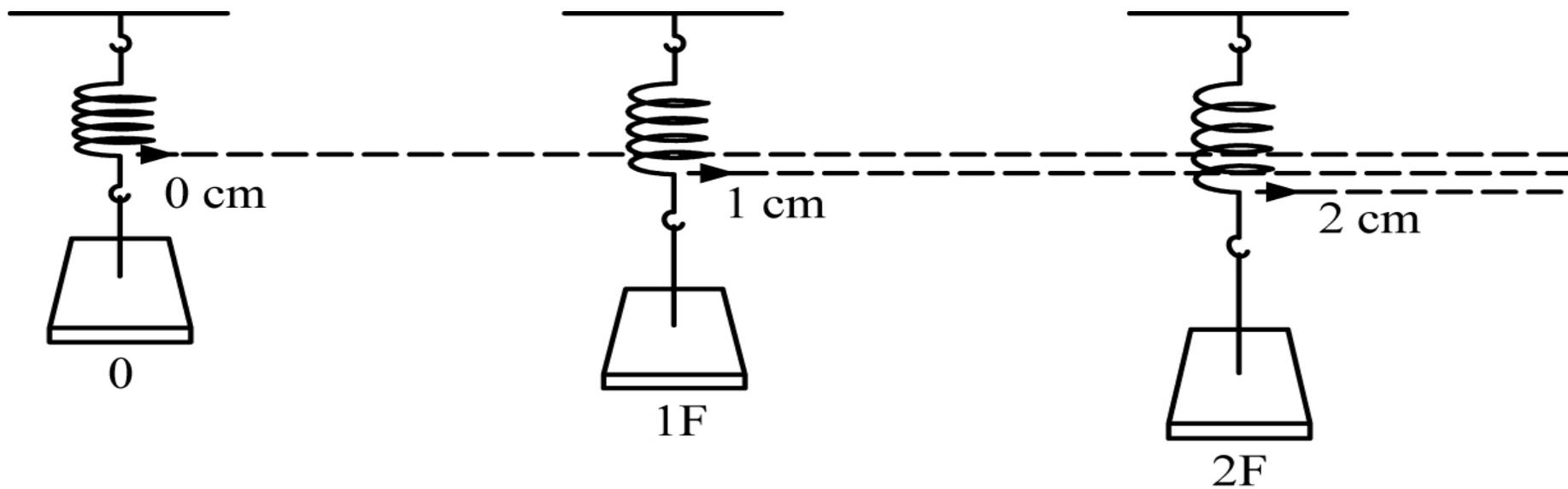


Figure 1-13 *Linear displacement of a spring*

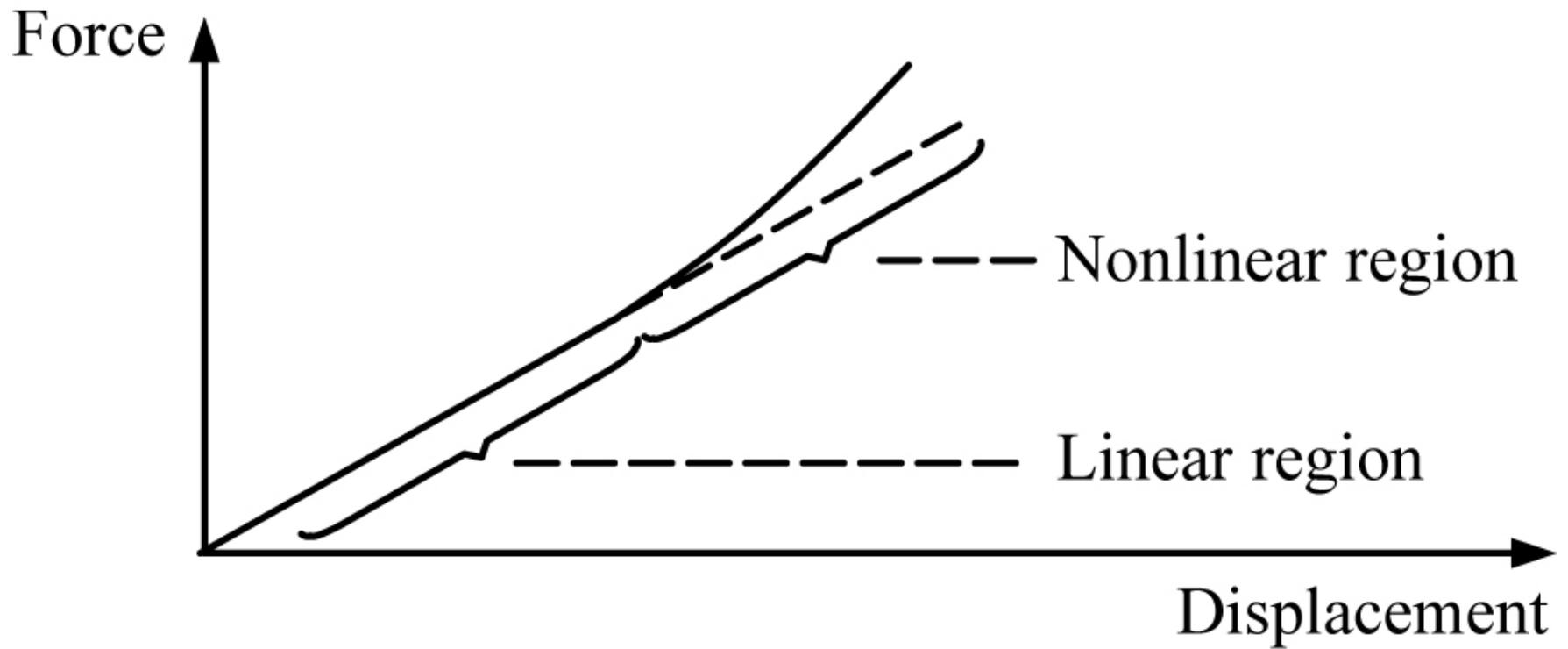


Figure 1-14 *Linear and nonlinear behavior of a stretched spring*

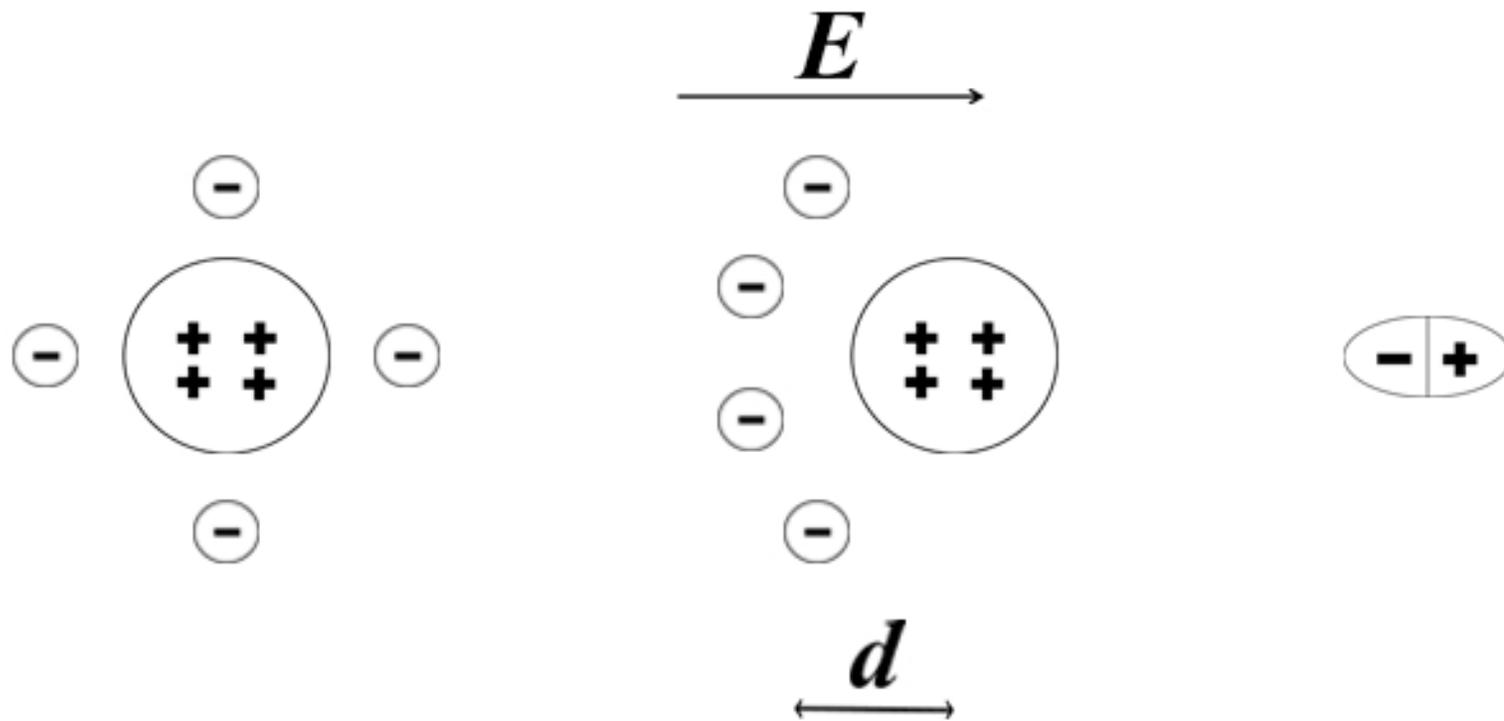


Figure 1-15 *Generation of a dipole*

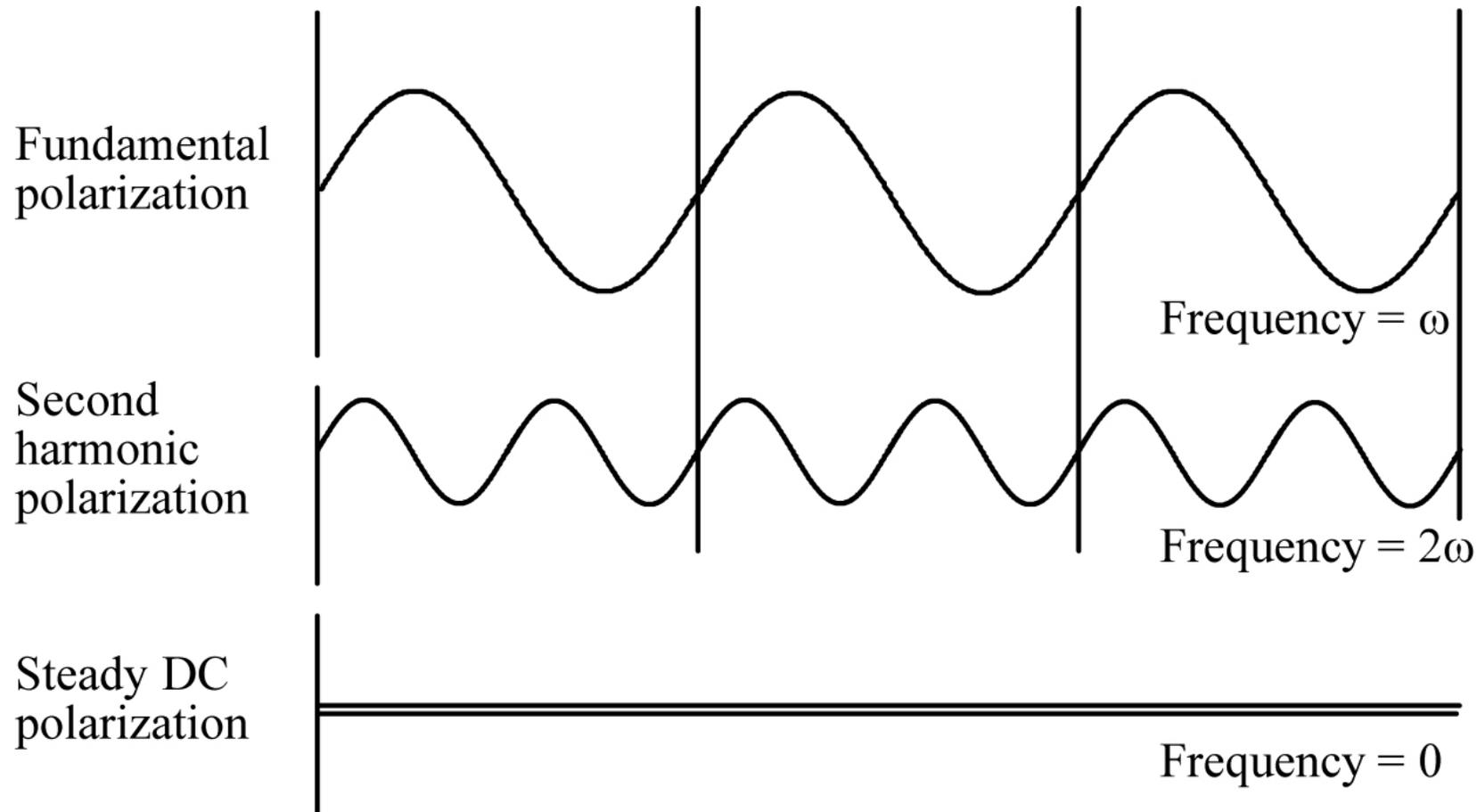


Figure 1-16 *Frequency associated with charge-polarization term*

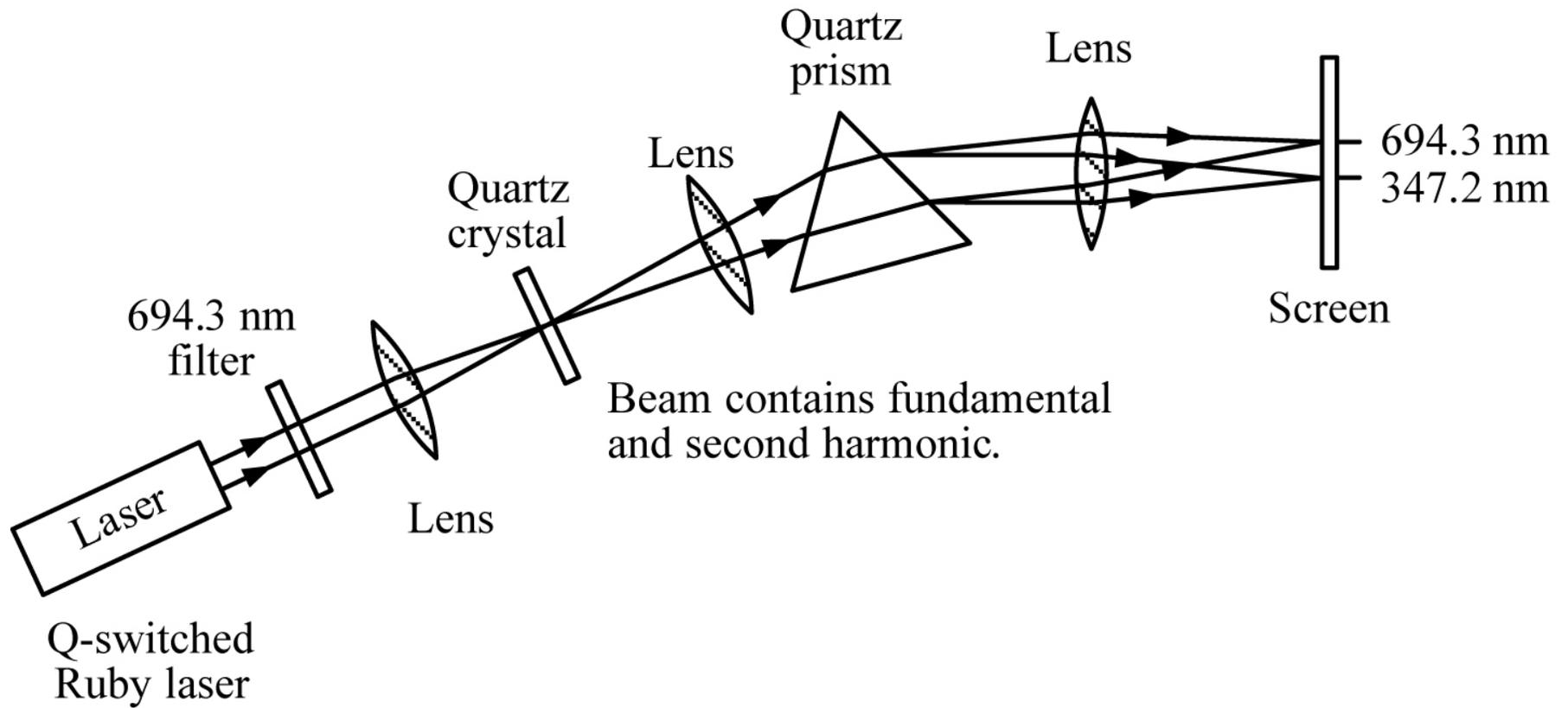


Figure 1-17 *Experimental arrangement for second harmonic generation*

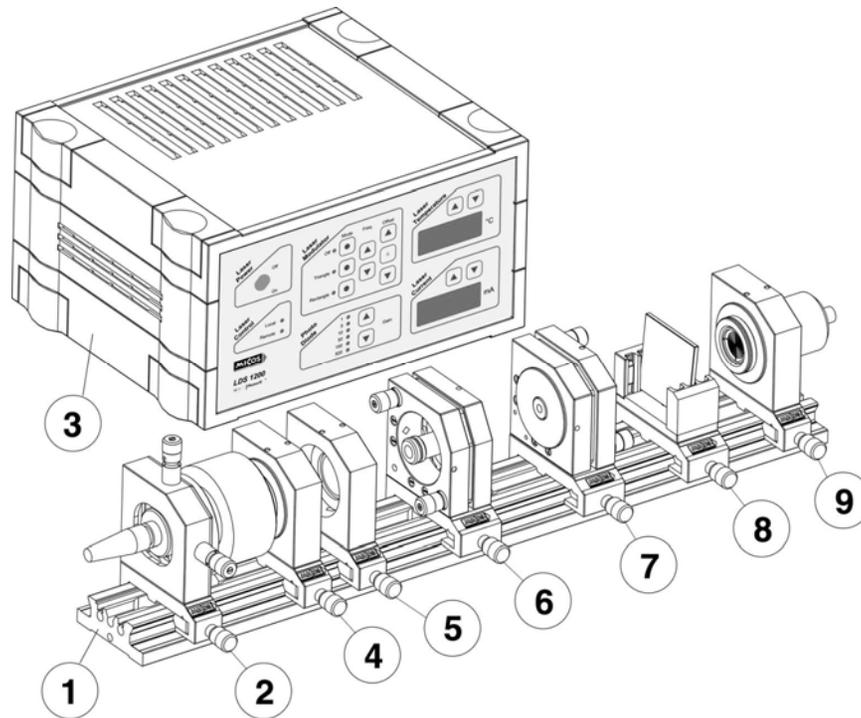


Figure 1-18 *Experimental setup and components of a diode pumped Nd:YAG laser. Part 1: Flat rail 500 mm with scale; Part 2: Laser diode 450 mW in X-Y adjustment holder; Part 3: Diode laser power supply LDS 1200; Part 4: Beam shaping optics in holder on carrier; Part 5: Beam focusing in holder on carrier; Part 6: Nd:YAG crystal in holder adjustable on carrier; Part 7: Laser mirror holder adjustable on carrier; Part 8 Filter holder on carrier with filter RG1000; and Part 9: Photo detector in holder on carrier and an adjustment target. (Courtesy of PI miCos)*

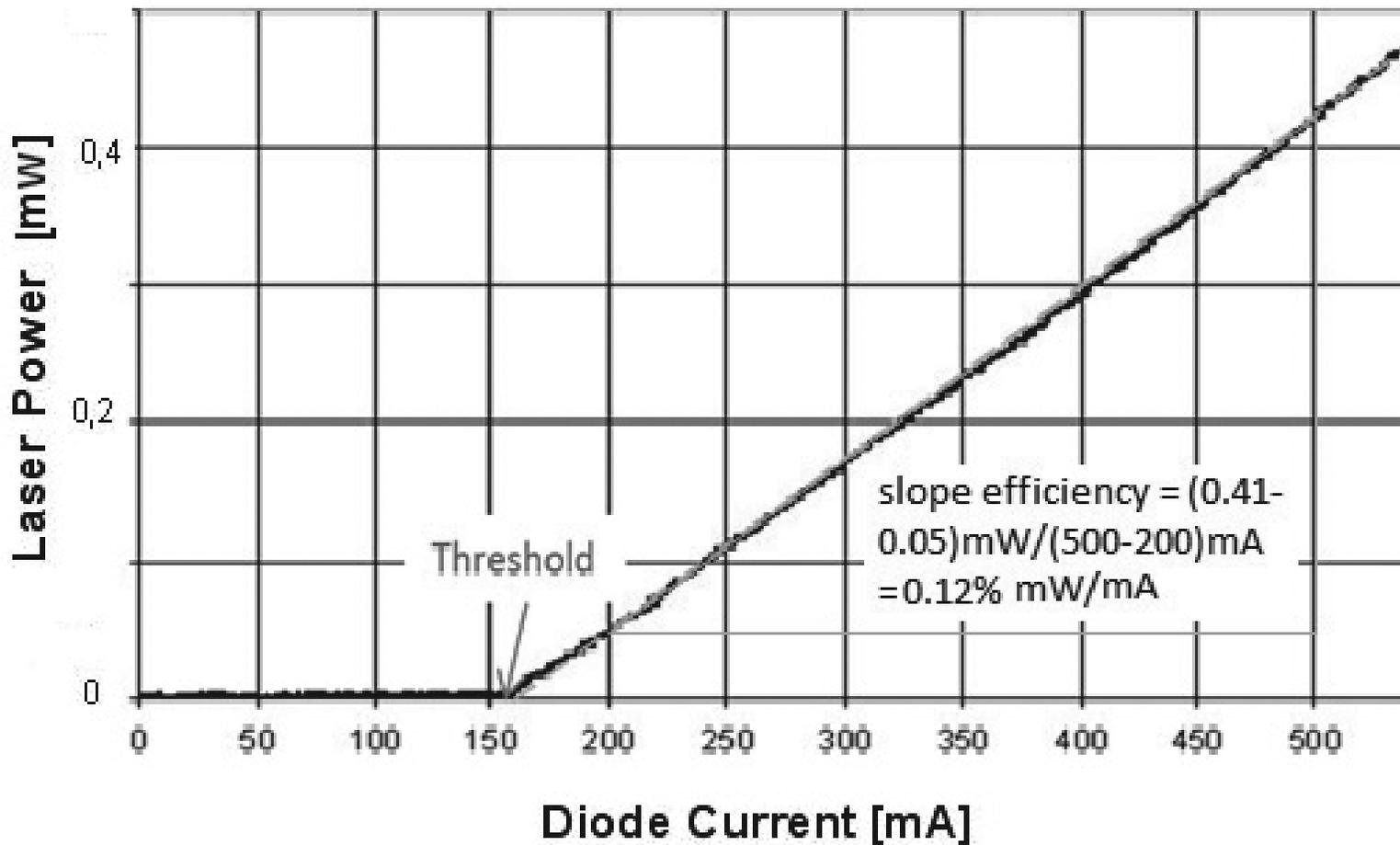


Figure 1-19 *An example of the diode laser optical output power versus drive current*