MTW Regen Overview

The regenerative Nd:YLF amplifier (regen) is a key subsystem for providing high gain at 1053 nm with a TEM_{00} Gaussian output spatial beam profile. A fiber-coupled, continuous-wave diode array works well in the pulsing regime for end pumping the Nd:YLF crystal. Two 25-W or one 50-W fiber-coupled diode arrays are used with a center wavelength of 805 nm, and the pump is delivered to the regen module via a 3-m-long, 800-μm-core step-index multimode fiber. The radial symmetry of the fiber output after collimation enables the pumped region to be matched to resonator's fundamental mode in the crystal.

The regen has a linear, semi-confocal, 2-m-long folded resonator with the switching time of the Pockels cell < 9 ns. The round-trip number of 64 is fixed and chosen as a compromise between higher output energy and lower pulse distortion. The maximum output energy at 2.8 ns pulse is 6°mJ. Excellent long-term (24-h) output-pulse-energy stability of better than 1% rms fluctuation has been achieved with excellent beam quality (<1% ellipticity).