# MTW-OPAL: A TECHNOLOGY DEVELOPMENT PLATFORM FOR ULTRA-INTENSE LASERS AND APPLICATIONS

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Optical parametric chirped-pulse amplification (OPCPA) provides broadband gain for large-aperture beams by using Nd:glass lasers to pump deuterated potassium dihydrogen phosphate (DKDP) crystals [1]. Scaling to kilojoule energies would enable focused intensities exceeding $10^{23}$ W/cm$^2$ with 20-fs pulses. A mid-scale optical parametric amplifier line (OPAL) pumped by the Multi-Terawatt laser (MTW) is being constructed to produce 7.5-J, 15-fs pulses and demonstrate technologies that are suitable for a kilojoule system pumped by OMEGA EP. The laser will share Nd:glass amplifiers and target area with the existing MTW Laser System (50 J, 1 to 100 ps), making it possible to perform several joint-shot configurations. In parallel, a novel Raman plasma amplifier is being developed; MTW is the picosecond pump laser and MTW-OPAL provides a tunable femtosecond seed.

A schematic of the laser system is shown in Fig. 1. The ultra-broadband front end (UFE) consists of a white-light continuum seed that is amplified by a three noncollinear optical parametric amplifiers (NOPA's). The pulses are stretched to 1.5 ns before further amplification in NOPA4. The radial group delay of the lens-based image relays is compensated before the final DKDP amplifier, NOPA5, which is pumped by MTW using three switchyards to provide narrowband pump pulses at 526.5 nm. The pulses are compressed and transported to a joint target chamber.

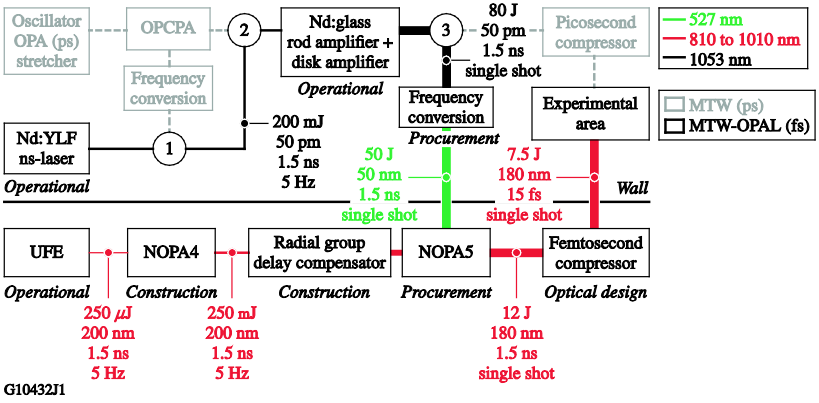


Fig. 1. The MTW-OPAL system in relation to the existing MTW laser.

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[1] Lozhkarev V.V. *et al.* 2005 *Laser Phys.* **15** 1319