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# Overview of optical fiber and fiber laser R&D at Lawrence Livermore Laboratory

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Lawrence Livermore National Laboratory has an active and robust program in fiber lasers and optical fiber research and development. In this talk an overview of former and current research projects will be presented. We have developed a 10 W, 589 nm fiber laser system based upon sum frequency mixing the out of high power 938 nm and 1583 nm fiber lasers. We have performed analyses of power scaling limits of single aperture, diffraction limited fiber lasers and understood the physical mechanisms that limit scaling beyond 10 s of kW. We have developed fiber based injection seed lasers for a number of larger lasers systems particularly the National Ignition Facility and the Mercury laser system. These laser systems create reliable ns and ps pulses for amplification to very high pulse energies in large energetic glass and crystal lasers. We have also developed high energy (mJ-class) sub-picosecond laser systems for frequency conversion to the green and UV for use as photocathode drive lasers for linear accelerators. In 2012, we installed and commissioned an optical fiber draw tower for developing photonic crystal fibers. Our initial efforts in this area focused on development of slab waveguide based fiber lasers. These "ribbon" fiber lasers have the potential to scale beyond the 10 kW limit of conventional round fibers. The author will discuss theoretical and experimental result from this effort and will also present data from other fiber development programs involving the draw tower.

## Biography

Jay W Dawson received his PhD in Applied Physics from California Institute of Technology in 1993. His thesis research was on single frequency fiber lasers. Between 1993 and 2002, he worked for 3M Company and Cidra Corporation performing product development in specialty fibers, fiber lasers, current sensors and fiber Bragg gratings. Since 2002, he led development of fiber laser projects at LLNL. The guide star project produced 10 W of 589 nm light. The short pulse injection seed laser project developed a front end enabling NIF to produce high energy, petawatt pulses. He led a team that has studied fiber laser power scaling.

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