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StarDriver: a Novel, Flexible, Solid-State Laser-Based Architecture for Inertial Confinement Fusion (ICF) D. EIMERL, EIMEX Software and Consulting and Logos Tech LLC, E.M. CAMPBELL, J. ZWEIBACK, Logos Tech LLC, W.F. KRUPKE, WFK Lasers and Logos Tech LLC, J. ZUEGEL, J. MYATT, J. KELLY, D. FROULA, R.L. MCCRORY, Univ. of Roch., Lab for Laser Energetics, W.L. KRUER, Retired — We introduce StarDriver, a novel, flexible, solid-state laser-based architecture for ICF, HED science and possible future energy production. StarDriver is a new approach to ICF that minimizes laser-plasma instabilities and improves laser-plasma coupling by the use of a multi-beam laser architecture with system bandwidth equal or greater than the fastest growing instability.In contrast to traditional and proposed architectures, the laser driver is constructed from 10^4-10^5 individual lasers,each delivering nominally 100J in several ns at a nominal wavelength of $\sim$ 355 nm with better than 3-5 diffraction-limited performance. The beamlets are individually narrowband but the ensemble of beamlets spans a wide frequency range.Currently available laser media enable system bandwidth $\sim$ 2% at 355nm with the possibility of system bandwidths approaching 10%. The many beamlets and large bandwidth of StarDriver provide optimal asymptotic smoothing for hydrodynamic instabilities (0-1%), with smoothing times $\sim$ 30fs. The distribution of frequencies among the beamlets allows flexibility for fine control of the seeding of the Rayleigh-Taylor instability. The ultra-broad bandwidth is greater than the Doppler widths and natural linewidths of plasma excitations in the expanding corona and thus has the potential to suppress or eliminate the most problematic laser-plasma instabilities.

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