The National Ignition Facility Laser Performance Status

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The National Ignition Facility (NIF) at Lawrence Livermore National Laboratory contains a 192-beam 4.2 MJ neodymium glass laser that is frequency converted to 351nm light or 3ω. It has been designed to support the study of Inertial Confinement Fusion (ICF) and High Energy Density Physics (HEDP).

Laser design criteria include the ability to routinely generate pulses up to 1.8-MJ total energy at 351nm, with peak power up to 500 TW and precisely-controlled temporal pulse shapes with intensities that span two orders of magnitude [1]. The focal spot fluence distribution of these pulses is conditioned, through a combination of continuous phase plates in the 526.5nm section of the laser, smoothing by spectral dispersion, and the overlapping of multiple beams with orthogonal polarizations.

During this talk, the current laser performance obtained for a wide range of energies, powers and durations requested for target shots will be reviewed. Moreover, the methods put in place to monitor the health and perform updates of the 192 laser models to meet the required accuracy of the delivered pulses at target chamber center will be discussed. We have also recently completed a set of limited tests at elevated energies on a single NIF quad, that are designed to assess laser performance limits and operational costs against predictive models. Results of these tests will also be discussed.

References

[1] M. L. Spaeth *et al*., Fusion Science and Technology **69** 366-394 (2016)

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