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Results and Diagnostic Technologies from the U.S. National Ignition Facility

The National Ignition Facility (NIF) at the Lawrence Livermore National Laboratory (LLNL) is the world's largest and most energetic laser system. The NIF is built to create very extreme states of matter - temperatures more than 100 million K and pressures more than 100 billion atmospheres - conditions emulating those found in the interiors of stars and planets. One of the main NIF campaigns is focused on demonstrating thermonuclear burn in the laboratory by laser inertial fusion. Rapid progress is being made, with recent experiments demonstrating fuel gains > 1 (more fusion energy generated than delivered to the fuel) and significant alpha heating. The diagnostic suite is an impressive one - with over 60 instruments simultaneously recording x-rays, gamma rays, optical signals and neutrons to explore the physics of inertial fusion. We will discuss these diagnostic technologies and the accompanying target platforms that have made these advances possible.

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