

Plans and Progress Toward an Upgraded Diagnostic Suite for the Z-facility

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Across more than two decades of intense work the High-Temperature Plasma Diagnostic community has delivered advanced diagnostic systems that ultimately guided the pursuit of ignition on the National Ignition Facility. A focused effort is underway to implement similar diagnostics at the Z-facility through a multi-lab collaboration primarily involving Sandia National Laboratories, Lawrence Livermore National Laboratory, and Los Alamos National Laboratory. Our goal is to fill in specific measurement gaps identified for magnetic direct drive fusion targets. Key investments are being made into several diagnostics: gamma reaction history, two-dimensional neutron imaging, multi-line-of-sight neutron time-of-flight, x-ray streak measurements, and x-ray backlighting. These capabilities will provide critical insight into the stagnation plasmas generated by imploding targets. This effort not only supports the current needs of today but also anticipates the needs for a major upgrade to the Z facility that would double the power and energy coupled to a target. This upgrade is expected to increase the thermonuclear yield and enable self-heating of the plasma, the detection of which will require advanced diagnostics. This talk will describe the approach, development plans, and the progress toward advancing these measurements.

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