

Novel DT-neutron activation diagnostics for increased neutron yield operations at Sandia's Z-Facility

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As inertial confinement fusion (ICF) experiments at Sandia National Laboratories Z-Facility begin using deuterium-tritium (DT) fuels, the expected DT-neutron yields are expected to increase many orders of magnitude. This brings about the need for diagnostics that have a significantly higher dynamic range of operation and ability to obtain yields where there will be significant radiation holds. Using the current activation diagnostic infrastructure at the Z-facility, a pair of activation diagnostics are being developed. The first is fluorine activation, which will be used in a similar manner to current copper activation diagnostics that are fielded in a rabbit for quick removal from the experiments without opening the vacuum experiment containment. The second is a prompt DT-neutron detector that exploits the activation of oxygen with similar operation characteristics as the current Be-probes fielded at Z. We will discuss the design of this pair of instruments, along with calibration work performed at Sandia's Ion Beam laboratory in support of the development and anticipated instrument performance.

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