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Advanced Scintillator Detectors for Neutron Imaging in Inertial Confinement Fusion VERENA GEPPERT-KLEINRATH, CHRISTOPHER DANLY, FRANK MERRILL, RASPBERRY SIMPSON, PETR VOLEGOV, CARL WILDE, Los Alamos National Laboratory — The neutron imaging team at Los Alamos National Laboratory (LANL) has been providing two-dimensional neutron imaging of the inertial confinement fusion process at the National Ignition Facility (NIF) for over five years. Neutron imaging is a powerful tool in which position-sensitive detectors register neutrons emitted in the fusion reactions, producing a picture of the burning fuel. Recent images have revealed possible multi-dimensional asymmetries, calling for additional views to facilitate three-dimensional imaging. These will be along shorter lines of sight to stay within the existing facility at NIF. In order to field imaging capabilities equivalent to the existing system several technological challenges have to be met: high spatial resolution, high light output, and fast scintillator response to capture lower-energy neutrons, which have scattered from non-burning regions of fuel. Deuterated scintillators are a promising candidate to achieve the timing and resolution required; a systematic study of deuterated and non-deuterated polystyrene and liquid samples is currently ongoing. A test stand has been implemented to measure the response function, and preliminary data on resolution and light output have been obtained at the LANL Weapons Neutrons Research facility.

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