Calibration of the NIF Neutron Time-of-Flight (nTOF) Detectors: The NIF neutron time-of-flight (nTOF) diagnostic will measure neutron yield and ion temperature in all NIF D_2, DT, and THD-filled-capsule implosion experiments. The NIF nTOF diagnostic is designed to measure neutron yields from 1×10^9 to 2×10^{19}. To provide this large dynamic range in neutron yield, the nTOF will consist of several detectors of varying sensitivity located at ~4.5 m and 20 m from the target. The NTOF detectors are of two basic types: scintillator with photomultiplier tube (PMT) assemblies, and chemical-vapor-deposition−(CVD) fabricated diamond detectors (Table 1). Production, testing, and calibration of the NIF nTOF detectors began at LLE in FY08. Neutron calibration of the NIF nTOF detectors was carried out on the OMEGA laser with the same cables, high-voltage power supply, and digital oscilloscopes that were selected for use on the NIF. The nTOF detector calibration uses OMEGA direct-drive implosions with D_2- and DT-filled capsules producing neutron yields in the range of 10^9 to 3×10^{13} neutrons. The "equivalent" NIF 4.5-m detector response is simulated by varying the distance of the detectors from the OMEGA target chamber center (TCC). NIF-equivalent neutron yields up to 3×10^{14} neutrons are produced in this manner. The calibration status of the NIF nTOF detectors located at 4.5 m from TCC is shown in Fig. 1. The calibration of the nTOF detectors designed for the NIF ignition campaign (nTOF6 and nTOF7) will be completed in FY09.

Table I. NIF nTOF detectors. The calibration of the detectors highlighted in yellow is now complete. The calibration of the detectors highlighted in orange will be completed in FY09.

Detector	Distance	Detector	Campaign	Yield
NTOF1	~4.5 m	PMT	D_2, THD	5×10^8 to 1×10^{11}
NTOF2	~4.5 m	PMT	D_2, THD	1×10^9 to 1×10^{12}
NTOF3	~4.5 m	PMT	DT, THD	5×10^{11} to 1×10^{14}
NTOF4	~4.5 m	PD	DT	1×10^{13} to 1×10^{15}
NTOF5	~4.5 m	CVD	DT	1×10^{13} to 5×10^{14}
NTOF6	~20 m	Four-channel scintillator	Ignition	1×10^{13} to 2×10^{19}
NTOF7	~20 m	Four-channel CVD set	Ignition	1×10^{15} to 2×10^{19}

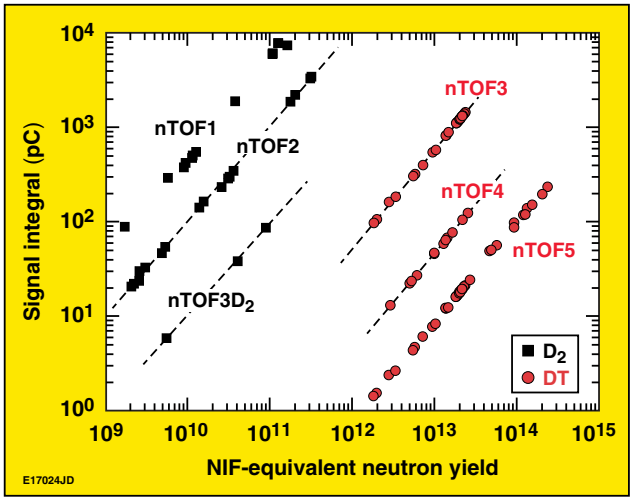

Figure 1. Current status of 4.5-m nTOF calibration on OMEGA.

OMEGA Operations Summary: OMEGA conducted 39 target shots in June with an overall experimental effectiveness of 88.5%. LLE teams led 12 target shots for the IDI NIC and 18 shots for the DDI campaigns, respectively. Four shots were taken for a LANL HED experiment and five shots were dedicated to an LLE-led LBS experiment. The first two weeks of June were dedicated to installing upgrades on OMEGA and performing preventive and corrective maintenance. A new Target Viewing System (TVS) was installed on the OMEGA target chamber, enhancing target-viewing performance and capability. The new TVS features real-time image processing, up to 50-mm field of view, up to 2000 frames/s data collection, cryogenic target-imaging improvements, remote focus capability, and target-detection improvements. The target-positioner controls were upgraded to harden the electronics from EMI. The environmental controls for the laser driver's ancillary laboratories were upgraded to provide better temperature and humidity control. All of the 60 SG4 distributed phase plates were recoated with sol-gel AR coatings. Standard optic replacements and maintenance activities also took place. On OMEGA EP, the first two weeks of June were dedicated to maintenance and facility improvements. Integration of the short-pulse, sidelighter beam path to the OMEGA EP target chamber was completed.

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