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Precision Neutron Time-of-Flight Detectors Provide Insight into NIF Implosion Dynamics¹ DAVID SCHLOSSBERG, M.J. ECKART, G.P. GRIM, E.P. HARTOUNI, R. HATARIK, A.S. MOORE, C.S. WALTZ, Lawrence Livermore Natl Lab — During inertial confinement fusion, higher-order moments of neutron time-of-flight (nToF) spectra can provide essential information for optimizing implosions. The nToF diagnostic suite at the National Ignition Facility (NIF) was recently upgraded to include novel, quartz Cherenkov detectors. These detectors exploit the rapid Cherenkov radiation process, in contrast with conventional scintillator decay times, to provide high temporal-precision measurements that support higher-order moment analyses. Preliminary measurements have been made on the NIF during several implosions and initial results are presented here. Measured line-of-sight asymmetries, for example in ion temperatures, will be discussed. Finally, advanced detector optimization is shown to advance accessible physics, with possibilities for energy discrimination, gamma source identification, and further reduction in quartz response times.

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