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Diagnosing Ignition Failure Modes on the Early NIF Ignition Implosion Campaign S.P. HATCHETT, C.J. CERJAN, S.W. HAAN, Lawrence Livermore National Lab. — The first ignition implosion attempts in the NIF Ignition Campaign are planned for late 2010. A number of non-ignition shots, almost all at less than full energy, will lead up to these, but the number of initial ignition attempts at $>\sim$1 MJ must be very limited — a situation quite unlike previous non-ignition implosion campaigns. We plan for success, ignition, but must have in place a suite of diagnostics capable of revealing the cause(s) of non-ignition. These causes include basic physics uncertainties such as thermal conductivities, hydrodynamic processes that we cannot calculate in full detail, and drive asymmetries that may only be apparent at full laser energy with cryogenic capsules. The capsules are sufficiently small that many possible ultimate causes and combinations of causes can produce modest ($\sim$10%) drops in some figures of merit, such as average fuel ρR, that will cause ignition failure. The diagnostic environment is harsh, the suite of diagnostics is limited, and the number of lines of sight is very limited. We will describe the proposed suite of diagnostics and discuss what we know about the diagnostic signatures of various failure modes. We will describe the implied requirements on sensitivity and dynamic range for the various diagnostics. Finally, we will describe a draft response matrix. *This work was performed under the auspices of the U.S. Department of Energy by the University of California, Lawrence Livermore National Laboratory under Contract No. W-7405-Eng-48.*

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