

Nuclear Diagnostics for ICF and Pulsed Power Systems

Gary Cooper
Chemical and Nuclear Engineering Department
University of New Mexico
Albuquerque, NM 87131

Diagnostics based on nuclear reactions can yield important, often unique information about various physical parameters of inertial confinement fusion (ICF) and pulsed power systems. In ICF systems, for example, the fusion yield, the fusion burn temperature, and the compressed fuel density can be obtained by making various measurements of the fusion neutrons produced using activation and scintillation detectors. Similarly, for particle beams and certain types of plasmas, nuclear diagnostics can yield information with respect to the ion species present, the ion energy (which is often directly related to the applied voltage), and the energy density carried in the beam. The fundamental physical processes occurring in these detectors will be discussed and results from specific applications will be given.

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