

Recent Progress of Inertial Confinement Fusion diagnostics technique and experimental improvement based on Shen Guang III laser facility in China

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Shen Guang III (SGIII) laser facility, developed by laser fusion research center (LFRC), is designed to provide the experimental capabilities to study the inertial confinement fusion (ICF) physics and high energy density physics (HEDP) in China. The disintegrate experiments of inertial confinement fusion physics could be carried out on SGIII laser facility. And the diagnostic systems are still in continuous development.

In this report, we give an overview of diagnosis system in SGIII laser facility, including optical diagnostic system, X-ray spectrum diagnostic system, X-ray imaging diagnostic system, fusion product diagnostic system, general diagnosis and recording system. Recent developments about new diagnostic concepts and techniques, such as three-dimension velocity interferometer system for any reflector (3D-VISAR), air chamber x-ray streak camera (ACXSC), air chamber x-ray frame camera (ACXFC), gated crystal spectrum (GCS), bangtime system with optical stream camera (BT-OSC), neutron time-of-flight (nTOF), rabbit system (RS), are introduced. Some experimental results have been conducted on SGIII laser facility to test the parameters of diagnostic systems or performance of laser system.

Then two typical implosion experiments, which are the low convergence-ratio implosion experiment and implosion tuning experiment with changing the trough length in two steps shaping laser, are demonstrated. The primary experimental results of shock timing in polystyrene (CH) material are analyzed. The improvement methods for implosion tuning and shock timing experiment, can be provided.