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Inferring the time resolved core electron temperature from x-ray emission measured by a streak camera SHAHAB KHAN, PRAVESH PATEL, NOBUHIKO IZUMI, ANDREW G. MACPHEE, TAMMY MA, CHARLIE CERJAN, DAVID K. BRADLEY, Lawrence Livermore National Laboratory —
The electron temperature (T_e) of the hot spot within the core of imploded inertial confinement fusion capsules is an effective indicator of implosion performance. A temporally resolved measurement of T_e helps elucidate the mechanisms for hot spot heating and cooling such as alpha-heating and mix. Additionally, comparison with simulations will aid in tuning models to effectively predict implosion performance. The Streaked Polar Instrumentation for Diagnosing Energetic Radiation (SPIDER) is an x-ray streak camera designed to record the x-ray burn history during the stagnation phase. SPIDER accurately reports bang time and burn duration of implosions on the National Ignition Facility (NIF). The addition of several filters of specific materials and thicknesses spread across the spatial axis of the streak camera imager allows for a least square fit of the signal through these filters to a bremsstrahlung hot spot model. The fitted parameters of the model are the T_e, opacity, and X-ray yield which is valuable for ablator mix estimates. The details of this calculation and results from several shots on NIF are presented.

Shahab F. Khan
Lawrence Livermore National Laboratory

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