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IFE/P6-10: Proton Imaging of Hohlraum Plasma Stagnation in Inertial Confinement Fusion Experiments

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We report the first time-gated proton radiography of the spatial structure and temporal evolution of how the fill gas compresses the wall blow-off, inhibits plasma jet formation, and impedes plasma stagnation in the hohlraum interior. Interpenetration of the two materials occurs due to the classical Rayleigh-Taylor instability as the lighter, decelerating ionized fill gas pushes against the heavier, expanding gold wall blow-off. The important roles of spontaneously generated electric and magnetic fields in the hohlraum dynamics and capsule implosion are demonstrated. The heat flux is shown to rapidly convect the magnetic field due to the Nernst effect. This experiment provides novel physics insight into the effects of fill gas on x-ray-driven implosions, and will have important impact on the ongoing ignition experiments at the National Ignition Facility.

Country or International Organization of Primary Author

USA

Primary author: Mr LI, Chikang (USA)

Co-authors: Dr NIKROO, Abbas (GA); Mr ZYLSTRA, Alex (MIT); Dr MACKINNON, Andy (LLNL); Prof. MEYERHOFER, David (University of Rochester); Dr SÉGUIN, Fredrick (MIT); Mr RINDERKNECHT, Hans (MIT); Dr HUND, Jared (GA); Dr KILKENNY, Joe (GA); Dr FRENJE, Johan (MIT); Dr SOURES, John (University of Rochester); Mr ROSENBERG, Mike (MIT); Dr LANDEN, Otto (LLNL); Dr AMENDT, Peter (LLNL); Prof. BETTI, Riccardo (University of Rochester); Dr PETRASSO, Richard (MIT); Dr TOWN, Richard (LLNL); Dr WILKS, Scott (LLNL)

Presenter: Mr LI, Chikang (USA)

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