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Proton Radiography of Electromagnetic Fields Associated with Imploded ICF capsules and Laser-Irradiated Hohlraums*

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Time-gated, mono-energetic-proton radiography provides unique measurements of electric (E) and magnetic (B) fields in laser-produced plasmas of imploded ICF capsules and in laser-irradiated hohlraums. These experiments resulted in the first observations of several new and important features previously unrealized [1-5]: first, the observation of radial electric fields inside the imploding capsule that are initially directed inward (at $\sim 10^9$V/m), reversing direction ($\sim 10^8$V/m) near deceleration onset, and are likely related to the evolution of the electron pressure gradient; second, the observation of many radial filaments with complex electromagnetic field striations and bifurcations, permeating the entire field of view, and third, the observation of electric fields up to $\sim 10^9$V/m in laser-irradiated gold hohlraums. In addition, these experiments also provide critical information about plasma areal density, both in direct-drive spherical or cone-in-shell targets, during the different times from acceleration, through coasting, deceleration, to final stagnation, thereby providing a comprehensive picture of ICF capsule implosion dynamics. [1] C. K. Li *et al.,* Phys. Rev. Lett. 97, 135003 (2006), [2] C. K. Li *et al.,* Phys. Rev. Lett. 99, 015001 (2007). [3] C. K. Li *et al.,* Phys. Rev. Lett. 99, 055001 (2007). [4] J. R. Rygg *et al.,* Science 319, 1223 (2008). [5] C. K. Li *et al.,* Phys. Rev. Lett. 100 225001 (2008).

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