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ICF Implosions, Space-Charge Electric Fields, and Their Impact on Mix and Compression DANA KNOLL, LUIS CHACON, ANDREI SIMAKOV, LANL — The single-fluid, quasi-neutral, radiation hydrodynamics codes, used to design the NIF targets, predict thermonuclear ignition for the conditions that have been achieved experimentally. A logical conclusion is that the physics model used in these codes is missing one, or more, key phenomena. Two key model-experiment inconsistencies on NIF are: 1) a lower implosion velocity than predicted by the design codes, and 2) transport of pusher material deep into the hot spot. We hypothesize that both of these model-experiment inconsistencies may be a result of a large, space-charge, electric field residing on the distinct interfaces in a NIF target. Large space-charge fields have been experimentally observed in Omega experiments. Given our hypothesis, this presentation will: 1) Develop a more complete physics picture of initiation, sustainment, and dissipation of a current-driven plasma sheath / double-layer at the Fuel-Pusher interface of an ablating plastic shell implosion on Omega, 2) Characterize the mix that can result from a double-layer field at the Fuel-Pusher interface, prior to the onset of fluid instabilities, and 3) Quantify the impact of the double-layer induced surface tension at the Fuel-Pusher interface on the peak observed implosion velocity in Omega.

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