



Wednesday
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3:30 pm
Room 1005 EECS

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Deconstructing Integrated High Energy Density Physics Experiments into Fundamental Models for Validation

While the march towards achieving indirectly driven inertial confinement fusion (ICF) at the National Ignition Facility has made great progress, experiments show that multidimensional effects dominate implosion performance. Low mode implosion symmetry and hydrodynamic instabilities seeded by capsule mounting features are two limiting factors for implosion performance. These factors have a sizeable impact on ICF performance due to the high convergences needed for high fusion gains. Physics models in the codes that are “good enough” at low convergences may not be accurate enough for high convergence ICF implosions. When applying large complex simulations to ICF problems, one may ask “what is the domain of validity for the models that make up the simulations.” A major challenge in high energy density science is code or model validation due to the integrated nature of experiments and the extreme experimental conditions. Designing experiments to isolate and validate models is important, as well as obtaining data to determine the confidence in the models as one moves to parameters where experimental data does not exist. This presentation will discuss the challenges, a framework for validating models, and the extrapolation beyond experimental data.

About the Speaker: Dr. John Kline received a BS at the U. of South Florida in 1995 and a PhD in Plasma Physics from West Virginia U. in 2002, focusing on ion heating in Helicon plasma sources. In 2002, he joined Los Alamos National Lab investigating laser plasma interactions in the context of ICF. Starting in 2008, Dr. Kline became involved in the national ICF program at the National Ignition Facility and later as a campaign leader. He conducted some of the first experiments on NIF after the initial completion of the facility studying hohlraum radiation drive and laser coupling to gas filled hohlraums. He has also been involved experiments covering a wide range of topics in High Energy Density Science (HEDS) including radiation transport, hydrodynamic instabilities, and electron heat transport. Dr. Kline has over 200 publications and is a Fellow of the American Physical Society. Dr. Kline is currently the LANL ICF program manager.