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Using xRage to Model Heat Flow for Experiments to Measure Opacities in HED Plasmas[1] L. ELGIN, R. VANDERVORT, P. KEITER, R.P. DRAKE, University of Michigan, K. MUSSACK, Los Alamos National Laboratory, C. ORBAN, The Ohio State University — We are developing a NIF proposal to measure opacities of C, N and O at temperatures and densities relevant to the base of the solar convection zone. Our proposed experiments would provide the first opacity measurements for these elements within this HED regime. A critical feature of our experimental platform is a super-sonic radiation front propagating within the targets. Under these conditions, density remains constant across the radiation front for a couple nanoseconds, enabling a window during which the opacities of the hot and cold target may be measured simultaneously. Afterwards, hydrodynamic effects create temperature and density gradients, which would obfuscate analysis of opacity data. We are using xRage to simulate heat flow within our targets in order to estimate the time scale over which temperature and density gradients evolve. These simulations will better inform our target design and diagnostic requirements. If successful, our experiments could yield the data necessary to validate existing opacity models or provide physical insights to inform the development of new opacity models. Accurate opacity models are essential to the understanding of radiation transport within HED systems, with applications ranging from astrophysics to ICF.

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Laura Elgin
University of Michigan, Los Alamos National Laboratory

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