

Abstract Submitted
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Spectroscopic diagnostics of NIF ICF implosions using line ratios of Kr dopant in the ignition capsule¹ ARATI DASGUPTA, NICHOLAS OUART, JOHN GIUIANI, ROBERT CLARK, Naval Research Laboratory, MARYLYN SCHNEIDER, HOWARD SCOTT, HUI CHEN, TAMMY MA, Lawrence Livermore National Laboratory — X ray spectroscopy is used on the NIF to diagnose the plasma conditions in the ignition target in indirect drive ICF implosions [1]. A platform is being developed at NIF where small traces of krypton are used as a dopant to the fuel gas for spectroscopic diagnostics using krypton line emissions. The fraction of krypton dopant was varied in the experiments and was selected so as not to perturb the implosion. Our goal is to use X-ray spectroscopy of dopant line ratios produced by the hot core that can provide a precise measurement of electron temperature. Simulations of the krypton spectra using a 1 in 10^4 atomic fraction of krypton in direct-drive exploding pusher with a range of electron temperatures and densities show discrepancies when different atomic models are used. We use our non-LTE atomic model with a detailed fine-structure level atomic structure and collisional-radiative rates to investigate the krypton spectra at the same conditions. Synthetic spectra are generated with a detailed multi-frequency radiation transport scheme from the emission regions of interest to analyze the experimental data with 0.02% Kr concentration and compare and contrast with the existing simulations at LLNL. [1] T. Ma, et al., RSI **87** (2016).

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