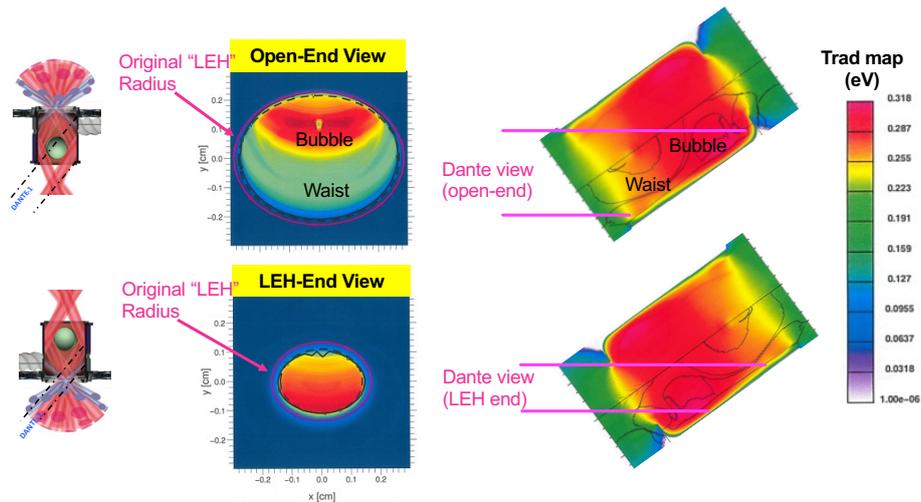


# Evidence of gold NLTE model in the deficiency of NIF ICF hohlraum x-ray drive prediction

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In the indirect-drive inertial confinement fusion (ICF) experiments on the National Ignition Facility (NIF) that have achieved ignition with energy gain of greater than one [1-3], advances in experimental design using hydrodynamic codes [3] have played critical role. To date, a less-than-unity artificial multiplier is often used in the design code, often referred as « drive-deficit », to match the implosion performance of deuterium-tritium fuel capsule [3]. We have performed a set of dedicated experiments using pairs of viewfactor targets [4] to understand the cause for such multiplier. The target and diagnostic setup is shown in Figure 1. The data revealed that the discrepancy between the simulation and data is larger when the measurement focus on the hotter (2-5 keV) region of non-Local thermal equilibrium (NLTE) plasma. Using an opacity multiplier on gold “M-band” emission in the code is shown to produce a much improved match to the measurements for both the radiation drive and the bubble temperature via K-shell dopant spectroscopy data. These experiments conclude that the inaccuracies in the atomic modeling of the NLTE gold plasma is likely responsible for the long standing “drive-deficient” hohlraum modeling [5].



**Figure 1.** A pair of viewfactor targets provide different view of hohlraum internals and the target view of the Dante radiation flux diagnostic. The hohlraum plasma viewing through « LEH-end » is dominated by the NLTE Au bubble.

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