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Recent Advancements on Opacity-on-NIF at Anchor 1: 160eV, 7e21/cm3[1]

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The Opacity-on-NIF campaign is a 5-lab collaboration, complementary to the Opacity-on-Z effort, that works to provide opacity data for Fe and other elements for comparison to theory [1]. The goal is to address the discrepancy between theory and the Opacity-on-Z experiments for temperatures between Te = 170-200eV, Ne = 2-4e22/cm3 [2]. For 160eV and 7e21/cm3 and below, where Opacity-on-Z and theory had better agreement, the first iron transmission data for Opacity-on-NIF has been published [3]. In that context, we will overview the current state of the platform for these conditions, including simulations [4], target fabrication modifications [5], spectrometer updates, and other recent advances needed to reduce platform uncertainties to approach the tight constraints on conditions required for an Opacity measurement on NIF. We will pay additional attention to plasma density determination, providing a comparison between density obtained from imaging the expanding sample through an aperture in the hohlraum wall [3,4,5], and density obtained from Stark broadening analysis of Mg lines, such as was done for Opacity-on-Z [6] using Stark-broadened lineshapes generated by MERL [7]. We will also discuss the plasma temperature determination. 1. T. S. Perry, R. Heeter, F. Opachich et al, HEDP 23, 223-227 (2017) 2. J.E. Bailey, T. Nagayama, G. P. Loisel et al., Nature 517 56-67, (2015) 3. R. F. Heeter, T. Perry, H. Johns, et al Atoms 6, 57, (2018) 4. E.S. Dodd, B. G. DeVolder, M.E. Martin et al, POP 25, 063301 (2018) 5. T. Cardenas, D.W. Schmidt, E. S. Dodd et al, Fusion Sci. Technol. 73, 458 (2018) 6. J. E. Bailey, G. A. Rochau, R. C. Mancini et al, RSI 79, 113104 (2008). 7. R. C. Mancini, D. P. Kilcrease, L. A. Woltz, et al, Computer Physics Communications 63, 314 (1991).

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