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Determination of the Charge State Distributions from X-ray Spectra in Au Plasmas at the OMEGA Laser M. MAY, H.K. CHUNG, S.B. HANSEN, G. BROWN, D.E. HINKEL, M.B. SCHNEIDER, K. WIDMANN, LLNL, C. AUSTRHEIM-SMITH, K. CONE, UC Davis — The determination of the charge state distributions (CSD) of highly ionized Au in Non-LTE high-density plasmas ($\sim 10^{21}$ cm^{-3}) is critical for benchmarking radiation-hydrodynamic physics codes. Predictive calculations of the CSD have produced widely varying results. We present Au CSDs inferred from spectroscopic measurements of reduced-scale hohlraum target experiments at the OMEGA Laser having high electron temperatures (5 - 10 keV). Time integrated spectra were recorded with the Henway crystal spectrometer. Time and spatially resolved spectral measurements were done with a new spectrometer, the MSPEC. The MSPEC can accommodate a variety of crystal configurations, connects to a standard X-ray framing camera, and has a better spectral range and resolution than previous instruments. Measurements of the 5f$\rightarrow$3d transitions in Ni- to Na-like Au and the 3d$\rightarrow$2p transitions in Co- to Ne-like Au were compared to atomic modeling from the Hebrew University Lawrence Livermore Atomic Code and the Flexible Atomic Code to infer the CSD and average ionization state (Z=58.5$\pm$1.3). The experimentally inferred CSDs will be compared with predictions from several available codes. This work was performed by the University of California LLNL under the auspices of the DOE under contract W-7405-ENG-48.

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