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Modeling Non-LTE Oxygen-like Multiplet Dynamics in Intense Laser-produced Xenon Plasmas[1] K.G. WHITNEY, TZ. B. PETROVA, Berkeley Research Inc., J. DAVIS, Plasma Physics Division, Naval Research Laboratory — An often used approximation employed to simplify the problem of modeling the L- and M-shell ionization dynamics of moderate to high atomic number plasmas is to lump the states within each $n\ell$ multiplet of each ionization stage by assuming the multiplet substates are in LTE with respect to one another. In plasmas created by intense laser pulses (10^20 W/cm^{-2}) irradiating a gas of xenon clusters, this assumption breaks down. A diagnostic for this breakdown is the appearance of a strongly amplified x-ray line at 2.9 Å. In this talk, we study the subpopulation dynamics in the O-like ionization stage of Xe where significant amounts of population can be stored in excited states. The non-LTE behavior of the following states is calculated: the ground states, the $\Delta n = 0$, and the $2p^3 3\ell$ or $2p^2 3\ell$ excited states of O-like Xe, and used to determine the impact on lumped state excitation and ionization rates and on the possibility of generating a population inversion between the substates of the n=2 and n=3 states. In particular, the reduction of the lumped state Einstein decay rates of the $n = 3$ states as a function of ion density is calculated.[2]

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[2]K. G. Whitney, et. al., J. Phys. B, **40, 2747 (2007).**

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