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Monte Carlo Mathematical Modeling and Analysis of Optogalvanic Waveforms FOR $1s_5$-$2p_j$ (j = 7,8,9) transitions of Neon in a Hollow Cathode Discharge KAYODE OGUNGBEMI, Howard University, XIANMING HAN, Butler University, PRABHAKAR MISRA, Howard University — The laser optogalvanic (OG) waveforms associated with the $1s_5$ – $2p_j$(j=7,8,9) transitions of neon in a hollow discharge lamp have been investigated as a function of discharge current (2.0 – 19.0 mA). We have refined a mathematical model in determining the amplitudes, decay constants, and time constants associated with these transitions. Monte Carlo least-squares fitting of these waveforms has helped to specifically determine the decay rate constant (a_i), exponential rates (b_i) and time constant (τ) parameters associated with the evolution of the OG signals. In our investigation of the $1s_5$ – $2p_j$(j=7,8,9)optogalvanic transitions of neon, we have measured the intensity of each transition ($3.65*10^{-28}$, $1.43*10^{-27}$ and $5.82*10^{-27}$ cm^{-1}/mole-cm^{-2}, respectively), which in turn has provided insight into the excitation temperature of the plasma (estimated to be 2847±285 K). The population distribution of the excited neon atoms in the pertinent energy levels has also been estimated using the Heisenberg Uncertainty Principle.

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