Relative Distribution of $Au^{48+}\sim Au^{52+}$ in Au Plasma by Ionization Dynamics

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Abstract: The present work proposes a theoretical method called ionization dynamics to derive the ionic charge state distribution. Using relativistic quantum mechanics to calculate the energy level lifetime and average ionic lifetime of each ion, the first-order ionization rate constant can be obtained. Based on these data, from the solution of differential equations for consecutive-irreversible ionization reactions, one will be able to derive the ionic charge state distribution. The calculated average positive charge 49.24 of $Au^{48+}\sim Au^{52+}$ and their relative distribution are in good agreement with the results of Lawrence Livermore National Laboratory.

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