P23

Numerical investigation of ionization dynamics in intense laser-heated argon plasma using the NLTE model

M. S. Cho[1], A. L. Milder[2], W. Rozmus[3], H. P. Le[1], and M. E. Foord[1]

[1]Lawrence Livermore National Laboratory, Livermore CA, USA
[2] Laboratory for Laser Energetics, Rochester NY, USA
[3]University of Alberta, Edmonton AB, Canada

The ionization dynamics of laser-generated plasmas play a crucial role in our understanding of larger macroscopic systems. The non-local thermodynamic equilibrium (NLTE) model stands out as a primary method for evaluation of ionization for given plasma conditions. This model identifies various ionization processes and allows calculation of the distribution of ionization states. Here, the ionization dynamics of underdense argon gas are presented. Time dependent calculations of argon gas ionized by an intense laser ($I=10^{15}$ W/cm^2) to a temperature of 700eV and density of 2.5×10^{19} cm^{-3} show an average ionization state lower then that predicted by steady state calculations. Modelling in this regime also shows ionization is dominated by two-stage processes where electrons are excited to high n-number primarily through collisional excitation and dielectric recombination and then ionized through photoionization.