

Modeling ionization potential depression using an average atom model with a relaxed density of states

J. Bjorgaard, C. Starrett

The ionization energy threshold in hot dense plasmas is affected by the plasma ionization state. This effect has been observed in ionization potential depression measurements carried out at the LCLS X-ray free electron laser facility. It has come to light that well-known density dependent analytic models do not fit these recent experimental results. In order to better model this phenomenon, we have implemented the Δ SCF approach in an average atom model. With a relaxed density of states from a self-consistent field calculation, the effects of local changes in the free electron density around a photoionized atom are included. We validate our results by comparison with experiments and discuss the effects of a relaxed density of states on the average atom electronic structure.

1. Ciricosta, O. *et al.* Measurements of continuum lowering in solid-density plasmas created from elements and compounds. *Nature Communications* **7**, 11713 (2016).
2. Starrett, C. E. Kubo–Greenwood approach to conductivity in dense plasmas with average atom models. *High Energy Density Physics* **19**, 58–64 (2016).