

The role of photoionization in extreme ultraviolet plasma interactions

James A Lolley, and Greg J Tallents

York Plasma Institute, University of York, Heslington, YO10 5DD, UK
jal538@york.ac.uk

In the extreme ultraviolet (EUV) regime, the photon energies are above the threshold for photoionization in all materials. We examine the absorption coefficients for inverse bremsstrahlung and photoionization and the contributions of these processes to EUV absorption under different ionization models. A Saha-Boltzmann ionization model is considered with and without continuum lowering [1], as well as a novel rate equation model including the photoionization transitions in population calculations. Also considered is the use of the collisional-radiative code FLYCHK [2] for ionization determination. We show that photoionization plays a significant role early in EUV ablation of solids, but inverse bremsstrahlung absorption dominates once temperatures in the ablated plasma exceed more than a few electron volts.

- [1] Stewart, J C and Pyatt, K D, "Lowering of ionization potentials in plasmas" *Astrophysical Journal* **144** 1203 (1966)
- [2] Chung, H K *et al.* "FLYCHK: Generalised population kinetics and spectral model for rapid spectroscopic analysis for all elements" *High Energy Density Physics* **1**(1) 3 (2005)