

Line shifts induced by plasma screening in x-ray heated matter

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The electronic structure of ions in dense plasma is influenced by changes in the microscopic electric fields, a phenomenon referred to as plasma screening. In our study, we have experimentally measured plasma screening by observing energy shifts in bound-bound transitions induced by an x-ray free electron laser (XFEL). This was achieved by identifying the specific electronic configurations corresponding to the $K\alpha$, $K\beta$, and $K\gamma$ lines of copper heated to roughly 100 eV. Our findings provide a foundation for refining plasma screening models, incorporating related effects such as ionization potential depression and continuum lowering, thereby enhancing our understanding of atomic physics within the Warm Dense Matter regime.

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