The Radiative Opacity of High Density Plasmas

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Presented are the results of experiments and simulations to determine the opacity of high density (>0.1 g cm^{-3}) iron and aluminium plasmas. The experimental work was facilitated using Ne-like Ge and Ni-like Ag 'x-ray' lasers of 22.1 and 13.9 nm wavelength at the PALS centre in the Czech Republic and the Rutherford Appleton Laboratory in the UK, respectively. A post-processor to the Ehybrid hydrodynamic and atomic physics code along with spectroscopic analysis enabled values to be deduced from transmission measurements for a range of temperature and density. This is an interesting region of the electromagnetic spectrum, as the significance of the transitions to which it corresponds in the astrophysically important iron was initially underestimated considerably. Until now, though, there have been no direct measurements at higher densities for code corroboration. One discrepancy that has actually *increased* in the light of very recently revised solar elemental abundances is that between predicted and observed frequencies of solar acoustic oscillation modes. This is important as the solar interior conditions inferred helioseismologically from these observations using currently accepted opacity values challenge the standard solar model itself.