THE EXTREME UV SPECTRA OF THE DITE TOKAMAK

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The emission spectrum of the Culham Tokamak, DITE, has been photographed between 10 and 300 Å with spatial and, to a limited extent, temporal resolution. The line spectrum throughout this wavelength range has been interpreted in detail. Apart from well known impurity lines of the light elements, O, N and C, and of metallic ions of Fe, Cr and Ni, the emission spectrum of DITE is found to be overwhelmingly due to high-stripped Mo ions, the identity of which is confirmed from comparisons with a laser-produced plasma spectrum of Mo and with ab initio Hartree Fock calculations.

In DITE it has been found that Mo ions with degrees of ionisation ranging from XIV to XXIV and above are present. The Mo spectrum may be broadly divided into two distinct regions. In the first, 65-90 Å, a strong dense band of emission lines is observed. These lines may all be accounted for as 3p → 3d transitions in Mo XVI and higher degrees of ionisation.

The second group of Mo lines, between 54 and about 20 Å comprises broad well-spaced bands of emission. The 3d → 4p bands extend below 35 Å, probably at least as far as Mo XXIV, but are overlapped by other n=3→n = 4 bands, notably 3d → 4f, in lower degrees of ionisation. Inner subshell transitions are shown to be of some importance in accounting for the complexity of the merging bands at around 20 Å.

With the notable exceptions of two very strong lines at 57.93 and 58.84 Å all lines have been interpreted in terms of electric dipole radiation. the 57.93 and 58.84 Å lines are particularly strong at the outside of the

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plasma and are identified as electric quadrupole transitions from the metastable Mo XV $3d^9 4s$ (J = 2) levels to the ground state.

Finally the XUV spectra are used to illustrate the effectiveness of the DITE bundle divertor in reducing the metallic impurities in the plasma and thus in reducing radiation losses.

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