VACUUM ULTRAVIOLET ABSORPTION OF DENSE PLASMAS WITH RESONANCE SERIES OF Be, B, C, N, Mg, Al AND Si

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Abstract. Absorption spectra of light elements were observed in the vacuum ultraviolet with an original technique described in an earlier paper (Mehlman-Balloffet and Esteva, 1969). The method utilizes a two-vacuum spark mounting: one of the sparks is emitting the continuous background, the other one generates the absorbing plasma. Several light element have been successsively introduced in the spark anode. For all of them new autoionizing levels have been observed in Rydberg series of resonances exhibiting the asymmetric 'Beutler-Fano' profile.

In the beryllium and magnesium spectra three new series corresponding to two-electron excitation process have been identified while for boron, carbon, nitrogen, aluminium and silicon the resonances observed correspond to single subshell electron excitation such as: $2s^2 2p\ ^2P^0 \rightarrow 2s2p(^3P^0)np\ ^2D^e$ for the case of boron.

All these series lie in the photoionization continuum of the absorbing atomic species and usually between the first and second ionization limit. This means that they were observed with a normal incidence grating spectrograph in the spectral range 500–1500 Å. In the extreme ultraviolet some other transitions involving inner-shell electron excitation were observed. In the beryllium spectra a series lying between 100 and 110 Å was identified while, the magnesium spectra exhibited only isolated resonances in the 220–265 Å range together with an inner-shell 2p electron photoioniation continuum.

A complete description of experimental results with numerical data is being submitted for publication (Esteva and Mehlman-Balloffet, 1972).

References

Mehlman-Balloffet, G. and Esteva, J.M.: 1969, *Astrophys. J.* **157**, 945.
Esteva, J. M. and Mehlman-Balloffet, G.: 1972, *J. Quant. Spectr. Radiative Transfer*, to be published.

DISCUSSION

W.R.S. Garton: What wavelength ranges have been concerned in your fine atomic absorption spectra?

G. Mehlman-Balloffet: Most of the work was done with a normal incidence grating spectrograph for various element series lying around 600 Å. Only for the inner-shell excitation processes in the case of Be and Mg did we use a grazing incidence instrument to observe respectively the regions around 100 Å and 250 Å.

G. Tondello: Have you been able to see the continuum at the limit of the series for C I?

G. Mehlman-Balloffet: We do see very well the photoionization continuum (with noticeable lowering of the ionization potential) at the end of the atomic discrete absorption series.

G. Tondello: Which configurations correspond to the autoionized lines you observed in C I?

G. Mehlman-Balloffet: In C I the observed lines involve inner sub-shell excitation namely: $-2s^2 2p^2\ ^3P \rightarrow 2s2p^2(^4P)np\ ^3D^0$.

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