

ELECTRON IMPACT EXCITATION OF THE $3p [^2P_{1/2} - ^2P_{3/2}]$ FINE STRUCTURE
TRANSITION IN THE SODIUM ISO-ELECTRONIC SEQUENCE

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The collision between an electron and a sodium-like positive ion has been treated quantum mechanically using the partial wave theory described by Percival and Seaton (1957) and Seaton (1962). Reactance matrix elements corresponding to transitions between the LS-coupled states of the $1s^2 2s^2 2p^6 3p k l$ configurations of a free electron and sodium like ion have been calculated in the Coulomb Born approximation but with neglect of the elastic scattering by the ion core. Results are tabulated for the ions: Mg^+ , Si^{+++} and Fe^{+15} .

The transmission matrix T is obtained from the reactance matrix by the matrix equation

$$T = \frac{-2 i R}{1 - i R}$$

where I is the unit matrix. We have used the weak coupling approximation,

$$T = -2 i R$$

to obtain T matrix elements.

A unitary transformation (Seaton, 1961) has been used to derive T matrix elements corresponding to transitions between jj -coupled states from those matrix elements in the LS-coupling representation.

Using the transformed T matrix elements we have estimated cross sections for the transition $3p [^2P_{1/2} - ^2P_{3/2}]$ in Mg^+ , Si^{+++} and Fe^{+15} .

Instead of cross sections we have tabulated collision strengths which are more symmetrical.

With suitable scaling our collision strengths show a slow variation along the iso-electronic sequence. This we have shown by means of a graph from which it should be possible to estimate collision strengths for other ions in the series.

THE GALACTIC CLUSTER COLLINDER 121

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Photoelectric data have been obtained for 21 stars of the cluster Cr 121, which lie around the red supergiant α^1 CMa.

Color-magnitude and color-color arrays were made.