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 $1s^2\ 2s^2\ 2p^6\ 3p\ kl$ 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 o' CMa.

Color-magnitude and color-color arrays were made.

They both show that there are 11 stars onthe main sequence. The brightest of them is a Wolf-Rayet star, HD 50896, of type WN5. Its absolute magnitude derived from the C-M diagram is M_v= -2.0. According to some authors this star displays variation in the radial velocity of some of the emission lines, which would suggest some binary motion, but this was not confirmed by our photometry.

The red supergiant o' CMa of spectral type K3 Iab belongs to the cluster, and its absolute magnitude is M_v= -5.0, in very good agreement with the value of M_v= -5.2 obtained by Wilson and Bappu (1957) from the K emission line.

The cluster is younger than the Pleiades and one could suggest that perhaps the Wolf - Rayet is in some stage of rapid evolution.

The complete results will be published somewhere else.

OSCULACIONES HIDROMAGNETICAS DE UN PLASMA EN ROTACION

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Se analiza el problema de un fluido altamente conductor en rotación limitado por un campo magnético exterior, mediante el método de las perturbaciones lagrangeanas de las ecuaciones viriales tensoriales.

I. Ecuaciones básicas

Las ecuaciones de movimiento, para un fluído en tales condiciones, en un sistema de referencia rotante (Ledoux) son:

$$(1) \qquad \frac{dv_i}{dt} = -\phi_{,i} - \frac{1}{\rho} P_{,i} - 2\varepsilon_{ijk}\Omega_j v_k - \varepsilon_{ijk}\Omega_j \varepsilon_{k\ell m}\Omega_\ell x_m - \varepsilon_{ijk}\dot{\Omega}_j x_k + \frac{1}{\rho} T_{ik,k}$$

$$\text{con} \quad T_{ik} = \frac{1}{8\pi} H^2 \delta_{ik} - \frac{1}{4\pi} H_i H_k$$

(Índices repetidos implican sumación). Se supone la rotación en el eje x_3 asimismo el campo magnético de intensidad h en el infinito ($H_i = h\delta_{i3}$ $r = \infty$). Se investigan las pulsaciones de simetría axial acorde con el problema, de este modo, debe cumplirse:

$$(2) \qquad 2\varepsilon_{ijk}\Omega_j v_k + \varepsilon_{ijk}\dot{\Omega}_j x_k = 0$$

viene del trabajo anterior

References

O.C. Wilson and M.K. Vainu Bappu, Ap.J., 125. 661 (1957)