Letters to the Editor

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Search for nuclear penetration in the internal conversion process of the 53 keV transition in ^{144}Pr.

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Of the 33, 53 and 133 keV transition depopulating the 133 keV level in ^{144}Pr, 53 keV should have an M_1 hindrance of 7 compared to single particle estimates. Geiger *et al* (1960) from careful cnalysis of L subshell ratios established the multipolarity of this transition as M_1 with less than 0 2%E_2. Since retardation is a common condition for nuclear penetrations we thought of making a search for them However, the K-conversion coefficient for this transition is far from accurately determined The findings of different groups as well as the same group using different techniques differ widely Geiger *et al* (1961) from the combined K 80-γ and K 133-γ results obtained a value for $\alpha_K = 3.7 \pm 1\ 0$, while from the L_1 80-γ coincidence spectrum results they obtained a value of $\alpha_K = 8.6+1.8$ and a still higher value of $\alpha_K = 10 \pm 3$ from their γ 80-γ coincidence measurements Iwashita *et al* (1963) found a value of $\alpha_K = 5.6$.

Mangal & Trehan (1969) from their scintillation spectrometer singles and sum peak coincidence measurements found an α_K value of 9.4 ± 1.0. We thus decided to re-evaluate this conversion coefficient for studying the penetrations. The γ-ray intensities were taken from the work of Potnis *et al* (1970) determined with a solid state detector. The electron intensities from the work of Geiger *et al* (1960) were used

Since for the 53 keV transition only L subshell intensities have been reported we have used the following method for finding the K-shell electron intensity. From the K and L electron intensities for the 133 and 80 keV transitions we find that the K/L ratios are 7.2 and 7.4 respectively, for these transitions with errors of about 5 and 10 percent. We took the theoretical (Hager & Seltzer 1968) K/L ratio of 7.2 for the 53 keV transition energy and M_1 multipolarity and from the L shell intensity after Geiger *et al* (1960) arrived at the K shell intensity for this transition as 14.8 ± 2.2. Using the theoretical conversion coefficient for the 133 keV pure M_1 transition from the work of Hager & Seltzer (1968) as $\alpha_K = 0.495$, the conversion coefficient for 53keV transition turns out to be $\alpha_K = 6\ 8 \pm 1.6$. Hager & Seltzer (1969) give the following relation for the lowest order magnetic conversion involving penetrations .

$$\beta^K_{M_1}(\lambda) = \beta^K_{M_1}(\lambda = 1)(1+B_1\lambda+B_2\lambda^2)$$

where $\beta^K_{M_1}(\lambda = 1)$ is the conversion coefficient without penetrations B_1 and B_2 are penetration coefficients for magnetic multipole conversion coefficients and λ is the penetration factor defined as ratio of penetration matrix element to the gamma ray matrix element. Taking the values of the quantities $\beta^K_{M_1}(\lambda = 1)$, B_1 and B_2 from the work of Hager & Seltzer (1968, 1969) and giving different values to λ we plot a graph between $\beta^K_{M_1}(\lambda)$ and λ.

From the graph corresponding to our value of the conversion coefficient determined above we find λ essentially equal to unity. Thus the conversion process is taking place without any dynamic nuclear effects present in it. This is confirmed from the study of the L_1 and L_2 conversion coefficients as well.

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Binding energy of hyper nuclei from K⁻—capture

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Experimental determinations of binding energies of hypernuclei have been made during the last decade. Yet there are reports of some observed uncertainties in the binding energies of hypernuclei. Thus it seems desirable to find the binding energies of hypernuclei just to increase the statistics and sharpen the mean values

In this note a study is made of mesic decays of hyperfragments produced by K^--reaction at rest in an emulsion which yields data on the binding energies of $Li^7{}_\Lambda$ and $B^{10}{}_\Lambda$. The average binding energies of $Li^7{}_\Lambda$ and $B^{10}{}_\Lambda$ was found to be 5 92 MeV and 8.90 MeV which agree with the binding energies summarized by Levisetti & Slater (1963), Slater (1959), and Gilbert (1956) as 5 5 MeV and 8 MeV.

During a systematic scanning of an emulsion plate $4.3' \times 4.3' \times 400\mu$ thick exposed to K^--particle beam, with momenta 800 MeV/c at the CERN Proton