Microscopic calculations of Λ single-particle energies

ABSTRACT

A binding energy data for total baryon number A Ò208 and for ş angular momenta ăş Ò3 are analyzed in terms of phenomenological (but generally consistent with meson-exchange) ş N and ş NN potentials. The Fermi hypernetted chain technique is used to calculate the expectation values for the ş binding to nuclear matter. Accurate effective ş N and ş NN potentials are obtained which are folded with the core-nucleus nucleon densities to calculate the ş single-particle potential Uş (r). We use a dispersive ANN potential but also include an explicit ȷ dependence to allow for reduced repulsion in the surface, and the best fits have a large ȷ dependence giving consistency with the variational Monte Carlo calculations for 5ş He. The exchange fraction of the ş N space-exchange potential is found to be 0.2-0.3 corresponding to m*ş ≃ (0.74 - 0.82)mş . Charge-symmetry breaking is found to be significant for heavy hypernuclei with a large neutron excess, with a strength consistent with that obtained from the A = 4 hypernuclei.

Keyword: ş single-particle energies; Microscopic calculations