# Λ single particle energies

ABSTRACT

The ş single-particle energies Bş of hypernuclei (HN) are calculated microscopically using the Fermi hypernetted chain method to obtain for our ş N and ş NN potentials the ş binding D(ȷ) to nuclear matter, and the effective mass m*ş (ȷ) at densities PÒȷ0 (ȷ0 is normal nuclear density), and also the corresponding effective ş N and ş NN potentials. The ş core-nucleus potential Uş (r) is obtained by suitably folding these into the core density. The Schrödinger equation for Uş and m*ş is solved for Bş . The fringing field (FF) due to the finite range of the effective potentials is theoretically required. We use a dispersive ş NN potential but also include a phenomenological ȷ dependence allowing for less repulsion for ȷ<<ȷ0, i.e., in the surface. The best fits to the data with a FF give a large ȷ dependence, equivalent to an A dependent strength consistent with variational calculations of 5ş He, indicating an effective ş NN dispersive potential increasingly repulsive with A whose likely interpretation is in terms of dispersive plus two-pion-exchange ş NN potentials. The well depth is 29±1 MeV. The ş N space-exchange fraction corresponds to m*ş (ȷ)å0.75-0.80 and a ratio of ȷ-to s-state potentials of å0.5±0.1. Charge symmetry breaking (CSB) is significant for heavy HN with a large neutron excess; with a FF the strength agrees with that obtained from the A = 4 HN. The fits without FF are excellent but inconsistent with the requirement for a FF, with 5ş He, and also with the CSB sign for A = 4.

**Keyword:** ş single-particle energies