

Homework 5, due 10-23

The figure shows energy levels in a Woods-Saxon potential. Concentrate on the right side of the figure which shows the results in the presence of a spin-orbit interaction.

1. Give the expected shell model spin and parity assignments for the ground state of (a) ${}^7\text{Li}$, (b) ${}^{11}\text{B}$, (c) ${}^{15}\text{C}$, (d) ${}^{17}\text{F}$, (e) ${}^{31}\text{P}$, (f) ${}^{141}\text{Pr}$.
2. The low-lying levels of ${}^{13}\text{C}$ are the ground state with $J^\pi = \frac{1}{2}^-$, a $\frac{1}{2}^+$ state at 3.09 MeV, a $\frac{3}{2}^-$ state at 3.68 MeV, and a $\frac{5}{2}^+$ state at 3.85 MeV. All other states are more than 7 MeV above the ground state. Try to give a shell model interpretation of these states.