Homework 9, due 11-16

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}Li, (b) ^{11}B, (c) ^{15}C, (d) ^{17}F, (e) ^{31}P, (f) ^{141}Pr.

2. The low-lying levels of ^{13}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.