QUANTUM MECHANICS I

PHYS 516

Problem Set # 5
Distributed: February 29, 2012
Due: March 6, 2012

1. Write down the electronic ground state configuration of C (6), Si (14), and Ge (32).

2. Write down the nuclear ground state configuration of $^{99}_{42}Mo$, $^{99}_{43}Tc$, and $^{99}_{44}Ru$. For each, what is the spin of the nuclear ground state?

	(2010)	(1970)
Δ^{++}	1231.2 ± 0.6	1231 ± 10
Δ^{+}	1233.0 ± 1.5	1233 ± 10
Δ^{0}	1233.7 ± 0.6	1235 ± 10
Δ^{-}	1244.1 ± 2.0	1237 ± 10
Σ^{+}	1382.8 ± 0.4	1381 ± 11
Σ^{0}	1383.7 ± 1.0	1385 ± 11
Σ^{-}	1387.2 ± 0.5	1389 ± 11
Ξ^{0}	1531.8 ± 0.3	1530 ± 15
Ξ^{-}	1535.0 ± 0.6	1540 ± 15
Ω^{-}	1672.4 ± 0.3	1670 ± 10

3. Fit a broken $SU(3)$ model ($U(2) \subset SU(3)$) to the 1970 data. Do you accept or reject this model? (In order to sound like a card-carrying statistician you must never say "accept". You must always say "The null hypothesis H_0 is ..... . I reject (or *fail to reject*) the null hypothesis H_0 at such and such confidence level.")

4. Fit a broken $SU(3)$ model ($U(2) \subset SU(3)$) to the 2010 data. Do you "accept" or reject this model?