Lecture 8. Problems.

1. Obtain the possible J^π values for $\nu(d_{5/2})^3$ configuration.

2. Using the coefficients of fractional parentage, construct $|(d_{5/2})^3; J = 9/2^+\rangle$ state of ^{19}O, assuming $(\nu d_{5/2})^3$ configuration for this state.

3. Using the coefficients of fractional parentage, construct $|(f_{7/2})^3; J = 11/2^-\rangle$ state of ^{51}V, assuming $(\pi f_{7/2})^3$ configuration for this state.

4. Using the experimental single-neutron energies and the excitation energies of 2^+ and 4^+ states in ^{18}O, calculate the position of $3/2^+$ state in ^{19}O, assuming $(\nu d_{5/2})^3$ configuration for this state.

5. Using the experimental single-neutron energies and the excitation energies of 2^+, 4^+ and 6^+ states in ^{50}Ti, calculate the position of lowest negative parity states in ^{51}V, assuming $(\pi f_{7/2})^3$ configurations for these states (all possible states within this model space).

6. What J_f^π states in ^{19}Ne are possible to populate with the reaction ^{18}F(d,n), provided that ^{18}F is in its ground state and the transferred proton occupies one of the *sd*-shell orbitals. What are the values of the transferred orbital angular momenta?

7. Calculate the spectroscopic factor for the reaction ^{18}O(d,p)^{19}O leading to the ground state of $J^\pi = \frac{5}{2}^+$ in ^{19}O, assuming the valence particles being in $d_{5/2}$ orbital only.

8. Calculate the spectroscopic factor for the reaction ^{50}Ti(^{3}He,d)^{51}V leading to the ground state of $J^\pi = \frac{7}{2}^-$ in ^{51}V, assuming the valence particles being in $f_{7/2}$ orbital only.