

2021 - PHY 981 - Homework set 14 (due Apr 25)

1. link to lecture notes  
link to nushellx.zip  
link to toi.zip link to mingw-w64.zip
2. Read Chapters 35-36.
3. For  $^{20}\text{Ne}$  in the  $(0d_{5/2}, 1s_{1/2})$  model space the proton OBTD for  $0_1^+$  to  $2_1^+$  are  
0.376 for  $0d_{5/2}$ - $0d_{5/2}$   
0.351 for  $1s_{1/2}$ - $0d_{5/2}$   
0.309 for  $0d_{5/2}$ - $1s_{0/2}$

What is the B(E2) using  $e_p = 1.5$  and  $e_n = 0.5$ ? Use  $\hbar\omega = 14$  MeV.

4. How does the result of the previous problem compare with that obtained in the full  $sd$  model space with the USDB Hamiltonian and  $e_p = 1.5$  and  $e_n = 0.5$ ?
5. How does these results for  $^{20}\text{Ne}$  compare to experiment.
6. Calcualte the gamma-decay scheme for  $^{21}\text{Ne}$  in the  $sd$  model space and the USDB Hamiltonian for  $J=1/2$  to  $9/2$ .
7. How to the calculated lifetimes of the first 5 levels compare to experiment?