

2021 - PHY 981 - Nuclear Structure Physics - Homework set 2

1. We meet Tuesdays and Thursdays 2-3 pm. link to zoom
2. Discussion session on Fridays 2-3 link to zoom
3. Read Chapter 7.
4. Do this before class on Tuesday
 - 1) download the zip file <http://babwww.com/2021-981/nushellx.zip>
 - 2) put the unzipped files on c:\aaa\nushellx.zip
 - 3) copy C:\aaa\nushellx\windows\login\nushellx-command-prompt to the desktop
5. A level of astrophysical interest for the (p,γ) reaction in ^{31}S has a calculated half-life of 1.06 fs. What is the width of this state in eV.
6. The half-life of the 4^+ level at 4.248 MeV in ^{20}Ne is 64 ps. What is the $B(E2, \downarrow)$ for the decay to the 2^+ state? The calculated $B(E4)$ to the 0^+ state is 10 Wu. What is the branching ratio for this E4 decay?
7. ^{42}Ti has a half-life of 209 ms. It beta decays to the ground state of ^{42}Sc with a branching ratio of 47.7 percent. Calculate the $\log ft$ value for this decay, and compare with the nuclear data sheets. What are the $B(F)$ and $B(GT)$ values for this decay?
8. What is the classical turning radius scattering of ^{14}C on ^{223}Ra ?
9. Estimate the alpha-decay half-life of ^{208}Pb and ^{216}Rn . Compare to experiment.