2021 - PHY 981 - Homework set 7 (due Mar 7)

1. **link to lecture notes**
   link to nushellx.zip
   link to toi.zip link to mingw-w64.zip

2. **Read Chapters 15-17.**

3. `Put mingw-w64 in folder \aaa\`

4. **Make a folder in rsh-nushellx called wspot.**
   Put the wspot.for program there.
   Ccmpile the wspot.for program by typing "g wspot"
   Use this folder for the remainder of this homework.

5. **A single-particle "halo" state might be defined as one in which the rms radius of the valence orbit is more than twice that of the core. Make a figure for the rms radius for the $1s_{1/2}$ and $0d_{5/2}$ neutron orbits for a ^{10}Be core as a function of their single-particle energy by varying VN in the *.dai file. What is the minimum value of the single-particle energy for the $1s_{1/2}$ to be a halo state. Use 2.5 fm the rms radius of ^{10}Be.**

6. **Use wspot to calculate the single-particle neutron decay width of the ^{25}O ground state, by constraining the neutron decay Q value to its experimental value. Compare to the experimental data in Y. Kondo et al., Phys. Rev. Lett. 116, 102503 (2016).**

7. **Use wspot to calculate the single-particle decay width for the $1/2^+$ state at 0.745 MeV in ^{19}Na. Assume that the state is described by one proton added to the ground state of ^{18}Ne. Compare to experiment.**