

PAN - 2017 - problems based on nuclear Energy Density Functional theory

1. Where is the proton drip line for $A=32$ and how does it compare with experiment?
2. Where is the neutron drip line for $A=32$ and how does it compare with experiment?
3. How does the nucleus ^{32}Ar decay?
4. How does the nucleus ^{32}Mg decay?
5. Look at the densities for ^{34}Si . This is called a bubble nucleus for protons because of the hole in the proton density near the center. Why does this happen?
6. The nucleus ^{60}Ca will be studied by FRIB. Do you expect this to be a magic nucleus for protons? for neutrons?
7. Make a plot of the neutron skin vs number of neutrons for $^{12,14,16,18,20,22}\text{C}$. The relatively large increase for ^{22}C is due to the large radius of the loosely bound $2s_{1/2}$ state. This is called a halo state.
8. What is the predicted total angular momentum for the ground state of ^{49}Ca ? How does it compare with experiment?
9. What is the predicted total angular momentum for the ground state of ^{79}Ni ? This will be measured with FRIB.