ECT Talent School 2017

Question set 1 to be discussed by the groups on Friday July 7th.

```
This homework makes use of:
1) https://people.nscl.msu.edu/~brown/chart/chart-levels.html
2) \nushellx\toi\mass-data\aud16.dat     binding enegies from 2016 mass compilation
3) \nushellx\toi\mass-data\rms13.dat     rms charge radii from 2013 compilation
4) toiee.dat    all energies and J-pi for even-even nuclei from 2016 NNDS (52,000)
```

1. Use aud16.dat find all known nuclei that are unbound to two-proton decay but bound to one-proton decay.

2. Use the liquid-drop model to obtain the neutron drip line for Z=36-44. Compare to the HFB-27 model and comment on the reasons for the difference.

3. Use rms13.dat to obtained the differences in charge radii for N and N-1 and make a plot vs neutron number N. Comment on the result. This is known as the Brix-Kopferman plot.

4. Use toiee.dat to make a plot of the ratio of the 8^+ to 6^+ energies for yrast states. Comment on your results.

5. Calculate the ^{14}C decay Q value of ^{223}Ra. Use this to estimate the half-life and compare to experiment. What is the branching ratio for the ^{14}C decay?