Global properties of atomic nuclei

RET Project

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Introductory material:

- https://people.nscl.msu.edu/~witek/Classes/PHY802/NuclPhys802-2018.html
  Slides: Introduction, Properties of nuclei, Fission, Nuclear shells
- K. Jones and W. Nazarewicz, “Designer Nuclei – Making Atoms that Barely Exist”, *The Physics Teacher* 48, 381 (2010).

Project 1: Assuming the nucleus of mass number *A* to be a spherical object with a sharp surface and constant nucleonic density ρ_0= 0.16 nucleons/fm^3, find the relation between nuclear radius and *A.*

Test the performance of the resulting expression by comparing with experimental data for charge radii:
http://www.sciencedirect.com/science/article/pii/S0092640X12000265
Assume that the radius of the mass distribution is the same as the radius of the charge distribution. Note that this reference discusses root-mean-square (rms) nuclear charge radii not geometric radii.

Compare experimental data with theoretical SV-min and UNEDF1 DFT predictions on Massexplorer http://massexplorer.frib.msu.edu

Material:

- https://people.nscl.msu.edu/~witek/Classes/PHY802/GlobalProperties-Sizes2018a.pdf
- https://people.nscl.msu.edu/~witek/Classes/PHY802/GlobalProperties-Sizes2018b.pdf