Nuclear Density : The volume (V) of a nucleus is proportional to A. Dividing A (the approximate mass in u) by V, $\rho = \frac{M}{V}$ cancels out A. Thus all nuclei have approximately the same density. This is of crucial importance in nuclear structure.

NB: $\rho_{nuclear} = \frac{A}{V} = 2.84 \cdot 10^{17}\ kg/m^3$ compare with $\rho_{water} = 10^3\ kg/m^3$ ← Normal matter is full of empty space!

Example: Comparing H with U

Uranium has mass number 238 and hydrogen has 1, accordingly their nuclear diameters reflect this $\sqrt[3]{A_U/A_H} \simeq 6.2$ ratio.

Actual values are
$$\left.\begin{array}{l} D\,(H\ \text{nucleus}) = 1.75\ fm \\ D\,(U\ \text{nucleus}) = 15\ fm \end{array}\right\}\ \text{ratio}: 8.57$$

Compare this with their atomic diameters.

$$\left.\begin{array}{l} D\,(H\ \text{atom}) \simeq 2.54\ Å \\ D\,(U\ \text{atom}) \simeq 3.45\ Å \end{array}\right\}\ \text{ratio}: 1.36$$

So, note that even though nuclear diameters are quite different, the two atoms' diameters are very close! This is because of the contrast bet. the behavior of nuclear vs. EM forces. The latter is long range and does not saturate; the 92 protons of U exert a huge Coulomb force on the $\bar{e}$'s, reducing the diameter close to that of H.