Answer on Question #64423, Physics / Atomic and Nuclear Physics

What is approximate density of nuclear matter from which all nuclei are made? Also compare with that water.

Answer:

The volume of the nucleus approximated as a uniform sphere of radius R.

$V = 4/3\ \pi R^2 = 4/3\ \pi\ (R^3_0\ A)$

The density ρ_0 of nuclear matter

$\rho_0 = A / V = A / 4/3\ \pi\ (R^3_0\ A) = 1 / 4/3\ \pi\ (1.2\ fm)^3 = 0.14$ nucleons/ fm^3

The mass of a nucleon is 1.7×10^{-27} kg

The mass density ρ_m of nucleon matter is then

$\rho_m = (0.14$ nucleons/ $fm^3)\ (1.7 \times 10^{-27}$ kg$)\ (1$ fm / 10^{-15} m$)^3 = 2.4 \times 10^{17}$ kg/m^3

2.4×10^{14} times the density of water.